PROJECT MANUAL

SET NO. _____

PROJECT MANUAL
INCLUDING SPECIFICATIONS
FOR GENERAL CONSTRUCTION

OF

Office Of Emergency Management (OEM)
EMERGENCY OPERATION CENTER

Tortugas Trails, Las Cruces, New Mexico 88007

FOR

Dona Ana County
845 N. Motel Blvd.
Las Cruces, NEW MEXICO 88007

100% Submittal
CONSTRUCTION DOCUMENTS

January 3, 2025

ASA PROJECT No: 22115L

ASA ARCHITECTS

PROJECT MANUAL
INCLUDING SPECIFICATIONS
FOR GENERAL CONSTRUCTION

OF

Office Of Emergency Management (OEM)
EMERGENCY OPERATION CENTER

Tortugas Trails, Las Cruces, New Mexico 88007

FOR

Dona Ana County
845 N. Motel Blvd.
Las Cruces, New Mexico 88007

CONTRACT DOCUMENTS

ASA Project No: 22115L

January 3, 2025

ASA ARCHITECTS
201 N. Alameda
Las Cruces, NM 88005
P 575.526.3111
www.asa-architects.com

CONSULTANTS
Civil: Souder, Miller & Associates
Structural: Stubbs Engineering, Inc.
MPE: RAXIS Engineering
Landscape: The Dry Land

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SECTION 000105 - CERTIFICATION PAGE

The technical material and data contained in this Project Manual were prepared under the supervision and direction of the undersigned, whose seal as a Professional Architect, licensed to practice in the State of New Mexico, is affixed below.

_____

Ted E. Shelton Jr., AIA
Registered Architect in the State of New Mexico
License No. 1369
201 North Alameda
Las Cruces, New Mexico 88005
575.526.3111

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END OF SECTION

INVITATION TO BID
DONA ANA COUNTY

Sealed Bids for general construction of "OEM Emergency Operations Center" will be received by the Doña Ana County Purchasing Agent at the Doña Ana Manager's Office, 845 N. Motel Blvd., Las Cruces, New Mexico 88007 until 2:00 p.m. M.T. (Local Time), ~~Tuesday, January 31, 2025,~~ **TBD**. At that time all bids will be publicly opened and read aloud. Any bid received after closing time will be returned unopened.

The Scope of Work includes new facilities to house the Office of Emergency Management (OEM), as well as an emergency operations center, a backup dispatch center, radio communications room, computer server/networking/storage room, classroom, conference rooms, restrooms, showers, lobby and related facilities. Location at NMSU Tortugas Trails, Las Cruces, NM.

Drawings, specifications and contract documents may be examined, without charge, at the Doña Ana County Manager's Office at 845 N. Motel Blvd., Las Cruces, New Mexico 88007 and ASA Architects, 201 North Alameda, Las Cruces, New Mexico, 88005, Phone (575) 526-3111.

Bona fide prime and sub bidders may obtain one (1) set of electronic PDF drawings and specifications from the Architect's office at 201 North Alameda, Las Cruces, New Mexico, 88005, Phone (575) 526-3111. No plan deposit is required.

Bidders are advised that the following is included in the contract:

1. Liquidated damage clause.
2. State Wage Rates and Federal wage rate
3. Public Works and Apprenticeship and Training Act.
4. 5% Preference applicable to qualified New Mexico Contractors.
5. Bid Bond, Performance Bond and Payment Bond shall be required from the Prime Contractor.
6. Contractors and all tiers of subcontractors whose bids are $60,000 or more must be registered with the Labor & Industrial Division of the New Mexico Labor Department.
7. A pre-bid conference will be held for all interested bidders on ~~Friday, January 17, 2025,~~ **TBD** at 11:00 a.m. (Local Time) at Dona Ana Conference room at 845 N. Motel Blvd., Las Cruces, New Mexico 88007

Doña Ana County reserves the right to reject any or all bids and to waive any or all informalities. Bids shall be good for 60 days following the opening of bids and may not be withdrawn without forfeiture of bid bond.

SECTION 003132 - GEOTECHNICAL DATA

PART 1 – GENERAL

1.01 SUMMARY

A. A Geotechnical Engineering Report for this project has been prepared by Geo Test, Inc. dated November 09, 2017.

1. The geotechnical report is provided herein following this page and totals 20 pages including this page.

B. Recommendations for soil preparation prior to the placement of footings, building slabs, concrete sidewalks, mowing strips, paving, and other site flatwork addressed in the geotechnical report shall be followed.

1. Neither the Owner nor the Architect guarantee or attest to the accuracy of the information contained in the report.

2. Should the Contractor question the recommendations of the report or require additional testing, the Contractor is then encouraged to perform additional testing at the expense of the Contractor.

C. Drainage report.

END OF SECTION

[GEOTECHNICAL REPORT FOLLOWS]

COZ Engineering, LLC

GEOTECHNICAL ENGINEERING REPORT

DAC OEM EMERGENCY OPERATIONS CENTER

LAS CRUCES, NEW MEXICO
Project No. 4224063
June 12, 2024

Prepared for:

DONA ANA COUNTY
Las Cruces, New Mexico

Prepared by:

COZ ENGINEERING, LLC
Las Cruces, New Mexico

COZ Engineering, LLC

PO Box 13331
Las Cruces, New Mexico 88013
Cell: 575.642.7671
Email: thecoz42@gmail.com

June 12, 2024

Dona Ana County
845 N Motel Blvd.
Las Cruces, NM 88007

Attn.: Robert Herrera, F&P Director
E: roberthe@donaanacounty.org
P: (575) 993-2659

Re: Geotechnical Engineering Report
DAC OEM Emergency Operations Center
Geothermal Road
Las Cruces, New Mexico
COZ Report No. 4224063

Dear Mr. Herrera:

The following is a geotechnical engineering report for the proposed development in Las Cruces, New Mexico. Recommendations for earthwork, foundations, slabs, pavements and other geotechnical considerations are presented in the report.

Thank you for the opportunity to provide this geotechnical engineering report. If you have any questions or concerns, please contact me at (575)-642-7671.

Sincerely,
COZ Engineering, LLC

Dan Cosper, P.E.

Appendix:

Site Investigation:

A subsurface investigation was performed for the proposed Dona Ana County (DAC) Office of Emergency Management (OEM) Center to be located north of Geothermal Road in Las Cruces, New Mexico. Twelve (12) test borings were advanced within the proposed building footprint and parking areas. The borings were terminated at depths of 5 and 25 feet below ground surface (bgs). The test boring logs and location plan are provided in the appendix of this report.

Site Conditions:

The current site surface is exposed subgrade sparsely to densely vegetated with native grasses and brush. An arroyo (earthen drainage channel) was observed on the property just north of our Boring B-1 and Boring B-3 locations (originating east of the site and continuing through the west site boundary). The exposed sidewalls of the channel contained construction debris consisting of asphalt and concrete. It is possible that this material was purposely placed in the area to reduce erosion of the on-site soils that cover a sewer line generally located along the channel alignment.

Native soils investigated at this site were generally comprised of sand with varying amounts of silt and gravel from the surface to the total explored depths.

The groundwater table was not encountered during the field investigation.

Percolation rate testing was performed at the site for determination of the rate at which water will infiltrate the near-surface soils. The percolation rate test was performed in general accordance with current EIB procedures. The percolation rate test result is presented in the following table:

Test Hole Location	Depth (feet)	Soil Classification	Percolation Rate (min/inch)
Perc-1	3	SP	2

Siltation and vegetation growth along with other factors may affect the percolation rate of the ponding area. The actual percolation rate may vary from the value reported above.

Planned Construction:

Based on the information provided, I understand the project will consist of a single-story main building (20,500 sf), a warehouse (1,500 sf) and a fueling station. A retention pond, retaining walls (4 feet in retained height) and parking/drive areas are associated with the project. Construction type is planned to be steel frame supported by spread and continuous footings with slab-on-grade. Structural loading will be 70 kips maximum column loads and 1.5 klf maximum wall loads. The parking and heavy vehicle pavements are estimated to have traffic loadings of 14,000 ESAL's (light duty areas) and 50,000 ESAL's (heavy-duty areas) for a 20-year design life. I should be notified immediately if the actual traffic loadings are greater than my above assumptions.

Initial Site Grading:

Areas for planned construction should be clear of debris, vegetation and any oversized or deleterious material prior to grading operations. The concrete and asphalt debris identified near the area of Borings B-1 and B-3 should be removed and disposed of offsite. Existing underground utilities (known sewer line) should be properly abandoned or re-routed outside of the proposed building footprint. Fill construction shall not be allowed on surfaces that contain vegetation or rocks larger than four inches in greatest dimension. No fill shall be placed that contains vegetative materials as decomposition of that material can cause voids and possibly result in surface settlement. Voids in the soil matrix created or encountered during grading operations shall be backfilled with approved compacted fill material.

Particular attention should be given to redirection/collection of the precipitation runoff previously gathered by arroyos throughout the site. After the initial site grading and backfilling, the newly directed precipitation runoff volumes should be collected and properly discharged of off the site or into planned retention ponds in order to not adversely affect the new structures, walls or pavement.

Soil Improvements:

Based on the geotechnical engineering analyses and subsurface exploration, it is my opinion that the proposed structures (main building, warehouse, fueling station) can be supported by engineered fill underlain by prepared native subgrade soils. The main building and warehouse could alternatively be supported by drilled shaft foundations. Subgrade preparation (beneath engineered fills and pavements) should consist of

scarifying the exposed subgrade surface a minimum thickness of 10 inches, moisture conditioning (-2% to +2% of optimum moisture content per ASTM D-1557) and compaction to a minimum of 95% of modified Proctor density (per ASTM D-1557).

Fill Material:

Engineered fill material for this project should meet the following gradation criteria:

Sieve	% Passing
4″	100
¾	70-100
#4	50-100
#200	50 max.

The plasticity index of the minus #40 sieve portion should not exceed fifteen (15). The on-site soils tested meet the above specifications.

Compaction Requirements:

The maximum thickness of engineered fill lifts should be 10 inches or less in loose thickness. Engineered fill materials should be compacted to a minimum of 95% of modified Proctor density (ASTM D1557) at a moisture content within –2% to +2% of optimum moisture (ASTM D1557).

Shallow Foundations:

The structures can be supported by a spread and continuous footing foundation system bearing on engineered fill. Design recommendations for foundations are presented in the following table.

Element	Recommendation
Foundation	Spread and Continuous Footings
Bearing Strata	Minimum thickness of **30 inches** of engineered fill underlain by prepared native subgrade soils.
Allowable Bearing Pressure	2,000 psf
Minimum Foundation Dimensions	Columns: 30 inches in width Continuous: 18 inches in width
Ultimate Coefficient of Sliding Friction	0.35
Minimum Foundation Embedment	18 inches
Estimated Settlement	1 inch or less
Estimated Differential Settlement	1/2 inch or less

The design bearing pressure may be increased by one-third when considering total loads that include wind and seismic conditions.

Engineered fill is recommended below new footings. The engineered fill should extend laterally an additional distance of 5 feet beyond the foundation perimeters.

Additional foundation settlements can occur if water from any source infiltrates the foundation soils. Proper drainage should be provided during construction and in the final design.

Deep Foundations:

As an alternative, the main building and warehouse structures can be supported by grade beam and drilled pier foundation systems. The drilled, straight-shaft foundations should be designed by the project structural engineer to resist horizontal and vertical forces. Horizontal forces are resisted by the passive pressure of soil acting on the vertical face of the support column foundations. Vertical downward forces are resisted by the allowable end bearing pressure of the soils at the bottom of the drilled straight-shafts. Vertical uplift forces can be resisted by the weight of the support column and its foundation. When foundation concrete is cast in direct contact with native materials, an allowable side friction value can be used to resist vertical loads.

Design parameters for drilled straight-shaft foundation systems are presented in the table below. The table includes the soil unit weights, allowable end bearing pressures, lateral passive pressures and skin friction values. The capacities within the upper 3 feet of the on-site native soils should be disregarded to account for surface effects and disturbance during foundation installation.

Settlement of the drilled straight-shaft foundations should be about one inch or less.

Depth Below Existing Grade	Unit Weight	Allow. End Bearing	Allow. Skin Friction	Allow. Passive Pressure (FS=2)	Coefficient of Subgrade Reaction	Cohesion	Angle of Internal Friction
ft	pcf	psf	psf	psf/ft	pci	psf	degrees
0-3	105	Ignore					
3-15	110	6,000	300	210	90	--	32
15-25	115	12,000	700	220	250	--	35

The cohesion, friction angle, and lateral subgrade modulus are ultimate values. The end bearing, skin friction, and passive resistance are allowable values with factors of safety of 3 and 2 (passive resistance). Lateral resistance and friction in the upper 3 feet should be disregarded due to the potential effects of frost action, desiccation, and drilling disturbance. The drilled piers must extend to the greater of 5 feet or one pier diameter into the bearing strata to achieve the listed capacity.

The drilled straight-shaft foundations should be installed in accordance with the procedures presented in "Drilled Shafts: Construction Procedures and Design Methods," by Reese, L. C. and O'Neill, M. W., FHA Publication No. FHWA-IF-99-025, 1999 and "Standard Specification for the Construction of Drilled Piers", ACI Publication No. 336.1-01, 2001.

Piers are considered to work in group action if the horizontal spacing is less than six-pier diameters. A minimum horizontal spacing between piers of at least three diameters should be achieved and adjacent piers should bear at the same elevation. The capacity of individual piers should be reduced when considering the effects of group action.

Drilling to design depths should be possible with conventional heavy-duty single flight power augers. Casing will likely be required to properly drill and clean piers. Due to potential sloughing of the native sand soils, foundation concrete quantities may exceed calculated volumes.

Exterior footings (pier caps and grade beams) should be placed a minimum of 18 inches below finished grade to provide confinement for the bearing soils. Finished grade is the lowest adjacent grade for perimeter footings.

Floor Slabs:

Design parameters for floor slab construction are presented below. Attention should be given to provide positive drainage away from the structures.

Element	Recommendation
Bearing Strata	Minimum of **18 inches** of engineered fill underlain by prepared native soils
Modulus of Subgrade Reaction	300 pounds per square inch per inch (psi/in)

Positive separations and/or isolation joints should be provided between slabs and foundations to allow for independent movement.

A vapor retarder should be considered beneath slabs that are planned to be surfaced with moisture sensitive coverings. The slab designer should consult ACI 302 and/or ACI 360 for procedures concerning the use and placement of vapor retarders.

Saw-cut control joints should be placed in the slab to control the extent of cracking and location. Joints or cracks that develop should be sealed immediately.

Lateral Earth Pressures:

Backfill Material	USCS	Phi Angle (degrees)	Cohesion (psf)	Unit Weight (pcf)
Poorly Graded Sand	**SP**	**35**	**--**	**115**

The recommended equivalent fluid pressures for **unrestrained** foundation elements when using on-site poorly graded sand as backfill are presented below:

- Active 30 psf/ft
- Passive 440 psf/ft
- Coefficient of base friction 0.35*

*(reduced to 0.23 when used in conjunction with passive pressure)

Where the design includes **restrained** elements, the following equivalent fluid pressure is recommended:

- At Rest 48 psf/ft

The lateral earth pressures above do not include a factor of safety.

Compaction of fill lifts adjacent to the wall should be accomplished with hand-operated tampers or other lightweight compaction equipment. Over-compaction can cause excessive lateral earth pressures resulting in wall movement.

Design of wall systems should include applicable external loading such as live load

surcharge due to traffic, dead-load surcharge from foundations, and sloping backfill conditions.

Drainage Recommendations:

In areas where sidewalks or paving (concrete or asphalt surfacing) do not immediately adjoin the structures, it is recommended that finished grade immediately surrounding the structures be sloped away a minimum of 5% grade for a distance of ten (10) feet. Runoff water caused by precipitation should be rapidly concentrated and directed away from the structures. Downspouts or roof drains should discharge into splash blocks when the ground surface beneath such features is not protected by concrete flatwork or paving. Water cannot be allowed to pond within ten (10) feet of any structure wall. It is recommended that planters and grass lawns not be placed within 5 feet of perimeter foundation elements. Moisture infiltration may cause unsatisfactory foundation performance.

Seismic Site Classification:

The seismic site classification is based upon the shear wave velocity in accordance with Section 20.4 of the ASCE 7 and the International Building Code (IBC). Based upon the shear wave analysis performed by Geolines, Inc., the Seismic Site Classification is **C ("Very Dense Soil or Soft Rock")**.

Pavements:

Design of parking and drive area pavements for the project has been based on the procedures outlined in the Design of Hot Mix Asphalt Pavements by the National Asphalt Pavement Association (NAPA). Traffic loading has been estimated as 14,000 ESAL's for light duty traffic areas and 50,000 ESAL's for heavy duty traffic areas.

The recommended flexible and rigid pavement sections are presented below:

Traffic Area	Asphalt Concrete Surface	Aggregate Base Course	Portland Cement Concrete	Total
Light Duty Traffic Areas	2	6	--	8
	--	--	5	5
Heavy Duty Traffic Areas	3	6	--	9
	--	--	6	6

Subgrade soils should be scarified a minimum of 10 inches, moisture condition to within -2% to +2 of optimum moisture content and compacted to a minimum of 95% of modified proctor value (ASTM D-1557) prior to base course or concrete placement.

Concrete construction and placement for the parking and drive areas should be in accordance with the New Mexico Department of Transportation (NMDOT) guidelines.

Aggregate base course (NMDOT Section 303-Type I or Type II) should be placed in lifts not exceeding six inches and should be compacted to a minimum of 95% Modified Proctor Density (ASTM D-1557).

Asphaltic concrete mix designs should be submitted prior to construction to verify their adequacy. Acceptable mix designs for the project should adhere to the requirements of NMDOT SP-IV. Asphalt material should be placed in maximum 3-inch lifts and should be compacted to a minimum of 93% Maximum Theoretical Density (AASHTO T-209).

Recommendations for pavement construction presented depend upon compliance with recommended material specifications. Observation and testing should be performed under the direction of a geotechnical engineer.

Pavement design methods are intended to provide structural sections with adequate thickness over a particular subgrade such that wheel loads are reduced to a level the subgrade can support. The support characteristics of the subgrade for pavement design do not account for settlement induced movements of subgrade such as the soils encountered on this project. Thus, the pavement may be adequate from a structural standpoint, yet still experience deformation due to settlement related movement of the subgrade. It is, therefore, important to minimize moisture changes in the subgrade to reduce settlement.

Minimizing subgrade saturation is an important factor in maintaining subgrade strength and stability. Some distress of pavements is possible due to the subgrade soils. Water allowed to pond on or adjacent to pavements could saturate the subgrade and cause premature pavement deterioration. The pavement should be sloped to provide rapid surface drainage, and positive surface drainage should be maintained away from the edge of the paved areas.

Periodic maintenance should be planned and provided throughout the life of the pavement. Maintenance consists of localized (crack and joint sealing and patching) and global (surface sealing). Even with maintenance, movements and cracking may still occur and repairs may be required.

It is recommended that reinforced concrete pads be provided in front of and beneath trash receptacles. The dumpster trucks should be parked on the rigid concrete pavement when the trash receptacles are lifted. The concrete pads at and adjacent to trash enclosures should be a minimum of 6 inches thick and properly reinforced.

Corrosion:

Based on soluble sulfate testing (55 mg/kg), ASTM Type I/II Portland cement can be suitable for concrete on and below grade for this project. On-site soils tested have a pH value of 6.92 and minimum resistivity of 2,660 ohm-centimeters. The pH and minimum resistivity values should be used to determine potential corrosive characteristics of the on-site soils.

Testing and Inspection:

It is recommended that all site grading and fill operations be inspected by a geotechnical engineer. The inspecting engineer should be responsible for immediately reporting any site or soil conditions that vary significantly from this report.

The testing of materials should be made at the following:

Soils:

1) One (1) soil density every 2,500 feet of pad area but a minimum of two (2) per compacted lift of material (ASTM D-1556, ASTM D-2167, or ASTM D-2922, ASTM D-3017).

2) One (1) soil density every three (3) isolated spread footings per lift or every 100 lineal feet of prepared continuous footing trench per lift of compacted material (ASTM designations as above).

3) One (1) sieve analysis and plasticity index per material used according to ASTM D-422 and ASTM D-4318.

4) One (1) proctor per each type of material used according to ASTM D-1557.

Concrete:

1) One (1) set of concrete cylinders with field testing per 50 cubic yards or day's placement if less than 50 yards, to include: sampling, temperature, slump test, air entrainment test, preparation of 4 cylinders, retrieving cylinders, lab curing and breaking and reporting the cylinders 1@7 days and 2 @ 28 days and 1@56 days (if needed) (ASTM C-31, 39, 172 and 1064)

Report Limitations:

The conclusions, recommendations and opinions presented herein are:

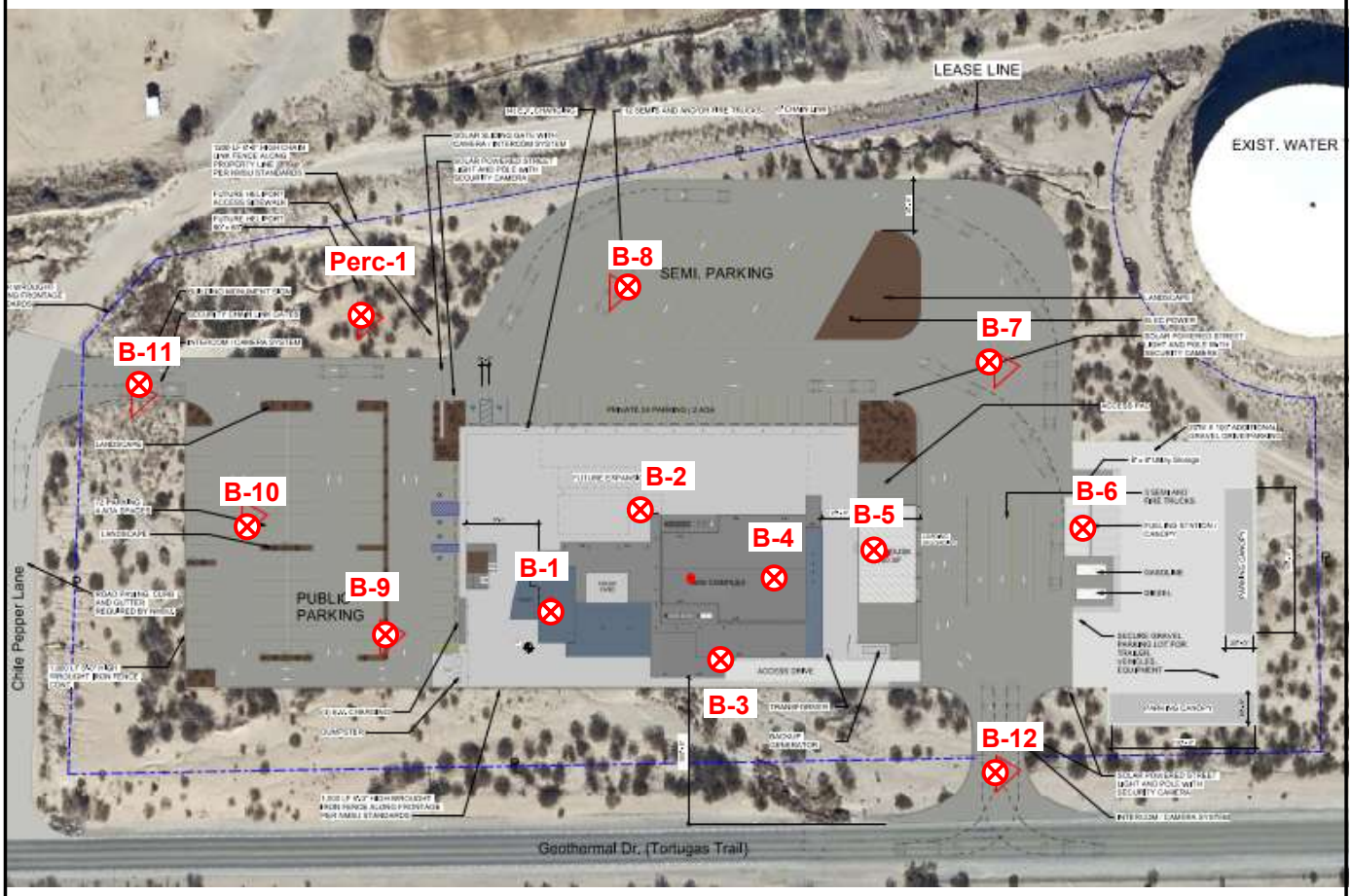
1) Based upon evaluation and interpretation of the findings of the field and laboratory program.

2) Based upon an interpolation of soil conditions between and beyond the explorations.

3) Subject to confirmation of the conditions encountered during construction.

4) Based upon the assumption that sufficient observation and testing will be provided during construction.

There is no other warranty, either express or implied. Any person using this report for bidding or construction purposes should perform such independent investigation as he deems necessary to satisfy himself as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project. If conditions are encountered during construction that appear to differ from those indicated in this report, I should be notified immediately.



N

⊗ Approximate Boring Location

Project Manager: DC Drawn by: DC Checked by: DC Approved by: DC	Project No. 4224063 Scale: AS SHOWN File Name: Figures Date: 6-9-24	COZ Engineering, LLC PO Box 13331 Las Cruces, NM 88013	BORING LOCATION PLAN DAC OEM Emergency Operation Center Geothermal Road Las Cruces, NM	Exhibit 1

Project: **DAC OEM Emergency Operation Center** Project Location: **Geothermal Road, Las Cruces, NM** Project Number: **4224063**	Log of Boring B-1 **Sheet 1 of 1**

Date(s) Drilled **5-15-24**	Logged By **COZ**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **26.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **see boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SP		POORLY GRADED SAND: light brown, dry, medium dense, trace gravel				
			1	11\11\12							
	5		2	6\6\7				1.2	4.9		NP
	10		3	6\8\11	SM		SILTY SAND: light brown, dry, medium dense				
	15		4	17\20\19			dense				
	20		5	10\18\25	SP		POORLY GRADED SAND: light brown, dry, dense				
	25		6	13\19\24							
	30						Bottom of Boring				

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Project: **DAC OEM Emergency Operation Center** Project Location: **Geothermal Road, Las Cruces, NM** Project Number: **4224063**	Log of Boring B-2 **Sheet 1 of 1**

Date(s) Drilled **5-15-24**	Logged By **COZ**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **26.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **see boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SP		POORLY GRADED SAND: light brown, dry, medium dense				
			1	7\5\6				0.8	3.1		NP
	5		2	4\6\7							
	10		3	11\16\18			dense				
	15		4	10\12\18							
	20		5	20\24\26			very dense				
	25		6	17\21\20			dense				
							Bottom of Boring				
	30										

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Project: **DAC OEM Emergency Operation Center** Project Location: **Geothermal Road, Las Cruces, NM** Project Number: **4224063**	Log of Boring B-3 **Sheet 1 of 1**

Date(s) Drilled **5-15-24**	Logged By **COZ**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **26.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **see boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: light brown, dry, dense				
			1	17\20\22							
	5		2	5\7\6	SP		POORLY GRADED SAND: light brown, dry, medium dense				
	10		3	6\6\8				0.7	4.8		NP
	15		4	8\10\13							
	20		5	9\17\23			dense				
	25		6	10\21\17							
	30						Bottom of Boring				

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Project: **DAC OEM Emergency Operation Center** Project Location: **Geothermal Road, Las Cruces, NM** Project Number: **4224063**	Log of Boring B-4 **Sheet 1 of 1**

Date(s) Drilled **5-15-24**	Logged By **COZ**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **26.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **see boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: light brown, dry, medium dense				
			1	5\6\8				2.1	15.1		NP
	5		2	4\6\7	SP		POORLY GRADED SAND: light brown, dry, medium dense				
	10		3	6\9\11				1.0	2.4		NP
	15		4	8\24\24			dense				
	20		5	21\39\50			very dense				
	25		6	8\30\33							
	30						Bottom of Boring				

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Project: **DAC OEM Emergency Operation Center** Project Location: **Geothermal Road, Las Cruces, NM** Project Number: **4224063**	Log of Boring B-5 **Sheet 1 of 1**

Date(s) Drilled **5-15-24**	Logged By **COZ**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **26.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **see boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: light brown, dry, medium dense				
			1	7\7\8							
	5		2	4\5\16	SP		POORLY GRADED SAND: light brown, dry, medium dense	0.8	3.1		NP
	10		3	7\11\12							
	15		4	7\13\34			dense				
	20		5	11\24\25							
	25		6	8\20\17							
	30						Bottom of Boring				

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Project: **DAC OEM Emergency Operation Center** Project Location: **Geothermal Road, Las Cruces, NM** Project Number: **4224063**	Log of Boring B-6 **Sheet 1 of 1**

Date(s) Drilled **5-15-24**	Logged By **COZ**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **26.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **see boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: light brown, dry, medium dense				
			1	5\7\8							
	5				SP		POORLY GRADED SAND: light brown, dry, medium dense				
			2	6\6\10							
	10						dense				
			3	15\15\17							
	15										
			4	12\15\15							
	20										
			5	14\21\23							
	25										
			6	9\14\21							
	30						Bottom of Boring				

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Project: **DAC OEM Emergency Operation Center** Project Location: **Geothermal Road, Las Cruces, NM** Project Number: **4224063**	Log of Boring B-7 **Sheet 1 of 1**

Date(s) Drilled **5-15-24**	Logged By **COZ**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **Grab**	Hammer Data
Borehole Backfill **cuttings**	Location **see boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SP		POORLY GRADED SAND: light brown, dry				
			1					0.8	4.5		NP
	5						Bottom of Boring				
	10										
	15										
	20										
	25										
	30										

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Project: **DAC OEM Emergency Operation Center** Project Location: **Geothermal Road, Las Cruces, NM** Project Number: **4224063**	Log of Boring B-8 **Sheet 1 of 1**

Date(s) Drilled **5-15-24**	Logged By **COZ**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s)	Hammer Data
Borehole Backfill **cuttings**	Location **see boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SP		POORLY GRADED SAND: light brown, dry				
	5						Bottom of Boring				
	10										
	15										
	20										
	25										
	30										

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Project: **DAC OEM Emergency Operation Center** Project Location: **Geothermal Road, Las Cruces, NM** Project Number: **4224063**	Log of Boring B-9 **Sheet 1 of 1**

Date(s) Drilled **5-15-24**	Logged By **COZ**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s)	Hammer Data
Borehole Backfill **cuttings**	Location **see boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SP		POORLY GRADED SAND: light brown, dry				
			1					1.1	4.9		NP
	5						Bottom of Boring				
	10										
	15										
	20										
	25										
	30										

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Project: **DAC OEM Emergency Operation Center** Project Location: **Geothermal Road, Las Cruces, NM** Project Number: **4224063**	Log of Boring B-10 **Sheet 1 of 1**

Date(s) Drilled **5-15-24**	Logged By **COZ**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s)	Hammer Data
Borehole Backfill **cuttings**	Location **see boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: light brown, dry				
	5						Bottom of Boring				
	10										
	15										
	20										
	25										
	30										

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Project: **DAC OEM Emergency Operation Center** Project Location: **Geothermal Road, Las Cruces, NM** Project Number: **4224063**	Log of Boring B-11 **Sheet 1 of 1**

Date(s) Drilled **5-15-24**	Logged By **COZ**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s)	Hammer Data
Borehole Backfill **cuttings**	Location **see boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: light brown, dry				
			1					1.7	18.6		NP
	5						Bottom of Boring				
	10										
	15										
	20										
	25										
	30										

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Project: **DAC OEM Emergency Operation Center** Project Location: **Geothermal Road, Las Cruces, NM** Project Number: **4224063**	Log of Boring B-12 **Sheet 1 of 1**

Date(s) Drilled **5-15-24**	Logged By **COZ**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s)	Hammer Data
Borehole Backfill **cuttings**	Location **see boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SP		POORLY GRADED SAND: light brown, dry				
	5						Bottom of Boring				
	10										
	15										
	20										
	25										
	30										

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Project: **DAC OEM Emergency Operation Center**
Project Location: **Geothermal Road, Las Cruces, NM**
Project Number: **4224063**

Key to Log of Boring

Sheet 1 of 1

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
1	2	3	4	5	6	7	8	9	10	11	12

COLUMN DESCRIPTIONS

1. Elevation (feet): Elevation (MSL, feet).
2. Depth (feet): Depth in feet below the ground surface.
3. Sample Type: Type of soil sample collected at the depth interval shown.
4. Sample Number: Sample identification number.
5. Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
6. Material Type: Type of material encountered.
7. Graphic Log: Graphic depiction of the subsurface material encountered.
8. MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
9. Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
10. Percent Fines: The percent fines (soil passing the No. 200 Sieve) in the sample. WA indicates a Wash Sieve, SA indicates a Sieve Analysis.
11. LL, %: Liquid Limit, expressed as a water content.
12. PI, %: Plasticity Index, expressed as a water content.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

Silty SAND (SM)

Poorly graded SAND (SP)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

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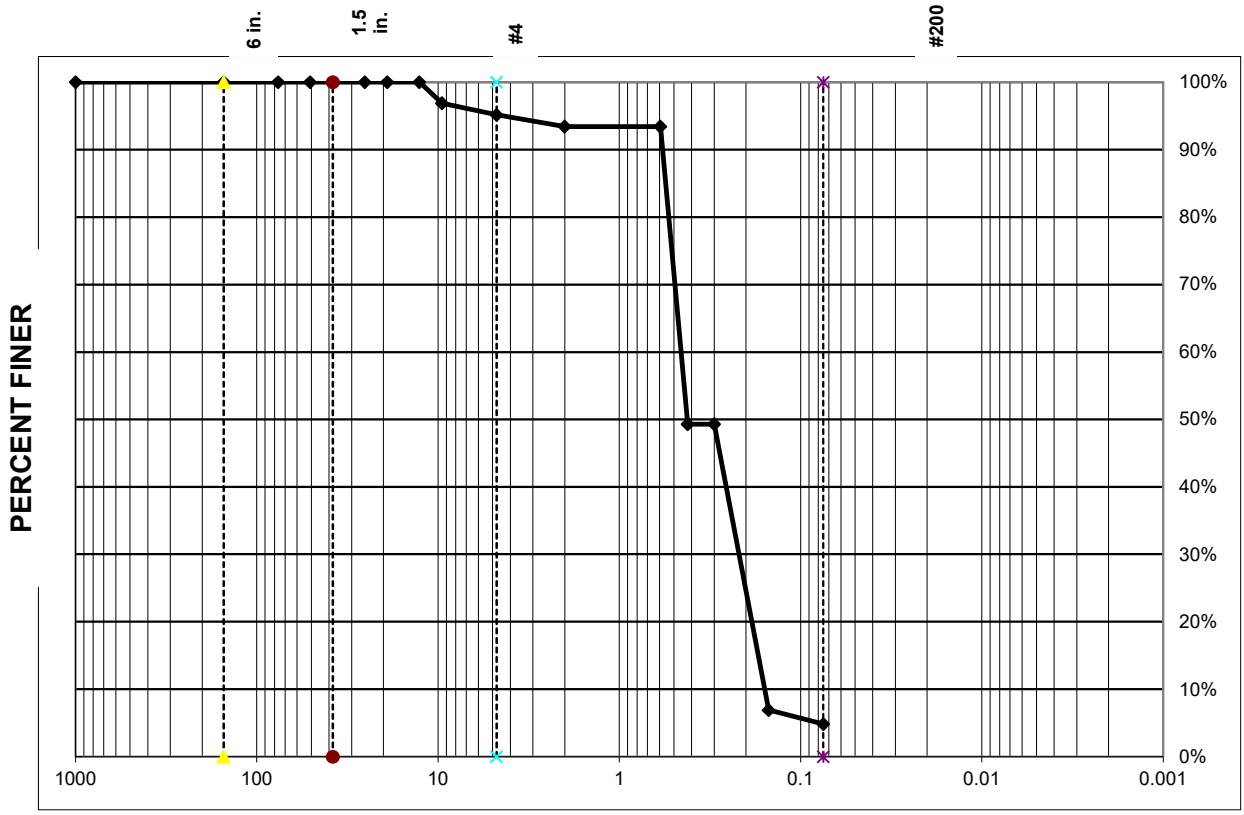
Figure B-1

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	97%	95%	93%	49%	7%	4.9%
Specification								

% GRAVEL =	5%	D_{85} = 0.6	D_{15} = 0.2
% SAND =	90%	D_{60} = 0.5	D_{10} = 0.2
% SILT & CLAY =	5%	D_{50} = 0.4	C_U = 2.9
		D_{30} = 0.2	C_C = 0.7

Sample Date: 5/15/24
Project No.: 4224063
Project Name: DAC OEM Emergency Operations Center
Report Date: 6/7/24
Sample Location: B-1 at 5'
Liquid Limit: **Plasticity Index:** NP
USCS Classification: SP
Material Description: Poorly Graded Sand
Moisture Content: 1.2%

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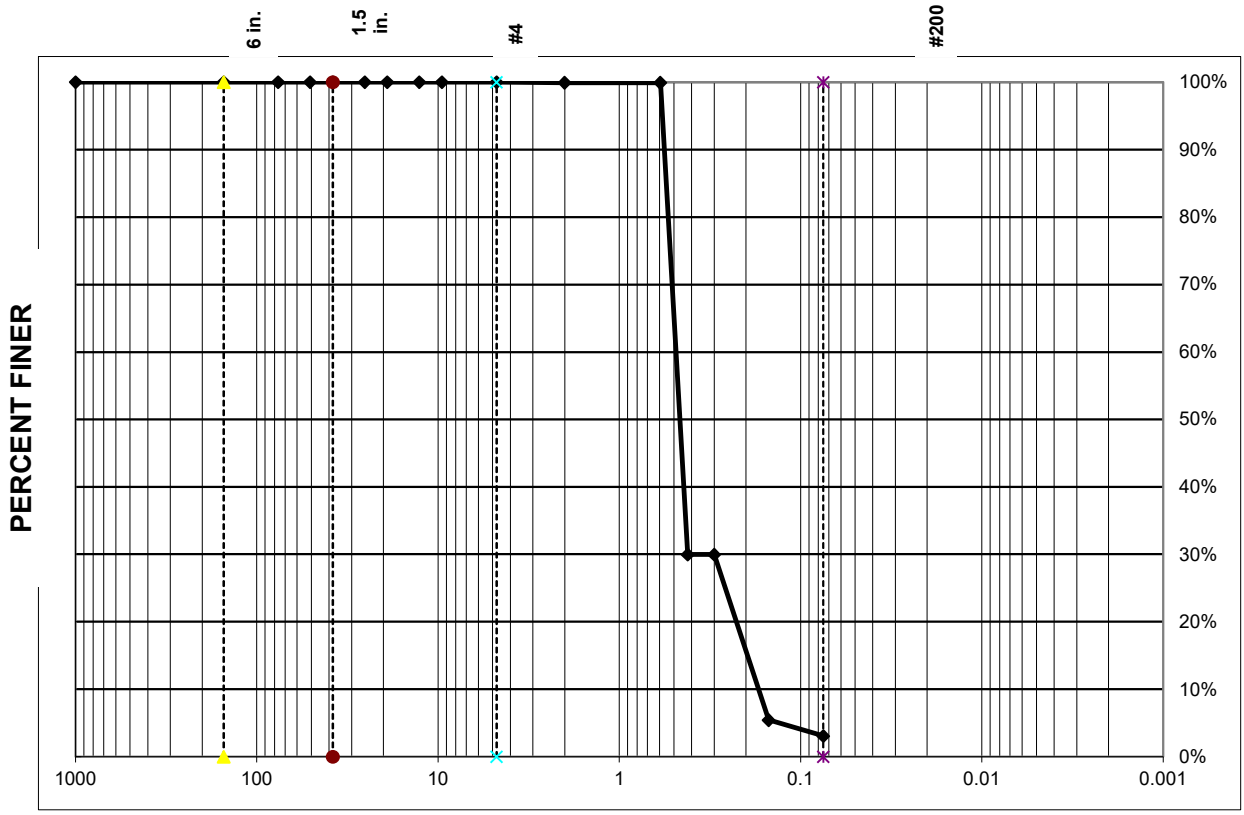
GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	100%	100%	100%	30%	5%	3.1%
Specification								

% GRAVEL =	0%	**D_{85} =** 0.6	**D_{15} =** 0.2
% SAND =	97%	**D_{60} =** 0.5	**D_{10} =** 0.2
% SILT & CLAY =	3%	**D_{50} =** 0.5	**C_U =** 2.9
		D_{30} = 0.4	**C_C =** 2.1

Sample Date: 5/15/24
Project No.: 4224063
Project Name: DAC OEM Emergency Operations Center
Report Date: 6/7/24
Sample Location: B-2 at 2.5'
Liquid Limit: **Plasticity Index:** NP
USCS Classification: SP
Material Description: Poorly Graded Sand
Moisture Content: 0.8%

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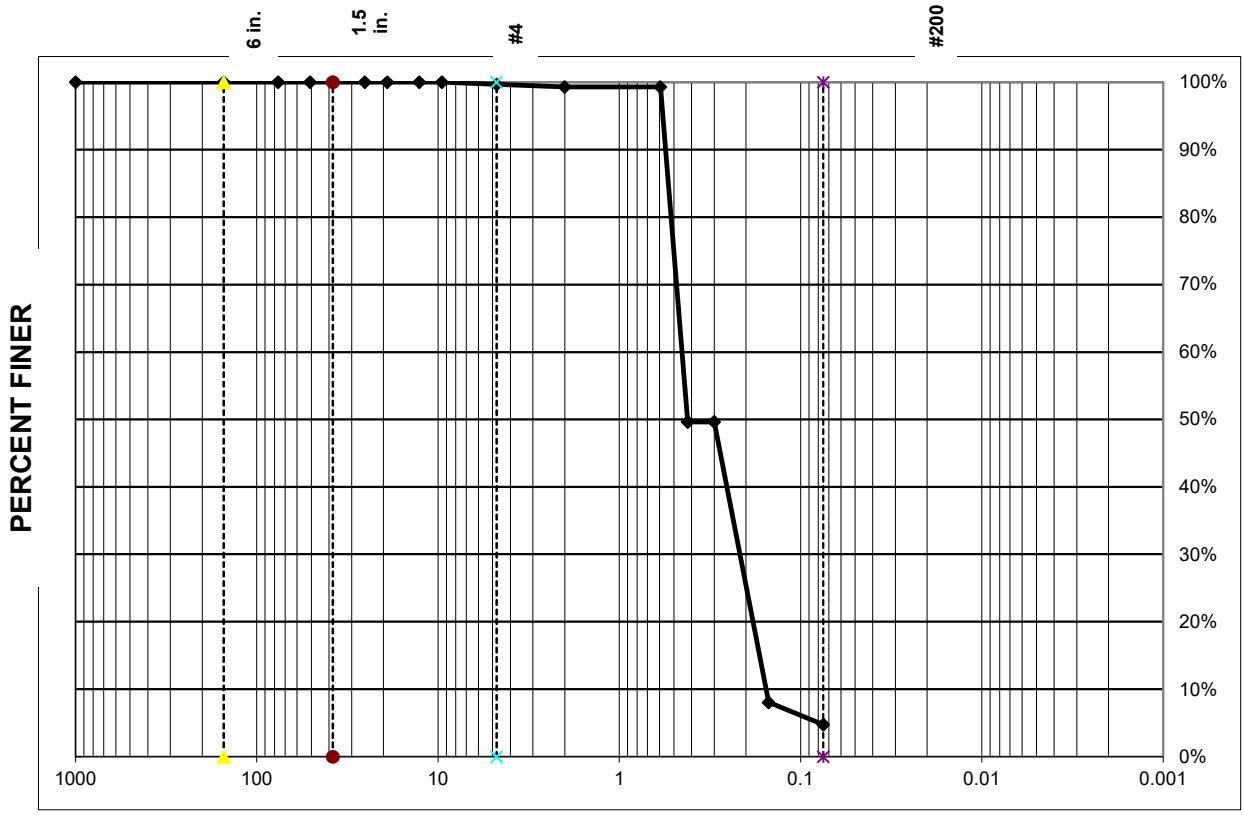
GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	100%	100%	99%	50%	8%	4.8%
Specification								

% GRAVEL =	0%	**D_{85} =** 0.5	**D_{15} =** 0.2
% SAND =	95%	**D_{60} =** 0.5	**D_{10} =** 0.2
% SILT & CLAY =	5%	**D_{50} =** 0.4	**C_U =** 2.9
		D_{30} = 0.2	**C_C =** 0.7

Sample Date: 5/15/24
Project No.: 4224063
Project Name: DAC OEM Emergency Operations Center
Report Date: 6/7/24
Sample Location: B-3 at 10'
Liquid Limit: **Plasticity Index:** NP
USCS Classification: SP
Material Description: Poorly Graded Sand
Moisture Content: 0.7%

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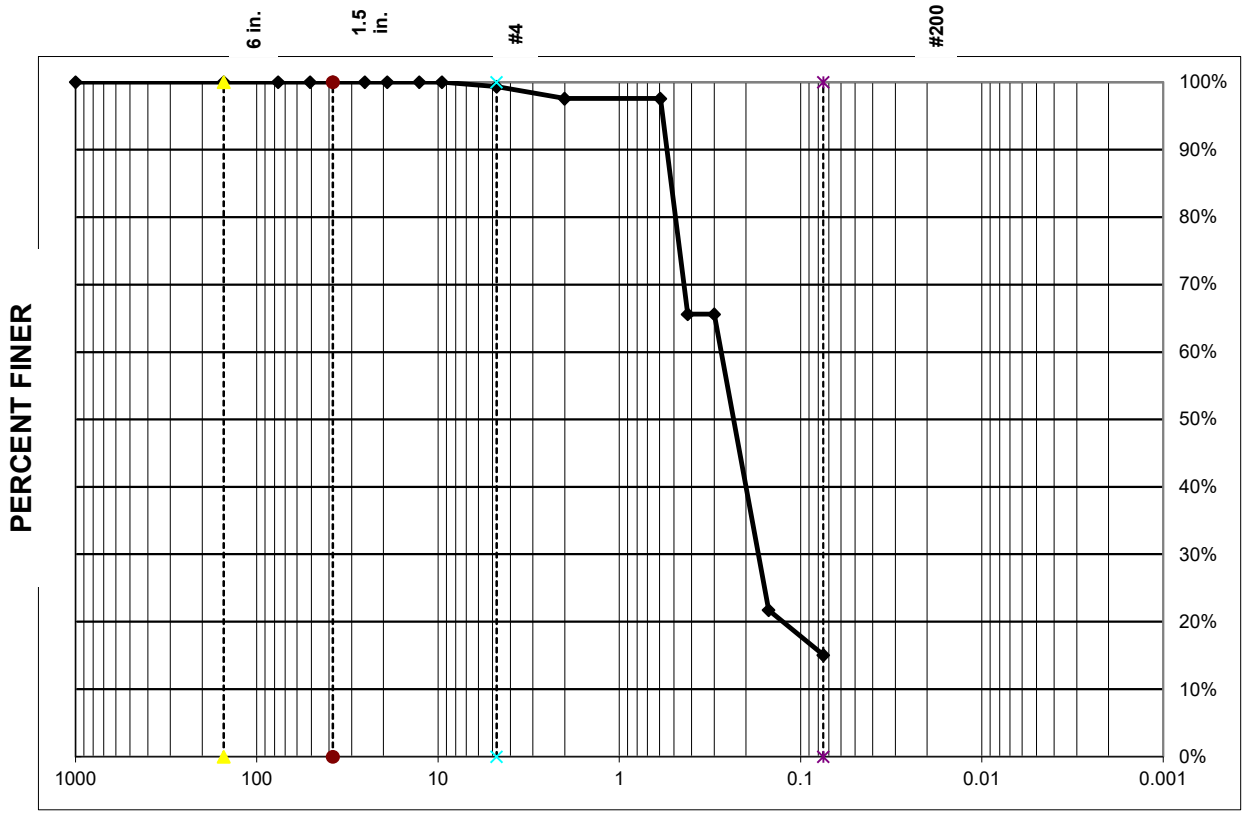
GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	100%	99%	98%	66%	22%	15.1%
Specification								

% GRAVEL =	1%	**D_{85} =** 0.5	**D_{15} =**
% SAND =	84%	**D_{60} =** 0.3	**D_{10} =**
% SILT & CLAY =	15%	**D_{50} =** 0.2	**C_U =**
		D_{30} = 0.2	**C_C =**

Sample Date: 5/15/24
Project No.: 4224063
Project Name: DAC OEM Emergency Operations Center
Report Date: 6/7/24
Sample Location: B-4 at 2.5'
Liquid Limit: **Plasticity Index:** NP
USCS Classification: SM
Material Description: Silty Sand
Moisture Content: 2.1%

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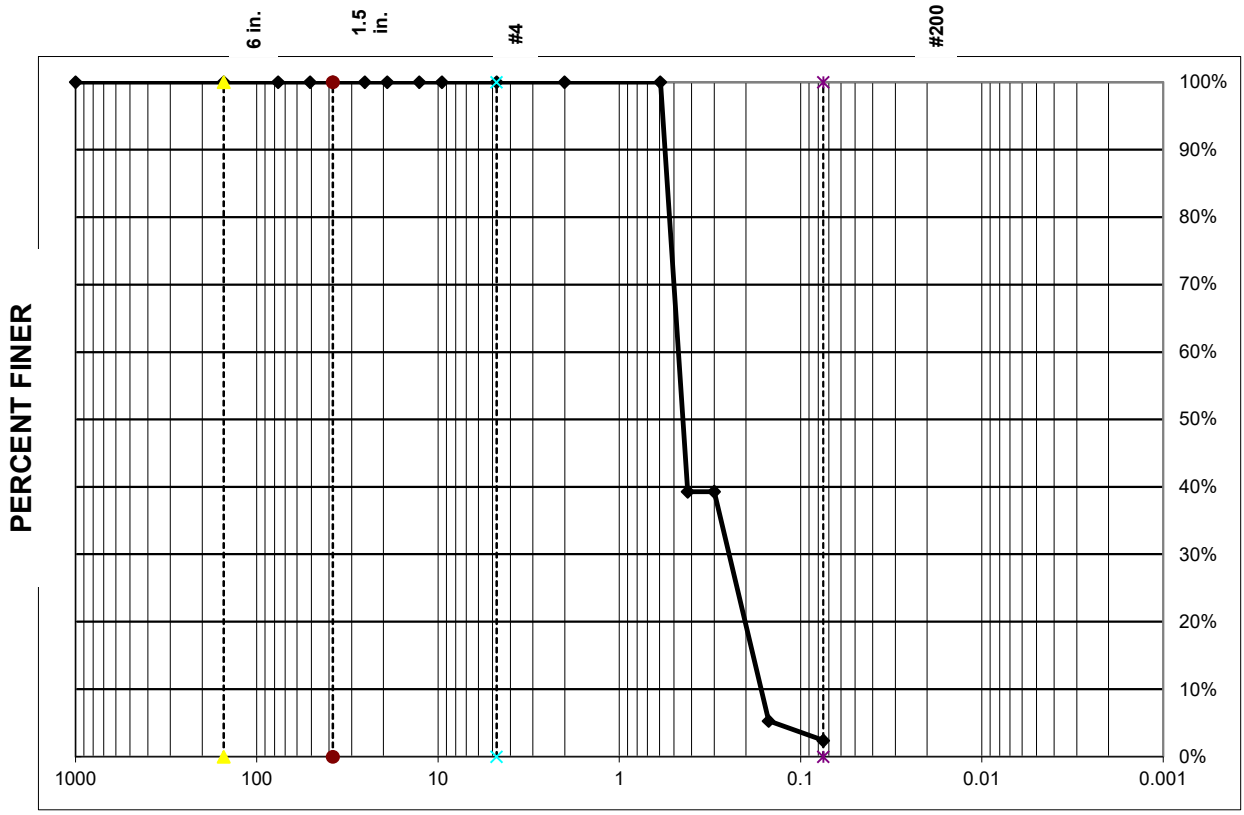
GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	100%	100%	100%	39%	5%	2.4%
Specification								

% GRAVEL =	0%	**D_{85} =** 0.5	**D_{15} =** 0.2
% SAND =	98%	**D_{60} =** 0.5	**D_{10} =** 0.2
% SILT & CLAY =	2%	**D_{50} =** 0.4	**C_U =** 2.9
		D_{30} = 0.2	**C_C =** 0.8

Sample Date: 5/15/24
Project No.: 4224063
Project Name: DAC OEM Emergency Operations Center
Report Date: 6/7/24
Sample Location: B-4 at 10'
Liquid Limit: **Plasticity Index:** NP
USCS Classification: SP
Material Description: Poorly Graded Sand
Moisture Content: 1.0%

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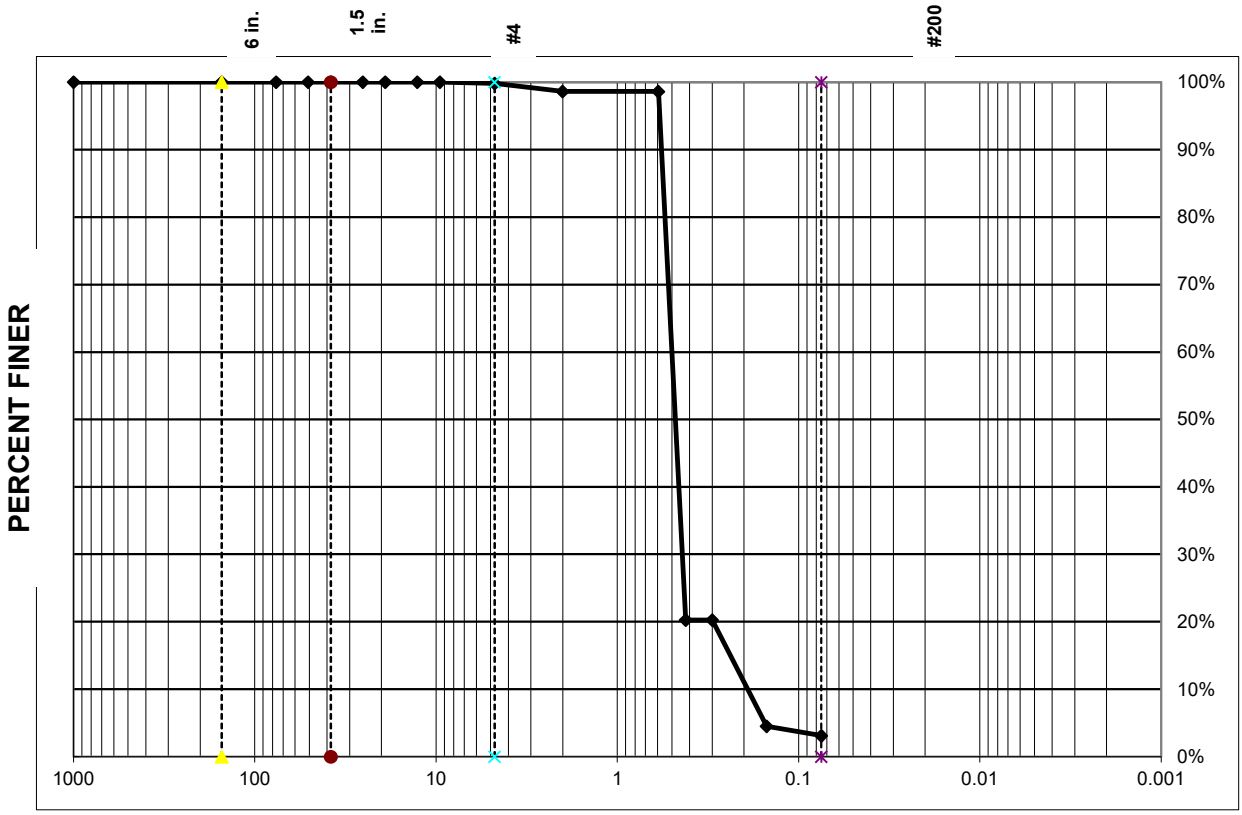
GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	100%	100%	99%	20%	5%	3.1%
Specification								

% GRAVEL =	0%	**D_{85} =** 0.6	**D_{15} =** 0.2
% SAND =	97%	**D_{60} =** 0.5	**D_{10} =** 0.2
% SILT & CLAY =	3%	**D_{50} =** 0.5	**C_U =** 2.6
		D_{30} = 0.4	**C_C =** 2.0

Sample Date: 5/15/24
Project No.: 4224063
Project Name: DAC OEM Emergency Operations Center
Report Date: 6/7/24
Sample Location: B-5 at 5'
Liquid Limit: **Plasticity Index:** NP
USCS Classification: SP
Material Description: Poorly Graded Sand
Moisture Content: 0.8%

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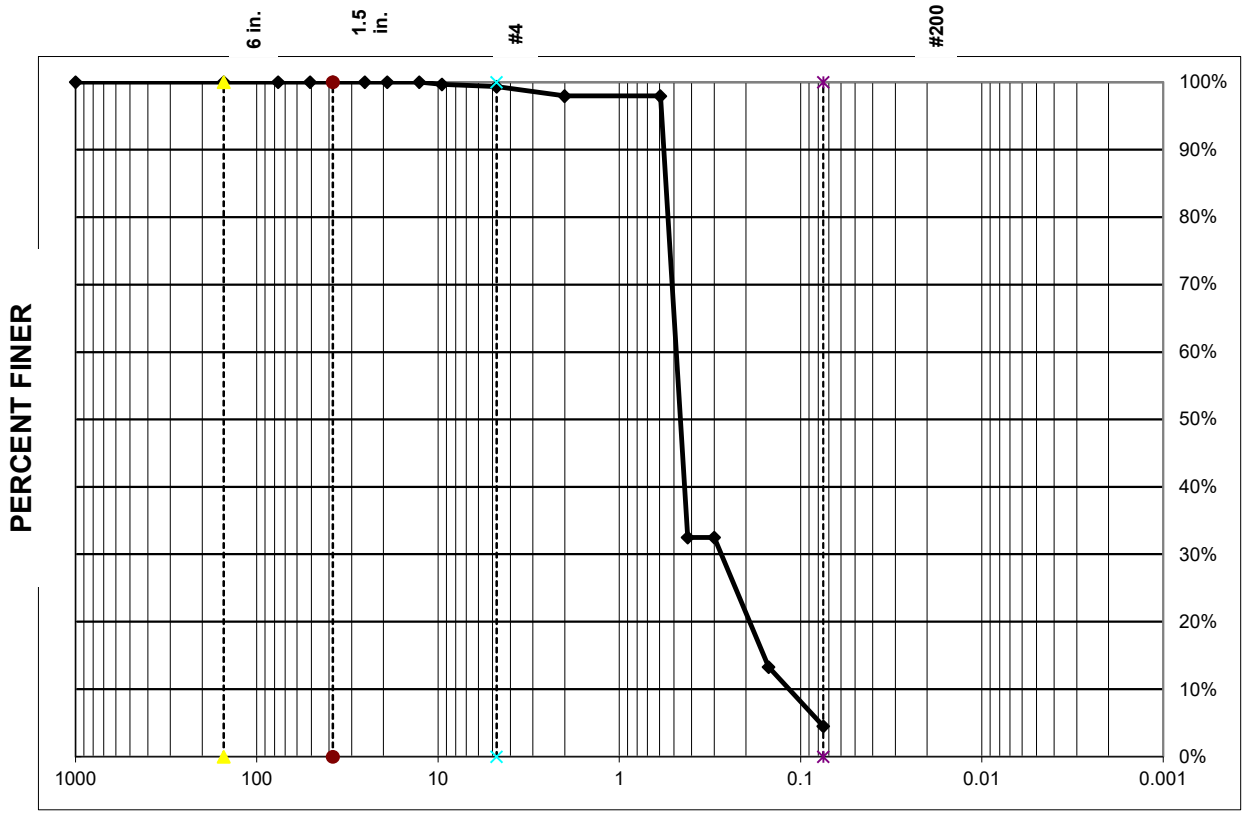

TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	100%	99%	98%	33%	13%	4.5%
Specification								

% GRAVEL =	1%	**D_{85} =** 0.6	**D_{15} =** 0.2
% SAND =	95%	**D_{60} =** 0.5	**D_{10} =** 0.1
% SILT & CLAY =	5%	**D_{50} =** 0.5	**C_U =** 4.2
		D_{30} = 0.3	**C_C =** 1.3

Sample Date: 5/15/24
Project No.: 4224063
Project Name: DAC OEM Emergency Operations Center
Report Date: 6/7/24
Sample Location: B-7 at 0-5'
Liquid Limit: **Plasticity Index:** NP
USCS Classification: SP
Material Description: Poorly Graded Sand
Moisture Content: 0.8%

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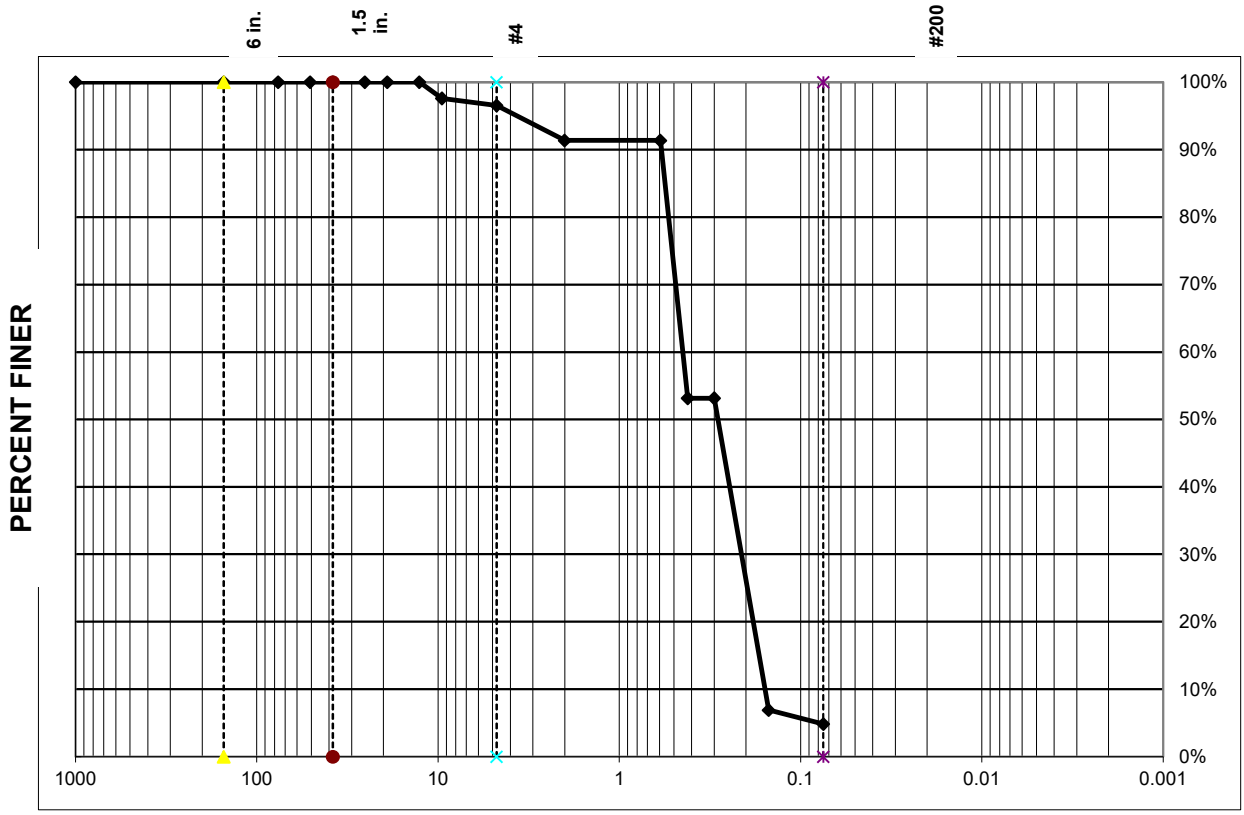
GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

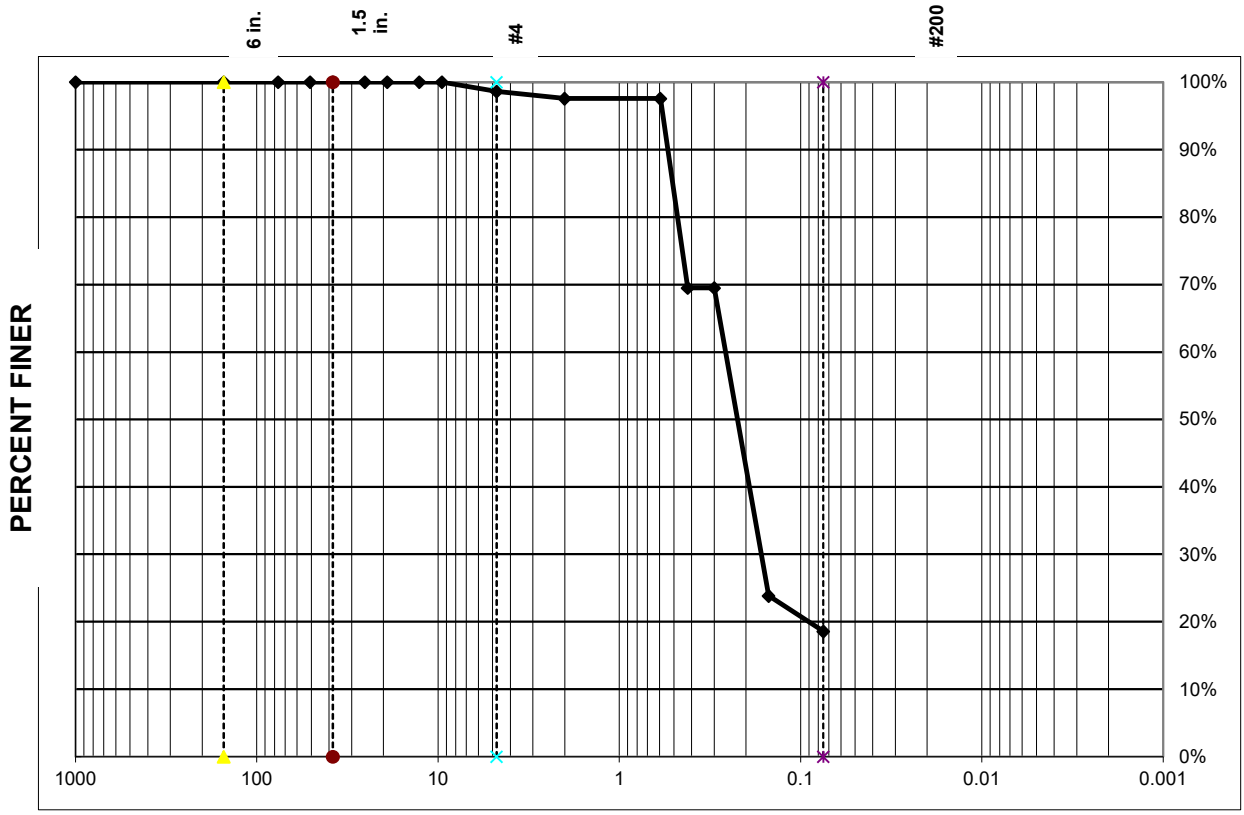
Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	98%	97%	91%	53%	7%	4.9%
Specification								

% GRAVEL =	3%	**D_{85} =** 0.6	**D_{15} =** 0.2
% SAND =	92%	**D_{60} =** 0.4	**D_{10} =** 0.2
% SILT & CLAY =	5%	**D_{50} =** 0.3	**C_U =** 2.8
		D_{30} = 0.2	**C_C =** 0.6

Sample Date: 5/15/24
Project No.: 4224063
Project Name: DAC OEM Emergency Operations Center
Report Date: 6/7/24
Sample Location: B-9 at 0-5'
Liquid Limit: **Plasticity Index:** NP
USCS Classification: SP
Material Description: Poorly Graded Sand
Moisture Content: 1.1%

COZ Engineering, LLC
PO Box 13331
Las Cruces, NM 88013
(575) 642-7671

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	100%	99%	98%	69%	24%	18.6%
Specification								

% GRAVEL =	1%	**D_{85} =**	0.5	**D_{15} =**	
% SAND =	80%	**D_{60} =**	0.3	**D_{10} =**	
% SILT & CLAY =	19%	**D_{50} =**	0.2	**C_U =**	
		D_{30} =	0.2	**C_C =**	

Sample Date: 5/15/24
Project No.: 4224063
Project Name: DAC OEM Emergency Operations Center
Report Date: 6/7/24
Sample Location: B-11 at 0-5'
Liquid Limit: **Plasticity Index:** NP
USCS Classification: SM
Material Description: Silty Sand
Moisture Content: 1.7%

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KE CORROSION

3028 ALDON AVE. LAS VEGAS, NV 89121

702-340-1186 KDE@KECORROSION.COM

CLIENT
COZ Engineering, LLC
PO BOX 13331
Las Cruces, NM 88013

PROJECT NO:

PROJECT
OEM Building

DATE: May 29, 2024

LAB ID: 24-0071

Sample By: Client

Analyzed By: Kurt D. Ergun

RESULTS FOR RESISTIVITY ANALYSIS OF SOILS

Sample No:	
Sample Location:	B-1
Sample Depth:	2.5
Laboratory Testing Methods	
pH Analysis, AWWA 4500-H	6.92
Water Soluble Sulfates, ASTM D516 (mg/kg)	55
Resistivity, ASTM G57 (ohm-cm)	2660

Kurt D. Ergun
Chemist

Note: The tests were performed in accordance with applicable ASTM, AASHTO, or AWWA methods. Test results submitted are only applicable to samples tested at referenced locations and are not indicative of the results of similar materials.

GEOLINES

May 23, 2024

COZ Engineering, LLC
PO Box 13331
Las Cruces, New Mexico 88013

Attention: Dan Cosper, P.E.

RE: **Shear Wave Velocity Profile** – Site Class
OEM Emergency Operation Center
Geothermal Rd
Las Cruces, New Mexico
Geolines Project No. NM-240009

Dear Dan Cosper:

This letter report presents the results of our refraction microtremor measurements and analysis for the referenced project. The purpose of our services was to provide a calculated average shear wave velocity of subsurface materials at the OEM Emergency Operation Center site to a depth of 30 meters (100 feet).

Fieldwork

The scope of our services for this project included measurement of surface waves on May 14, 2024, with one geophone array using standard p-wave geophones. Ambient noise/refraction microtremor data were recorded using a geophone spacing of ten meters with 12 channels. Ground motion sampling was performed at a two-millisecond rate for 30 second periods.

The approximate location of the array is shown on Plate 1, *Site Map*. The array was located in the field by measuring from existing natural and cultural features, and the array was located and aligned inside of the proposed building footprint. The location of the array is accurate only to the degree implied by the methods used. Array location information was collected using a Juniper Systems Geode sub-meter GPS unit.

Data reduction and results

The one-dimensional shear wave velocity profile and average shear wave velocity to 100 feet depth were modeled for each of 15 array data sets using Optim Software's SeisOpt® ReMi™v4.0 software. The field data were reduced and processed by the software to produce a velocity spectrum by slowness-frequency (p-f) transformation of the records. Using the processed data, the software produces a p-f image and the normal-mode dispersion trend is identified. Frequency-velocity pairs comprising the dispersion curve are picked at the lower bounds of the trend of the high spectral ratio

band identified in the p-f image. The p-f image and dispersion modeling picks for the array measurements are shown on Plate 2, *Dispersion Curve and p-f Image*. The dispersion curve modeling picks obtained from the p-f image were then used to develop a calculated dispersion curve and a one-dimensional shear wave velocity model for the site. Frequency-velocity picks and calculated dispersion curve fits are shown on Plate 2, *Dispersion Curve and p-f Image*. The shear wave velocity profile for the array is presented in Plate 3, *Shear Wave Velocity Model*. The chart from ASCE 7-16 Chapter 20 Table 20.3-1 detailing seismic site classifications is presented on Plate 4, *ASCE 7-16 Site Classification*. Tabular data of the velocities are presented on Plate 5, *Tabular Velocity Data.*

The calculated average shear wave velocity for 100 feet depth at the geophone array is 1335 feet per second (f/s). Based on this finding, a Site Class C as presented in the 2018/2021 IBC is appropriate.

Closure

Professional services for this project were performed using that degree of care and skill ordinarily exercised under similar circumstances by specialists practicing in this or similar localities. No warranties, express or implied, are intended or made.

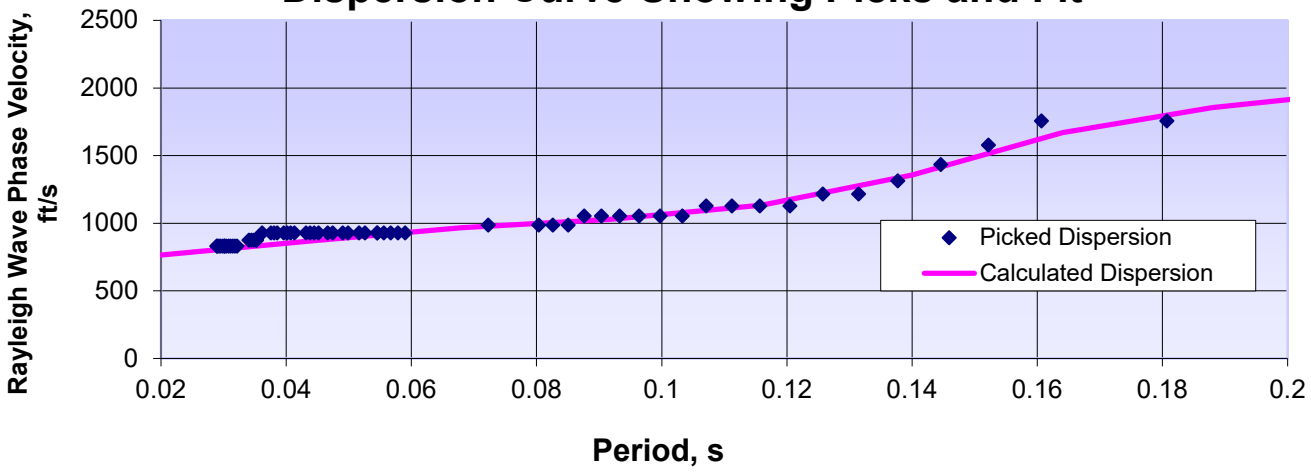
Respectfully Submitted:

5-23-2024

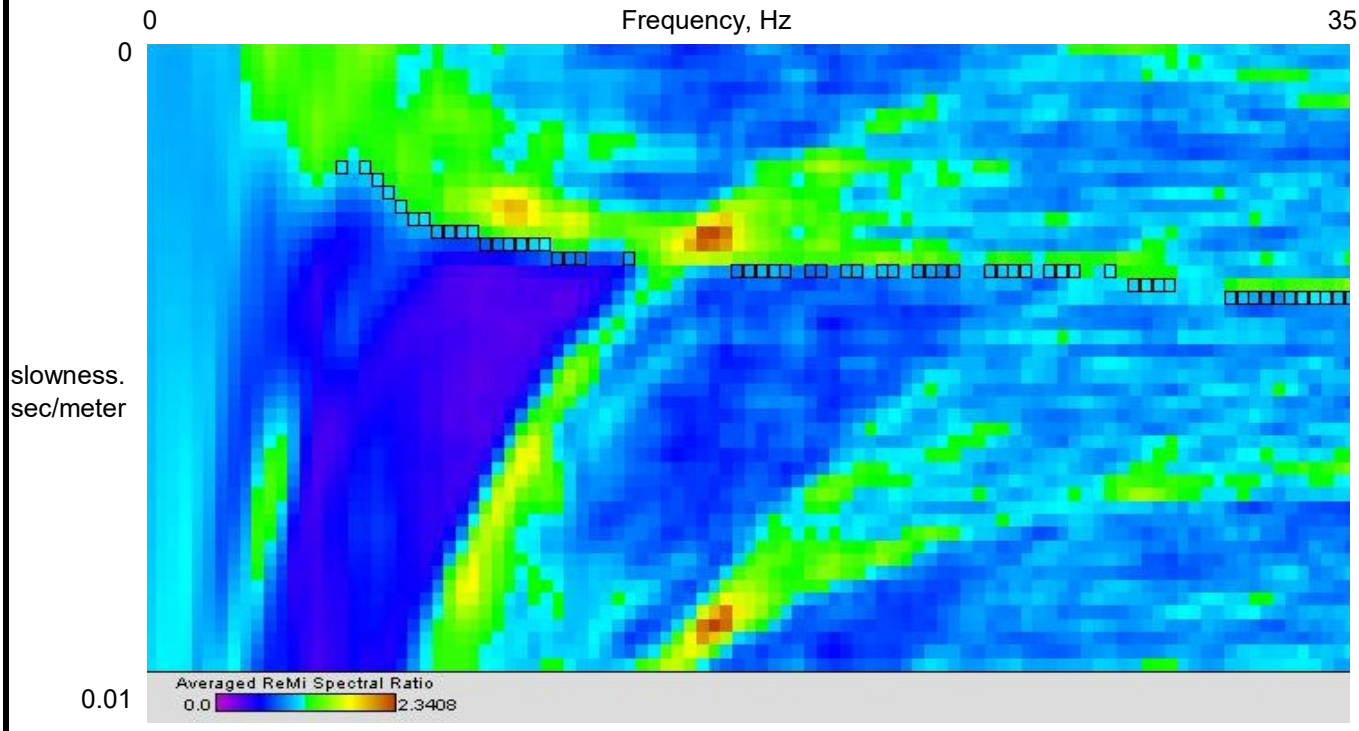
Zachary J. Rockhold
Owner

GEOLINES	**COZ Engineering, LLC** **PO Box 13331** **Las Cruces, New Mexico 88013**	**SITE MAP**	
	OEM Emergency Operation Center Geothermal Rd Las Cruces, New Mexico	PROJECT NO.:	PLATE NO.
		NM-240009	1

Dispersion Curve Showing Picks and Fit

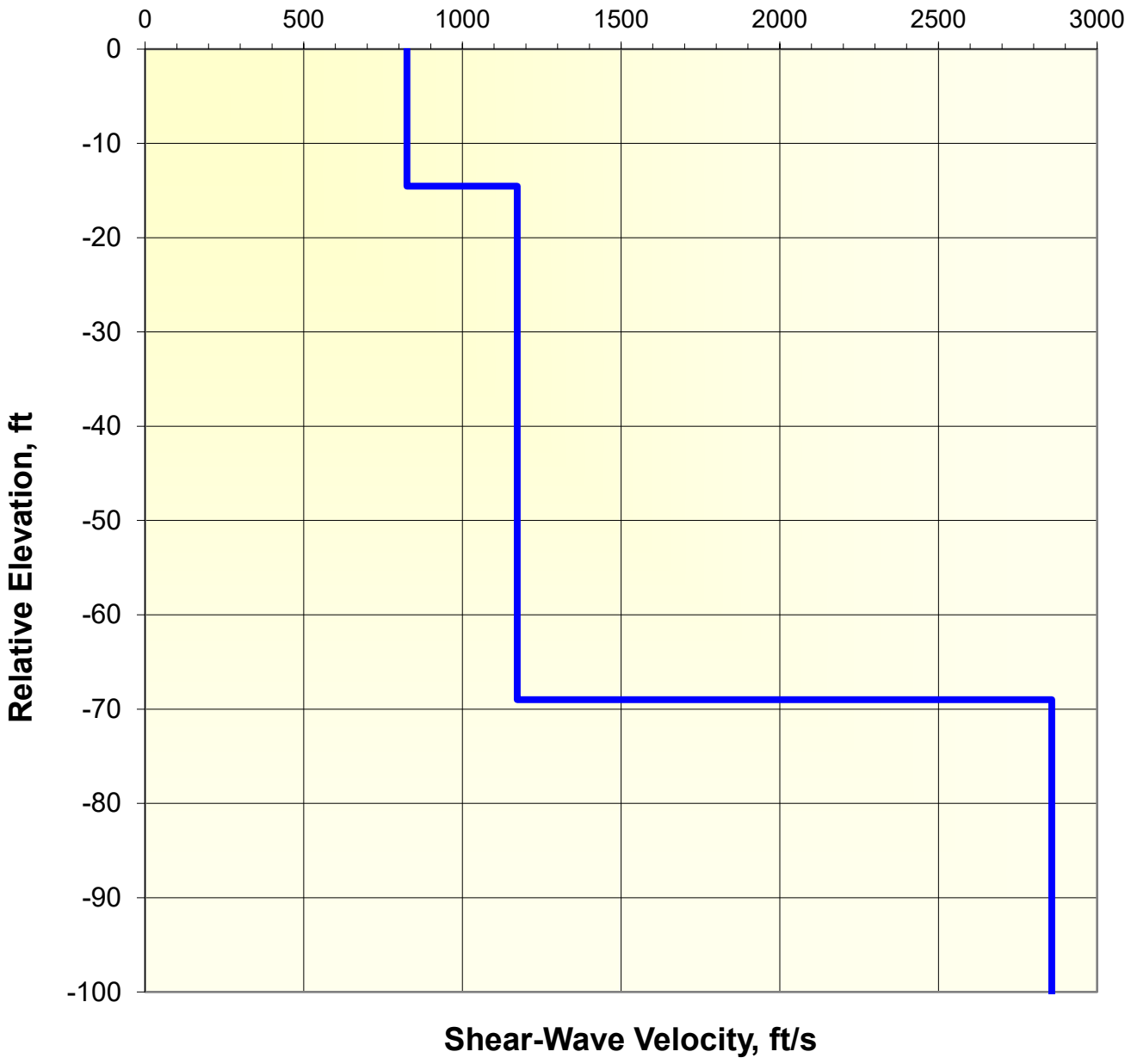


p-f Image and Dispersion Picks



GEOLINES	**COZ Engineering, LLC** **PO Box 13331** **Las Cruces, New Mexico 88013**	**Dispersion Curve and p-f Image**	
	OEM Emergency Operation Center Geothermal Rd Las Cruces, New Mexico	PROJECT NO.:	PLATE NO.
		NM-240009	2

1-D Shear-Wave Velocity Profile



* The modeling methods used to calculate shear wave velocities do not necessarily have unique solutions, therefore velocities and depth to changes in velocities should be considered approximate.

GEOLINES	**COZ Engineering, LLC** **PO Box 13331** **Las Cruces, New Mexico 88013**	**SHEAR WAVE VELOCITY MODEL**
	OEM Emergency Operation Center Geothermal Rd Las Cruces, New Mexico	PROJECT NO.: NM-240009 / PLATE NO.: 3

Table 20.3-1

Site Classification

Site Class	$\bar{v}_s$	N or N_{ch}	$\bar{s}_u$
A. Hard rock	$> 5{,}000$ ft / s	NA	NA
B. Rock	2,500 to 5,000 ft / s	NA	NA
C. Very dense soil and soft rock	1,200 to 2,500 ft / s	> 50 blows / ft	$> 2{,}000$ lb / ft^2
D. Stiff soil	600 to 1,200 ft / s	15 to 50 blows / ft	1,000 to 2,000 lb / ft^2
E. Soft clay soil	< 600 ft / s	< 15 blows / ft	$< 1{,}000$ lb / ft^2
	Any profile with more than 10 ft of soil that has the following characteristics: — Plasticity index $PI > 20$, — Moisture content $w \geq 40\%$, — Undrained shear strength $\bar{s}_u < 500$ lb / ft^2		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

Note: For SI: 1 ft = 0.3048 m; 1 ft / s = 0.3048 m / s; 1 lb / ft^2 = 0.0479 kN / m^2.

Print

TABULATED SEISMIC WAVE VELOCITIES

Array Name	Depth Below Surface (feet) from	to	Calculated Shear Wave Velocity (feet/second)
Array 1	0	15	825
	15	69	1173
	69	100	2857

* The modeling methods used to calculate shear wave velocities do not necessarily have unique solutions, therefore velocities and depth to changes in velocities should be considered approximate.

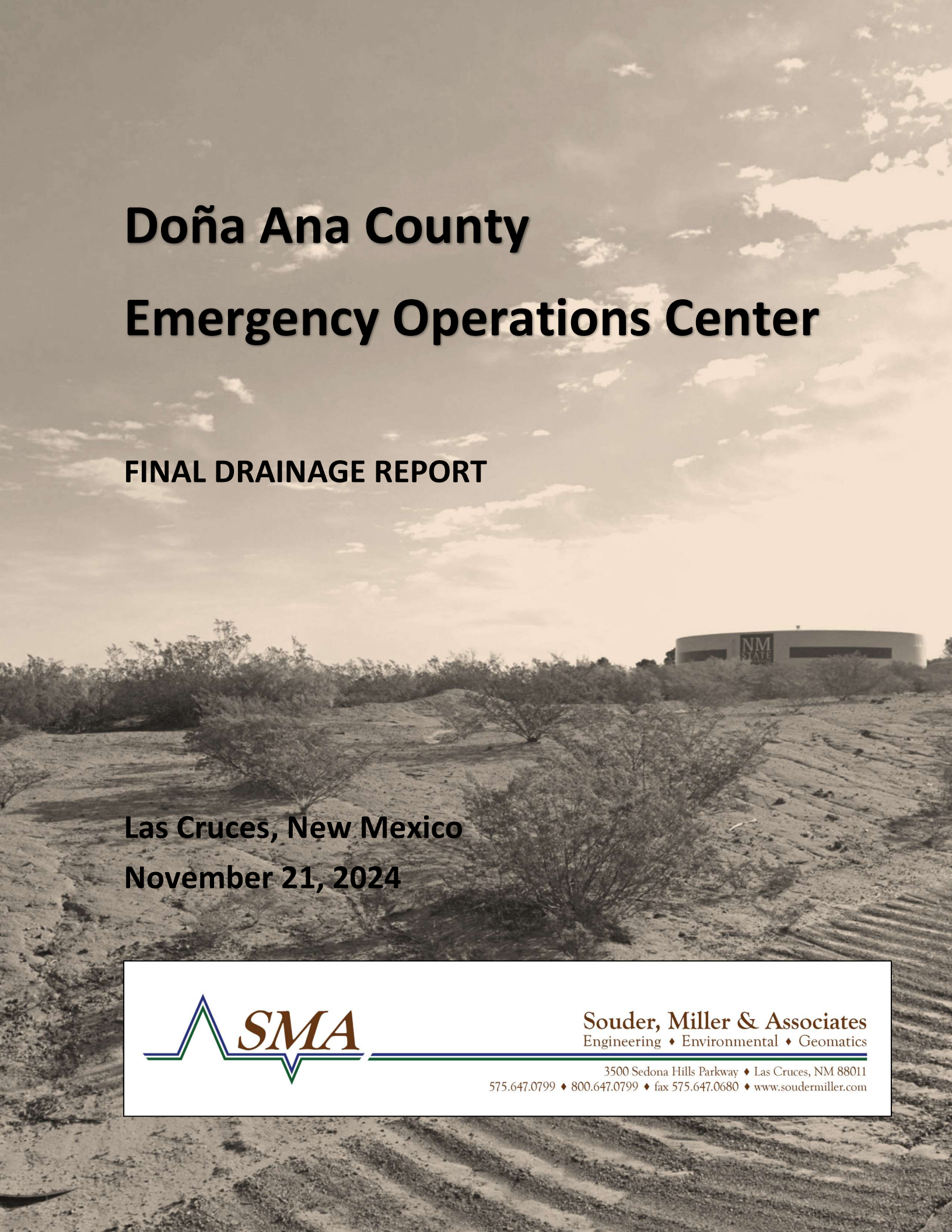
GEOLINES

COZ Engineering, LLC
PO Box 13331
Las Cruces, New Mexico 88013

OEM Emergency Operation Center
Geothermal Rd
Las Cruces, New Mexico

Tabular Velocity Data

PROJECT NO.:	PLATE NO.
NM-240009	5



Doña Ana County
Emergency Operations Center

FINAL DRAINAGE REPORT

Las Cruces, New Mexico

November 21, 2024

SMA

Souder, Miller & Associates
Engineering ♦ Environmental ♦ Geomatics

3500 Sedona Hills Parkway ♦ Las Cruces, NM 88011
575.647.0799 ♦ 800.647.0799 ♦ fax 575.647.0680 ♦ www.soudermiller.com

FINAL DRAINAGE STUDY

DOÑA ANA COUNTY
EMERGENCY OPERATIONS CENTER

LAS CRUCES, NEW MEXICO

Prepared for

Mr. Manuel Alvidrez
ASA Architects
201 N. Alameda
Las Cruces, New Mexico 88005

November 21, 2024

This document was prepared under the supervision and direction of the undersigned whose seal as a Professional Engineer, licensed to practice as such in the State of New Mexico, is affixed below.

Paul J. Pompeo, P.E.

11490 — NMPE Number

11/21/2024 — Date

Souder, Miller & Associates ♦ 3500 Sedona Hills Parkway ♦ Las Cruces, NM 88011
(575) 647-0799 ♦ (800) 647-0799 ♦ fax (575) 647-0680

November 21, 2024 #9331490

Mr. Manuel Alvidrez
ASA Architects
201 N. Alameda
Las Cruces, New Mexico 88005

RE: Doña Ana County Emergency Operations Center
Final Drainage Study, Las Cruces, New Mexico

Dear Mr. Alvidrez:

Souder, Miller and Associates is pleased to present the enclosed Final Drainage Study for the above reference project. Should any portion of the attached report require modifications to further adhere to your specific needs, please contact our office to schedule a meeting.

Sincerely,

MILLER ENGINEERS, INC. D/B/A
SOUDER, MILLER & ASSOCIATES

Brice Ortiz, EIT
Staff EIT II
brice.ortiz@soudermiller.com

Paul J. Pompeo, PE
Vice President, Civil Technical Sector Director
paul.pompeo@soudermiller.com

Enc: Doña Ana County Emergency Operations Center, Final Drainage Report

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APPENDIX D.R.2

APPENDIX D.R.3

APPENDIX D.R.4

FINAL DRAINAGE STUDY

DOÑA ANA COUNTY
EMERGENCY OPERATIONS CENTER
LAS CRUCES, NEW MEXICO

NOVEMBER 21, 2024

1.0 INTRODUCTION

A drainage investigation was completed for the proposed development of the Doña Ana County Emergency Operations Center project, a +/- 7.45-acre tract of land that will be developed into an institutional property. This report will address all findings obtained during the drainage investigation and identify the drainage characteristics for the overall development. Included within this report is the drainage study which analyzes the increased runoff being produced as a result of the new development in addition to any external flow that will traverse the development. The locations of the contributing drainage basins to the project area are shown on the vicinity map in Appendix D.R.1. It is the intent of the developer to fully contain the additional flow between the pre-development and post-development peak rainfall discharge rates for the 10-year and 100-year frequency storm events as per City of Las Cruces Design Standards.

1.1 SCOPE OF INVESTIGATION

The intent of this investigation is to identify drainage characteristics within the project area and identify any areas of concern that require additional water routing. Further discussion of the findings is located in Sections 5.0 and 6.0. These findings include:

- Identifying probable contributing drainage basins, external and internal, that are responsible for conveying runoff flow into the project area.
- Determining the peak discharge rates and runoff volume from the determined drainage basins for the 10-year and 100-year frequency storm events.
- Appropriately sizing, when required, hydraulic structures which include but are not limited to ponds, roadways, channels, and storm drain structures for the 10-year and 100-year frequency storm events.

1.2 METHODOLOGY

This drainage analysis was completed using the methodology outlined in the Engineering Field Manual for Conservation Practices, Chapter 2 titled "Peak Rates of Discharge for Small Watersheds" published in 1985 by the Natural Resources Conservation Service, United States Department of Agricultural.

2.0 SITE CHARACTERISTICS

2.1 CLIMATE

The City of Las Cruces, Mesilla Valley and surrounding areas have a mild, arid or semi-arid continental type climate. This climate is characterized by fairly hot summers with mild winters and warm spring and fall seasons. The air within this area is generally classified as clear and dry with considerable annual and diurnal fluctuations in temperature.

On average, the majority of rainfall experienced in this area occurs during the summer months in the form of thunderstorms. These storms are of short duration and are a result of convective and/or orographic lifting of air masses. Stronger thunderstorms occur following a period of inflow of warm airs originating from the Gulf of Mexico. Occasional precipitation occurs as a result of an invasion of tropical Pacific air. Frontal activity is most prevalent in the area and is accompanied by rain or snow of light intensity.

2.2 RAINFALL

Precipitation information obtained from the environmental data services record by National Oceanic and Atmospheric Administration (N.O.A.A) states that the average annual rainfall around the Mesilla Valley area is approximately within the range of 8 to 10 inches. The more extreme storms generally occur during the months of July through September.

Utilizing N.O.A.A Precipitation Frequency Data Server (Atlas 14, Volume 1, Version 5), the precipitation frequency estimates for the project area was obtained. The geographical coordinates for the project area are Latitude 32.2813° and Longitude -106.7332°. The corresponding NOAA precipitation frequency estimates are provided in Appendix D.R.2. The 24-hour duration rainfall totals for this development is as follows:

Las Cruces Rainfall Summary			
Duration	Average Recurrence Interval		
	2 Year	10 Year	100 Year
24-hour	1.38 inches	2.18inches	3.70 inches

The estimated precipitation values listed above were used for the completion of the following drainage study. In order to incorporate the estimated rainfall intensity as a principal factor of peak flows on a small watershed, the Natural Resources Conservation Service (NRCS) developed a method that relates the percent of daily rainfall having a 1 percent chance of occurrence with 75 percent of the design storm event occurring in the peak hour. This was derived from NRCS studies for the Mesilla Valley area. The rainfall distribution for this specific storm is located in Appendix D.R.2.

2.3 TERRAIN

The project area is located near recreational, institutional, residential and undeveloped areas. Based on survey data and Autodesk Civil 3-D software the project area has generally steep sloping terrain, with slopes ranging between 0.5% and 7.0%. The tract of land where the development will occur contains approximately 7.45 acres of land.

2.4 FEDERAL EMERGENCY MANAGEMENT AGENCY

The project area is located in the unshaded region of Flood Zone X of the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps. The unshaded region of Flood Zone X is outside the 500-year floodplain. The corresponding map numbers for the project location is Map #35013C1111G, dated July 6, 2016 and Map #35013C1113G, dated July 6, 2016. The FEMA Maps are included in Appendix D.R.1. The project area is indicated on the FEMA map with an orange boundary line.

3.0 GEOLOGY AND SOIL CHARACTERISTICS

3.1 GEOLOGY AND ORIGIN OF SOIL

The geologic information indicates that unconsolidated and partially consolidated sediment of tertiary and later ages underlies the area near Las Cruces, New Mexico. The deposit consists of varying proportions of sand, gravel and silt that fill the deep trough of the Rio Grande depression. This soil formation is commonly known as the "Santa Fe" formation. The Santa Fe soil formation varies abruptly in lateral and vertical directions from coarse conglomerates and gravel to sand mixed with silt and clay lenses. The gravel and sand strata are usually tan to gray in color, containing large amounts of interstitial silt.

3.2 HYDROLOGIC SOIL CLASSIFICATION

Hydrologic soil classification was determined from soil survey information available from the local Natural Resources Conservation Services field office. Soil Survey of Doña Ana County Area was accessed on-line via the United States Department of Agriculture Web Soil Survey at http://websoilsurvey.sc.egov.usda.gov/app/WebSoilSurvey.aspx. This information was used to determine the soil classification and properties within the project area. A map titled "Custom Soil resource Report, Soil Map" shows the locations of the individual soils used in this drainage report and can be found in Appendix D.R.2.

The soil survey map for this area shows that the following soil types are found within the project area and within the drainage basins leading into the project area:

Soil Types		
Soil Symbol	Soil Group Name	Hydrologic Soils Class
Bm	Bluepoint loamy sand, 0 to 5 percent slope	A
Bp	Bluepoint-Caliza-Yturbide complex	A

There are two soil types and one corresponding hydrologic soil classification within the project boundary of the Doña Ana County Emergency Operations Center development.

4.0 BASIN DESCRIPTIONS

4.1 GENERAL DRAINAGE CHARACTERISTICS

The tract of land containing approximately 7.45 acres of land is located in Las Cruces, New Mexico. The project area constitutes part of the moderate sloping plain known as the "East Mesa" which extends west from the Organ Mountain Range area to the Rio Grande Valley floor. This mesa has the aspect of a regular plain but varies in the west-east direction by minor entrenchments and deposition of many drainage channels. The current drainage pattern is comparatively stable and is directed toward the Rio Grande Valley floor. The FEMA flood insurance rate maps, included in Appendix D.R.1, indicate that the project area is found within Zone X, a flood zone that lies outside the 500-year floodplain.

4.2 LAND USE

The pre-development condition of the +/- 7.45 acre property top be developed is that of an undisturbed natural state. The contributing off-site drainage basin located to the east of the development is mostly in an undisturbed natural state with portions of residential development including a single residence with asphalt and desert landscaping. The site currently discharges storm water from the northeast toward both the northwest in the direction of the New Mexico State University (NMSU) golf course and to the southwest in the direction of Geothermal Drive. Under normal conditions, during storm events, exterior stormwater flows enter the development from the east/northeast direction. The contributing off-site drainage basins ae delineated based on updated USGS topographic data and are shown as pre-development basin A3 and post-development basin B10 on the basin maps provided in Appendix D.R.1.

The external conditions of the adjoining properties are as follows; the property to the north of the basin boundary consists of an existing undeveloped land in its natural state adjacent to the property boundary with the NMSU golf course further north. The property to the east of the property boundary consists of a single residential home with the remainder of the land being undeveloped in its natural state. The property to the west of the property boundary consists of a small institutional type building surrounded by undeveloped land in its natural state. The property to the south of the property boundary is undeveloped in its natural state with residential homes further south.

The post-development condition of the property will be a new institutional type development. On average, the land use will consist of impervious area in the form of asphalt, rooftop, and sidewalks with the remaining area consisting of desert landscape, cleared area and natural area. All off-site basins will remain in their existing conditions with minor changes to exterior flow path routing. See appendix D.R.2 for Land Use and Weighted CN calculations.

Based on the above outlined land uses, the composite curve numbers for the pre- and post-development of each individual basin are as follows:

Pre-Development Composite Curve Numbers							
Basin	Total Area (acres)	Land Cover Description: (acres)					Composite CN
		Natural	Impervious	Desert Landscape	Lawn Landscape	Cleared	
A1	0.60	0.48	0.00	0.00	0.00	0.12	66
A2	6.69	5.35	0.00	0.00	0.00	1.34	66
A3	11.34	8.73	2.27	0.35	0.00	0.00	70

Post-Development Composite Curve Numbers							
Basin	Total Area (acres)	Land Cover Description: (acres)					Composite CN
		Natural	Impervious	Desert Landscape	Gravel Cover	Cleared	
B1	0.23	0.00	0.00	0.23	0.00	0.00	63
B2	0.36	0.00	0.00	0.02	0.00	0.35	76
B3	0.41	0.00	0.00	0.21	0.21	0.00	70
B4	0.25	0.00	0.00	0.25	0.00	0.00	63
B5	1.53	0.00	0.00	0.61	0.76	0.15	71
B6	2.28	0.00	1.85	0.43	0.00	0.00	91
B7	0.45	0.00	0.34	0.11	0.00	0.00	89
B8	0.67	0.00	0.61	0.05	0.00	0.00	95
B9	1.20	0.00	0.42	0.78	0.00	0.00	75
B10	11.23	8.20	2.02	1.01	0.00	0.00	69

5.0 HYDROLOGY

Based on the site characteristics, soil characteristics and land descriptions detailed in the previous sections, the following hydrologic parameters for the contributing drainage basins were analyzed. The estimated peak rainfall discharge rates were obtained for the pre-development and post-development stages of the Doña Ana County Emergency Operations Center project.

5.1 Storm Water Discharge Calculations

In order to establish the storm water discharge rates and volumes for the 10-year storm frequency event and the 100-year storm frequency event, determination of weighted curve numbers was required. Based on the various physical characteristics detailed in the previous sections, weighted curve numbers for each contributory drainage area were identified and are summarized in Appendix D.R.2. Pre-development and post-development analyses, including watershed model schematics, hydrographs, and hydrograph summary reports containing project specific hydrologic data are included in Appendix D.R.3.

The hydrologic data will be used to size the storm water retention ponds, storm sewer system, culvert system, confirm that internal channels can accommodate the amount of storm water, and the pond inlet/outlet structures. The calculations for this analysis were computed using Hydraflow Hydrographs Extension for Autodesk Civil 3D, Version 2025 by Autodesk, Inc.

The input values for the hydrograph calculations in Appendix D.R.3 were determined with the following input data:

- The 10 and 100-year, 24-hour precipitation was determined from the NOAA web site. The chart titled “Point Precipitation Frequency Estimates” outlines the anticipated precipitation for this specific location and can be found in Appendix D.R.2. The normal annual precipitation and average annual temperature were determined by contacting the local NRCS office in Las Cruces, NM.

- Time of concentration (Tc) values were determined from the TR-55 Method within the hydrograph software and are contained in Appendix D.R.3. Where the hydrograph computer program calculates a time of concentration less than 6 minutes, "User" Tc Method is selected and a manual entry of 6 minutes per the NMSU Urban Drainage Criteria. This situation is common for small drainage basins within the proposed development with relatively small basin lengths.

- The stormwater routing model is based on the Soil Conservation Service methodology. The unit peak discharge hydrographs for the stormwater routing are attached in Appendix D.R.2 of this report.

5.1.1 Runoff Curve Numbers

From the hydrologic soils types listed in Section 3 and the Runoff Curve Numbers found in Tables 2-2a and 2-2d of the Technical Release 55, "Urban Hydrology for Small Watersheds", the following table includes a summary of the runoff curve numbers used in this report. Weighted runoff curve numbers based on these values are calculated in data sheets in Appendix D.R.2 and summarized in tabular form in Section 4.2.

Curve Number - Soil Type Summary				
Land Use Cover	***Hydrologic Soils Class A***	Hydrologic Soils Class B	Hydrologic Soils Class C	Hydrologic Soils Class D
Natural Cover	***63***	77	85	88
Impervious	***98***	98	98	98
Cleared Desert Land Areas	***77***	86	91	94
Gravel Area	***76***	85	89	91
Desert Landscape Areas	***63***	77	85	88

Values listed above represent land uses typically found in the southwestern United States for both pre-development and post-development conditions. Not all values were used for this report.

5.2 10-Year Storm Frequency Event Calculations

5.2.1 Pre-Development

The table listed below outlines the hydrologic summary of the pre-development basin calculations for the 10-year storm frequency event. The data includes basin identification, the total area in acres, the calculated time of concentration, the hydraulic basin length which is also known as the longest flow path, and the weighted CN. Based on these characteristics the volume and peak discharge per basin were identified.

Pre-development Basin Conditions - 10 Year Event						
Basin	Area	Tc[1]	Hydraulic Basin Length	Weighted CN	Volume	Peak Discharge
	(acre)	(min)	(ft)		(ft^3)	(ft^3/sec)
A1	0.60	13.0	249	66	450	0.26
A2	6.69	19.1	305	66	5,035	2.21
A3	11.34	26.4	2,242	70	12,944	4.70

(1) - Should the calculated Tc be less than 6 minutes, per the NMSU Urban Drainage Criteria, a minimum Tc of 6 minutes shall be used.

Pre-development Basin Conditions - 10 Year Event Confluence Point		
Hydrologic Element Id	Volume	Peak Discharge
	(ft^3)	(ft^3/sec)
AP 1 – Northwest Offsite Flow	5,484	2.43
AP 2 – Southwest Offsite Flow	12,944	4.70
AP 3 – Total Offsite Flow	18,429	6.73

5.2.2 POST-DEVELOPMENT

The table listed below outlines the hydrologic summary of the post-development basin calculations for the 10-year storm frequency event. The data includes basin identification, the total area in acres, the calculated time of concentration, the hydraulic basin length which is also known as the longest flow path, and the weighted CN. Based on these characteristics the volume and peak discharge per basin were identified.

Post-development Basin Conditions - 10 Year Event						
Basin	Area	Tc[1]	Hydraulic Basin Length	Weighted CN	Volume	Peak Discharge
	(acre)	(min)	(ft)		(ft^3)	(ft^3/sec)
B1	0.23	6.00[1]	50	63	126	0.10
B2	0.36	6.00[1]	147	76	686	0.70
B3	0.41	6.00[1]	940	70	479	0.47
B4	0.25	6.00[1]	94	63	137	0.11
B5	1.53	25.80	634	71	1,907	0.71
B6	2.28	7.70	295	91	10,671	9.54
B7	0.45	7.70	371	89	1,878	1.71
B8	0.67	6.00[1]	248	95	4,151	3.62
B9	1.20	36.10	172	75	2,070	0.64
B10	11.23	26.40	2,242	69	11,667	4.12

(1) - Should the calculated Tc be less than 6 minutes, per the NMSU Urban Drainage Criteria, a minimum Tc of 6 minutes shall be used.

Post-development Basin Conditions - 10 Year Event Confluence Point		
Hydrologic Element Id	Volume (ft^3)	Peak Discharge (ft^3/sec)
AP 1 – Total Northwest Flow	3,072	1.41
AP 2 – Total Southwest Flow	11,667	4.12
AP 3 – Total Offsite Flow	14,739	4.95

5.3 100-Year Storm Frequency Event Calculations

5.3.1 Pre-Development

The table listed below outlines the hydrologic summary of the pre-development basin calculations for the 100-year storm frequency event. The data includes basin identification, the total area in acres, the calculated time of concentration, the hydraulic basin length which is also known as the longest flow path, and the weighted CN. Based on these characteristics the volume and peak discharge per basin were identified.

Pre-development Basin Conditions - 100 Year Event						
Basin	Area (acre)	Tc[(1)] (min)	Hydraulic Basin Length (ft)	Weighted CN	Volume (ft^3)	Peak Discharge (ft^3/sec)
A1	0.60	13.0	249	66	1,952	1.39
A2	6.69	19.1	305	66	21,857	12.27
A3	11.34	26.4	2,242	70	47,001	20.11

(1) - Should the calculated Tc be less than 6 minutes, per the NMSU Urban Drainage Criteria, a minimum Tc of 6 minutes shall be used.

Pre-development Basin Conditions - 100 Year Event Confluence Point		
Hydrologic Element Id	Volume (ft^3)	Peak Discharge (ft^3/sec)
AP 1 – Northwest Offsite Flow	23,809	13.45
AP 2 – Southwest Offsite Flow	47,001	20.11
AP 3 – Total Offsite Flow	70,810	31.79

5.3.2 Post-Development

The table listed below outlines the hydrologic summary of the post-development basin calculations for the 100-year storm frequency event. The data includes basin identification, the total area in acres, the calculated time of concentration, the hydraulic basin length which is also known as the longest flow path, and the weighted CN. Based on these characteristics the volume and peak discharge per basin were identified.

Post-development Basin Conditions - 100 Year Event						
Basin	Area	Tc[1]	Hydraulic Basin Length	Weighted CN	Volume	Peak Discharge
	(acre)	(min)	(ft)		(ft^3)	(ft^3/sec)
B1	0.23	6.00[1]	50	63	653	0.66
B2	0.36	6.00[1]	147	76	2,038	2.00
B3	0.41	6.00[1]	940	70	1,739	1.75
B4	0.25	6.00[1]	94	63	710	0.72
B5	1.53	25.80	634	71	6,677	2.88
B6	2.28	7.70	295	91	22,038	19.01
B7	0.45	7.70	371	89	4,050	3.55
B8	0.67	6.00[1]	248	95	7,864	6.52
B9	1.20	36.10	172	75	6,330	2.18
B10	11.23	26.40	2,242	69	44,166	18.72

(1) - Should the calculated Tc be less than 6 minutes, per the NMSU Urban Drainage Criteria, a minimum Tc of 6 minutes shall be used.

Post-development Basin Conditions - 100 Year Event Confluence Point		
Hydrologic Element Id	Volume	Peak Discharge
	(ft^3)	(ft^3/sec)
AP 1 – Total Northwest Flow	21,901	13.39
AP 2 – Total Southwest Flow	46,642	18.72
AP 3 – Total Offsite Flow	68,543	27.55

5.4 PONDING VOLUME CALCULATIONS

For the total development of the Doña Ana County Emergency Operations Center, all additional storm water from the development shall be routed through an on-site storm water network including storm water inlets, storm drains and detention ponds. The required ponding volume is listed below. The ponding area will be constructed at the time of the initial site construction.

10-Year Storm Water Volume Summary					
Hydrologic Element Id		Total Pre-Development Runoff Volume (ft^3)	Total Post-Development Runoff Volume [1] (ft^3)	Required Volume Retained [2] (ft^3)	Provided Pond Volume at High Water Elevation [3] (ft^3)
Pre-Model	Post-Model				
A1+A2	B2+B3+B4 +B5+B6	5,542	13,880	8,338	11,300
A3	B1+B7+B8 +B9+B10	12,944	19,892	6,948	16,418[4]
Total		**18,486**	**33,772**	**15,286**	**27,718**[5]

(1) – The summation of total Post-Development basins.
(2) – Volume difference between the total post-development runoff and pre-development runoff.
(3) – Pond volume retained at weir elevation/high water elevation.
(4) –Summation of pond volumes at high water elevation for South Pond and West Pond.
(5) –Summation of pond volumes at high water elevation for South Pond, North Pond and West Pond.

100-Year Storm Water Volume Summary					
Hydrologic Element Id		Total Pre-Development Runoff Volume (ft^3)	Total Post-Development Runoff Volume (1) (ft^3)	Required Volume Retained (2) (ft^3)	Provided Pond Volume at High Water Elevation (3) (ft^3)
Pre-Model	Post-Model				
A1+A2	B2+B3+B4 +B5+B6	24,060	33,202	9,142	11,300
A3	B1+B7+B8 +B9+B10	47,001	63,063	16,062	16,418(4)
Total		***71,061***	***96,265***	***25,204***	***27,718***(5)

(1) – The summation of total Post-Development basins.
(2) – Volume difference between the total post-development runoff and pre-development runoff.
(3) – Pond volume retained at weir elevation/high water elevation.
(4) –Summation of pond volumes at high water elevation for South Pond and West Pond.
(5) –Summation of pond volumes at high water elevation for South Pond, North Pond and West Pond.

6.0 HYDRAULICS

6.1 POND CONSTRUCTION

Summaries of the construction of the proposed ponds are as follows:

Proposed Pond Construction Summary								
Pond	Top Area (ft^2)	Bottom Area (ft^2)	Side Slope	Structure Depth (ft)	Slope Treatment	Outlet Structure	Weir Length (ft)	Design Volume at Highwater Elevation (ft^3)
North Pond	5,248	1,880	3.25:1	4.0	3" – 4" River Rock	Broad Crested Weir	10' 9"	11,300
South Pond	2,708	262	3.25:1	4.0	3" – 4" River Rock	Broad Crested Weir	5'	4,207
West Pond	5,500	2,146	3.25:1	4.0	3" – 4" River Rock	Broad Crested Weir	5'	12,211

The proposed ponds are anticipated to be constructed as summarized above. The total depth of the ponds is 4.0 feet with 0.5 feet of free board at the top of each pond. The North Pond and West Ponds will be constructed with broad crested weirs as the sole outlet structure with the bottom of the weirs being 3.50 feet from the bottom of the pond. The South pond will be constructed with a Nyloplast Drain basin as the sole outlet structure with the overflow invert of the drain basin being 3.50 feet from the bottom of the pond. Therefore the maximum allowable water depth in each pond is 3.50 feet. Refer to final grading and construction plans for pond and outlet elevations.

6.2 Storm Drain Networks

Multiple storm drain networks will be utilized to convey the 100-year design storm event from the project site's contributing basins to the on-site ponding areas and off-site outflow areas. Basins B2, B3 and B5 as shown on the post-development basin map in Appendix D.R.1 are designed to convey water directly off site to the northwest. One of the storm drains will route water from basin B6 into the north pond located within basin B4. The storm water from basin B6 will be routed via four (4) Nyloplast 2' x 3' High Flow Capacity Curb Inlets through a 24" ADS N-12 Storm Drain Pipe. The storm drain pipe will be approximately 316 feet in total flowing between inlets with slopes ranging from 4.25% to 3%. Basins B2, B3, B5 and the outflow from the north pond will flow off-site in the northwest direction.

Basins B8 and B9 as shown on the post-development basin map in Appendix D.R.1 will contribute water directly into the south pond. Storm water from basin B8 will sheet flow through the parking lot into a Nyloplast 2' x 3' High Flow Capacity Curb Inlet. The water from basin B8 will then be conveyed through a 18" ADS N-12 Storm Drain Pipe 46 feet in length with a 5.5% slope directly into the south pond. A majority of the storm water from basin B9 will sheet flow from the roof and surrounding area directly into the south pond. Storm water within the small courtyard area will be conveyed to the south pond via a 8" Nyloplast inline drain and a 6" ADS N-12 Storm Drain Pipe. Storm water overflow from the south pond will be routed into the west pond via a Nyloplast drain basin and a 18" ADS N-12 Storm Drain Pipe 100 feet in length with a 4.0% slope

Basins B1 and B7 as shown on the post-development basin map in Appendix D.R.1 will contribute water directly into the west pond. Storm water overflow from the south pond will also be routed through the west pond for flow dissipation measures. Storm water from basin B7 will sheet flow through the driving aisle into a Nyloplast 2' x 3' High Flow Capacity Curb Inlet. The water from basin B7 will then be conveyed through a 18" ADS N-12 Storm Drain Pipe 31 feet in length with a 12.25% slope directly into the west pond. Storm water from basin B1 will flow directly into the west pond.

Basin B10, an off-site basin contributing water to the development area, will remain mostly unchanged from pre-development conditions. The only alterations made to this basin are a small earthen berm to be constructed just east of the future expansion area of the development. This earthen berm is not anticipated to change flow rates of the off-site basin but will serve to divert the storm water around the project site. Storm water from Basin B10 is flowing generally in a southwest direction in the pre-development conditions towards a roadside swale running adjacent to Geothermal Drive. Post-development flows will follow the same path with a redesign of the roadside swale to better account for the flow rates of the basin. Storm water from basin B10 will eventually outflow from the swale and flow off-site in the southwest direction combining with the outflow from the west pond.

Calculations for capacities of culverts are found in Appendix D.R.4. Calculations accounted for sufficient capacity of culvert structures to pass runoff from the major storm considering general capacity credits for structures.

100-Year Storm Event Culvert Summary					
Culvert Structure	Contributing Hydrologic Element Id	Design Flow (cfs)	Culvert Diameter (in)	Minimum Required Culvert Slope (%)	Structure Capacity (cfs)
Storm Drain 1	B6	19.01	24	3.0	42.45
Storm Drain 2	B7	3.55	18	1.0	11.38
Storm Drain 3	B8	6.52	18	1.5	13.94
Storm Drain 4	South Pond Outflow	3.92	18	1.0	11.38
Storm Drain 5	B10/Swale Flow	18.72	24	2.5	38.75

6.3 CATCH BASIN CAPACITIES

The storm drain network will require a total of six (6) Nyloplast 2' x 3' High Flow Capacity Curb Inlets. Four of the inlets will collect and convey storm water from basin B6 along the north curb line. One (1) of the inlets will collect and convey storm water storm water from basin B7 along the west curb line. One (1) of the inlets will collect and convey storm water from Basin B8 along the south curb line. The storm drain network will also consist of an inline drain in the courtyard of the building and a Nyloplast Drain Basin located within the south pond that will convey overflow from the south pond into the west pond.

The capacities of the catch basin and standard grate inlet structures were calculated using the Nyloplast Inlet Capacity Charts, June 2012. Calculations for capacities of inlets are found in Appendix D.R.4. For this analysis at the inlet location, design head was taken as the height of the curb, 0.50 feet. The inlet structures were analyzed with a 35% inlet reduction factor allowing for 65% capacity of the maximum design flow through the inlet. The inlet structures shall be analyzed per the storm event hydraulic peak flow as listed below.

For the design of inlets within basin B6, the total allowable flow rate of all four (4) inlets must sum to be greater than the peak flow rate of basin B6. With basin B6 having a peak flow rate of 19.01 cfs, and accounting for a 35% inlet reduction factor, the four (4) inlets must have a cumulative capacity of 29.25 cfs. After design, the four (4) inlets within basin B6 have a total capacity of 46.2 cfs.

The inlets located within basins B7 and B8 must have 5.46 cfs and 10.04 cfs flow capacities respectively after accounting for a 35% inlet reduction factor. Each Nyloplast 2' x 3' High Flow Capacity Curb Inlet has a capacity of 11.55 cfs.

The six (6) Nyloplast 2' x 3' High Flow Capacity Curb Inlets meet the peak flow requirements of the post-development major storm event. Calculations for capacities of culverts are found in Appendix D.R.4.

7.0 CONCLUSIONS AND RECOMMENDATIONS

From the previously outlined analysis, this final drainage report details that the drainage system design will meet the requirements of the City of Las Cruces Development Code, Part II, Chapter 32 "Design Standards", Article III, Division 2 "Urban Drainage Criteria" and the NMSU Urban Drainage Criteria at the time the Final Drainage Report is submitted. Specifically:

- The post-development storm water discharge rate from the project site is less than the pre-development discharge rate.
- The total post-development storm water volume allowed to drain from the project site is less than the pre-development storm water volume generated prior to site development.

7.1 STORMWATER CONTROL

All excess storm water produced by the development will be contained in three (3) on-site storm water detention ponds. The ponds will be constructed at the time of site development. The proposed ponding areas shall contain, at a minimum, the difference between the pre-development and post-development 100-year storm events. The ponding area shall also be utilized to control the post-development storm water discharge rate to that equal to or less than the pre-development values. Storm water from the ponding area shall be allowed to discharge into the areas directly surrounding the ponding area and ultimately flow to the northwest and southwest of the project site similarly to pre-development conditions. These flows will be control released over weir structures to spread out the flow and keep the discharge velocities at a minimum. It shall be the responsibility of the developer to maintain the ponding area.

8.0 LIMITATIONS

For the purposes of the drainage report for the Doña Ana County Emergency Operations Center, the peak discharge rates and storm water volumes shall be kept at or below the calculated pre-development values. It is important to note that no additional storm water flow and volume is proposed to exit the property.

APPENDIX D.R.1

VICINITY MAP

FLOOD INSURANCE RATE MAPS

PRE-DEVELOPMENT BASIN MAP

POST-DEVELOPMENT BASIN MAP

SMA
Engineering
Environmental
Geomatics

SOUDER, MILLER & ASSOCIATES
3500 Sedona Hills ParkwayLas Cruces, NM 88011
Phone (575) 647-0799 Toll Free (800) 647-0799 Fax (575) 647-0680

VICINITY MAP

DOÑA ANA COUNTY OEM EMERGENCY OPERATIONS CENTER
TORTUGAS TRAIL
LAS CRUCES, NM

Designed	Drawn	Checked
MJ	DIF	MJ

Date: 10/8/24
Scale: 1' = 500'
Project No: 9331490
V-1

 P:\9-ASA DAC Emergency Mgmt Facility (9331490)\CAD\Civil\Drainage Exhibits\9331490 - Vicinity Map.dwg, DIF, 10/8/2024 7:41 AM

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey, SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D Boundary
CBRS and OPA Boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

(A)——(A)	Cross section line
(23)- - - - -(23)	Transect line
97° 07' 30", 32° 22' 30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4276000mE	1000-meter Universal Transverse Mercator grid values, zone 13N
600000 FT	5000-foot grid ticks: New Mexico State Plane coordinate system, Central zone (FIPSZONE 3002), Transverse Mercator
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index.

EFFECTIVE DATE OF COUNTYWIDE FLOOD
INSURANCE RATE MAP PANEL
SEPTEMBER 27, 1991

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

SEPTEMBER 3, 1992 - to add Base Flood Elevations, to change Special Flood Hazard Areas, to change zone designations, and to relfect updated topographic information.
SEPTEMBER 6, 1995 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Aresa, to change Special Flood Hazard Areas, to change zone designations, to advance the sufix, to add roads and road names, and to relfect updated topographic information.
JULY 6, 2016 - to update corporate limits, to change Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to add roads and road names, to incorporate previously issued Letters of Map Change, and to update map format.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1111G

FIRM

FLOOD INSURANCE RATE MAP

DONA ANA COUNTY, NEW MEXICO

AND INCORPORATED AREAS

PANEL 1111 OF 1925

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DONA ANA COUNTY (UNINCORPORATED AREAS)	350012	1111	G
LAS CRUCES, CITY OF	355332	1111	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
35013C1111G

MAP REVISED
JULY 6, 2016

Federal Emergency Management Agency

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SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D Boundary
- CBRS and OPA Boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 (EL 987) — Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- 97° 07' 30", 32° 22' 30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4276000mE — 1000-meter Universal Transverse Mercator grid values, zone 13N
- 600000 FT — 5000-foot grid ticks: New Mexico State Plane coordinate system, Central zone (FIPSZONE 3002), Transverse Mercator
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index.

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP PANEL
SEPTEMBER 27, 1991

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

SEPTEMBER 3, 1992 - to add Base Flood Elevations, to change Special Flood Hazard Areas, to change zone designations, and to reflect updated topographic information.
SEPTEMBER 6, 1995 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to advance the suffix, to add roads and road names, and to reflect updated topographic information.
JULY 6, 2016 - to update corporate limits, to change Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to add roads and road names, to incorporate previously issued Letters of Map Change, and to update map format.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1113G

FIRM

FLOOD INSURANCE RATE MAP

DONA ANA COUNTY, NEW MEXICO AND INCORPORATED AREAS

PANEL 1113 OF 1925

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

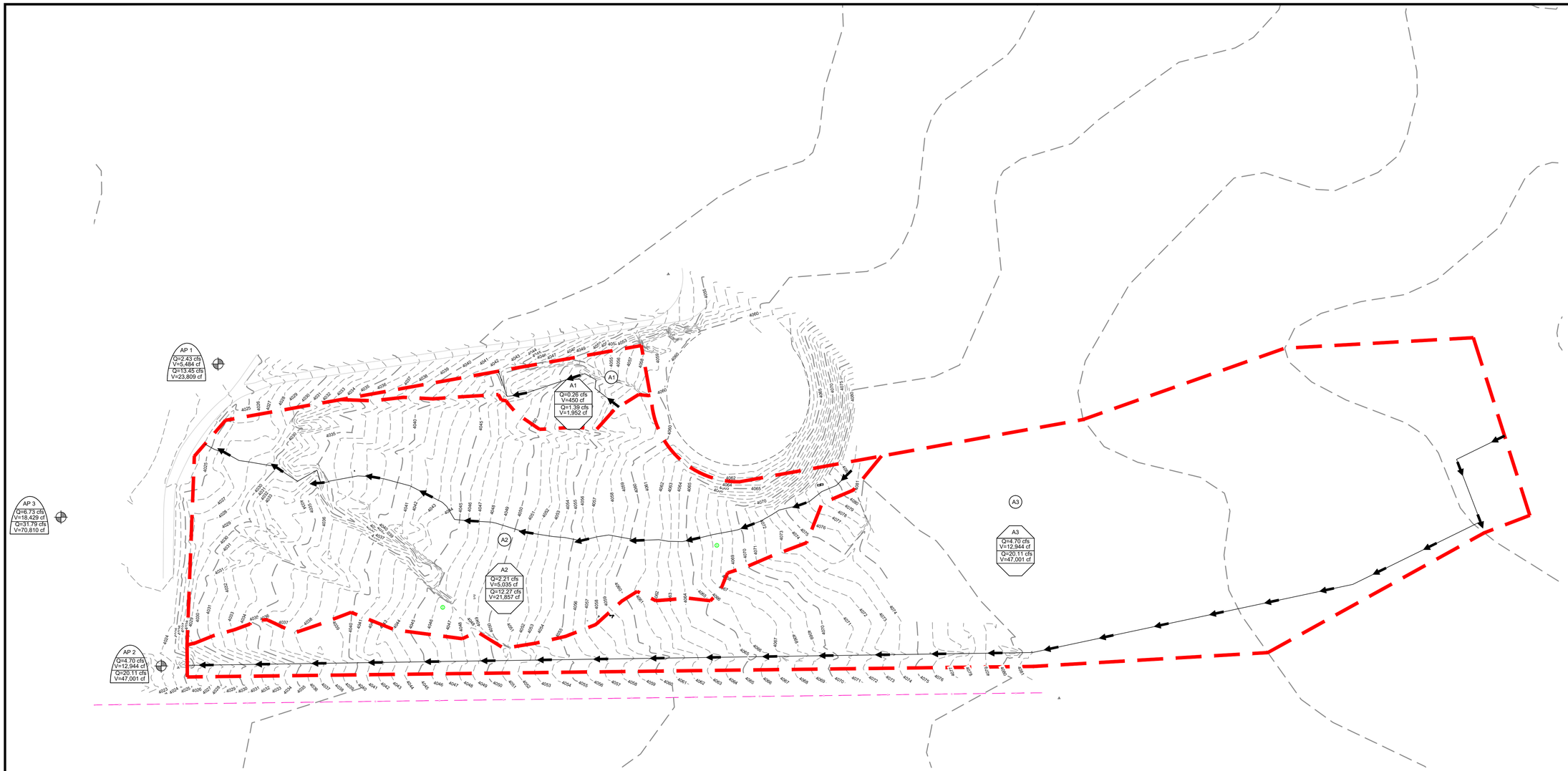
COMMUNITY	NUMBER	PANEL	SUFFIX
DONA ANA COUNTY (UNINCORPORATED AREAS)	350012	1113	G
LAS CRUCES, CITY OF	355332	1113	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
35013C1113G

MAP REVISED
JULY 6, 2016

Federal Emergency Management Agency



PRE DEVELOPMENT BASIN MAP

SCALE: 1" = 80'

N
W E
S

0 80' 60'

SCALE: 1" = 80'

BASIN LEGEND

BASIN FLOW POINTS ON MAP

- FLOW ENTERING BASIN

BASIN LABEL

X
Q=10 cfs
V=10 cf
Q=100 cfs
V=100 cf

Q=10, V=10

Q=100, V=100

- FLOW GENERATED WITHIN BASIN

BASIN LABEL

X
Q=10 cfs
V=10 cf
Q=100 cfs
V=100 cf

Q=10, V=10

Q=100, V=100

-FLOW EXITING BASIN

BASIN LABEL

X
Q=10 cfs
V=10 cf
Q=100 cfs
V=100 cf

Q=10, V=10

Q=100, V=100

DIRECTION OF FLOW

ANALYSIS POINT

GENERAL LEGEND

BASIN DESIGNATION

PRE-DEVELOPMENT BASIN BOUNDARY

POST-DEVELOPMENT BASIN BOUNDARY

PRE-DEVELOPMENT FLOW LINE

POST-DEVELOPMENT FLOW LINE

MAJOR CONTOUR (5' INTERVAL)

MINOR CONTOUR (1' INTERVAL)

A

Rev #	Date	Description	By	Chk'd
1	11/11/24	ADDENDUM NO. 1	DIF	MJ

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DOÑA ANA COUNTY

LAS CRUCES, NEW MEXICO

DOÑA ANA COUNTY OEM EMERGENCY OPERATIONS CENTER

TORTUGAS TRAIL - LAS CRUCES, NM

PRE DEVELOPMENT BASIN MAP

NOTE: THESE DRAWINGS ARE TO BE USED TO ACQUIRE PERMITS FROM JURISDICTIONAL GOVERNMENTAL AGENCIES AND ARE NOT TO BE RELIED UPON FOR PROJECT BIDDING PURPOSES OR FOR CONSTRUCTION UNTIL APPLICABLE CONSTRUCTION PERMITS ARE ISSUED.

THIS DRAWING IS INCOMPLETE AND NOT TO BE USED FOR CONSTRUCTION UNLESS IT IS STAMPED, SIGNED AND DATED.

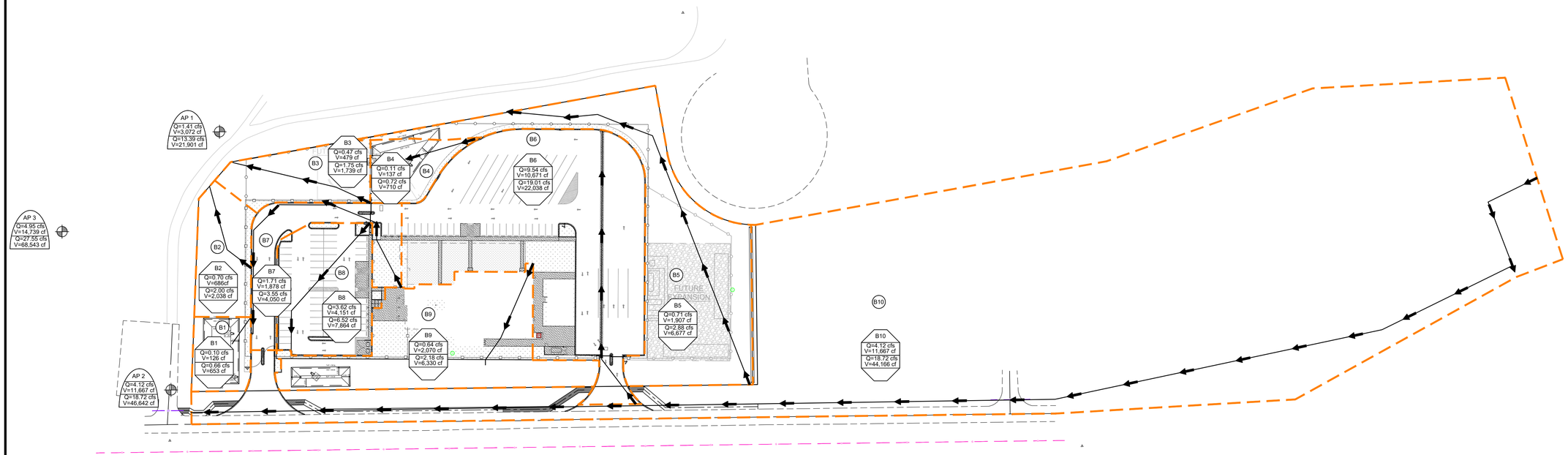
Designed	Drawn	Checked

Date: November 2024

Scale: Horiz: AS SHOWN
Vert:

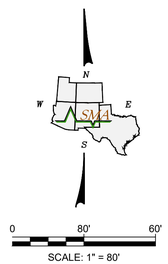
Project No: 9331490

Sheet: DS-1



POST DEVELOPMENT BASIN MAP

SCALE: 1" = 80'

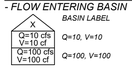


SCALE: 1" = 80'

BASIN LEGEND

BASIN FLOW POINTS ON MAP

- FLOW ENTERING BASIN

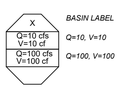


BASIN LABEL

Q=10, V=10

Q=100, V=100

- FLOW GENERATED WITHIN BASIN



BASIN LABEL

Q=10, V=10

Q=100, V=100

-FLOW EXITING BASIN

BASIN LABEL

Q=10, V=10

Q=100, V=100

DIRECTION OF FLOW

ANALYSIS POINT

GENERAL LEGEND

BASIN DESIGNATION	A
PRE-DEVELOPMENT BASIN BOUNDARY POST-DEVELOPMENT BASIN BOUNDARY	
PRE-DEVELOPMENT FLOW LINE	
POST-DEVELOPMENT FLOW LINE	
MAJOR CONTOUR (5' INTERVAL)	
MINOR CONTOUR (1' INTERVAL)	

Rev #	Date	Description	By	Chk'd
1	11/11/24	ADDENDUM NO. 1	DIF	MJ

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TORTUGAS TRAIL - LAS CRUCES, NM
POST DEVELOPMENT BASIN MAP

NOTE: THESE DRAWINGS ARE TO BE USED TO ACQUIRE PERMITS FROM JURISDICTIONAL GOVERNMENTAL AGENCIES AND ARE NOT TO BE RELIED UPON FOR PROJECT BIDDING PURPOSES OR FOR CONSTRUCTION UNTIL APPLICABLE CONSTRUCTION PERMITS ARE ISSUED.

THIS DRAWING IS INCOMPLETE AND NOT TO BE USED FOR CONSTRUCTION UNLESS IT IS STAMPED, SIGNED AND DATED

Designed	Drawn	Checked

Date: November 2024

Scale: Horiz: AS SHOWN
Vert:

Project No: 9331490

Sheet: DS-2

811 Professional Resources for Damage Prevention

To Request a Line Locate Dial 811

New Mexico state law requires everyone involved in any excavation to provide at least two working days' notice to owners of underground facilities when a dig is planned. All facility owners are then required to mark the locations of any underground lines or take other appropriate measures to protect them.

P:\9-ASA DAC Emergency Mgmt Facility (9331490)\CAD\Civil\Drainage Exhibits\9331490 - Basin Maps.dwg 1/21/2024 10:22 AM BCO

APPENDIX D.R.2

POINT PRECIPITATION FREQUENCY ESTIMATES

RAINFALL DISTRIBUTION

RUNOFF CURVE NUMBER TABLES

MANNING'S ROUGHNESS COEEFICIENTS REFERENCE DOCUMENTS

CUSTOM SOIL RESOURCE REPORT SOIL MAP

LAND USE SUMMARY AND WEIGHTED CN CALCULATIONS

NOAA Atlas 14, Volume 1, Version 5
Location name: Las Cruces, New Mexico, USA*
Latitude: 32.2813°, Longitude: -106.7332°
Elevation: 4036 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.219 (0.190-0.249)	0.284 (0.249-0.323)	0.381 (0.335-0.433)	0.458 (0.400-0.519)	0.560 (0.487-0.633)	0.643 (0.555-0.727)	0.728 (0.626-0.823)	0.818 (0.698-0.924)	0.940 (0.794-1.06)	1.04 (0.873-1.18)
10-min	0.333 (0.290-0.378)	0.432 (0.379-0.492)	0.580 (0.510-0.660)	0.697 (0.609-0.790)	0.852 (0.741-0.964)	0.978 (0.845-1.11)	1.11 (0.952-1.25)	1.24 (1.06-1.41)	1.43 (1.21-1.62)	1.58 (1.33-1.79)
15-min	0.413 (0.359-0.469)	0.535 (0.470-0.609)	0.719 (0.632-0.818)	0.864 (0.755-0.980)	1.06 (0.918-1.20)	1.21 (1.05-1.37)	1.37 (1.18-1.55)	1.54 (1.32-1.74)	1.77 (1.50-2.01)	1.96 (1.65-2.22)
30-min	0.556 (0.484-0.632)	0.721 (0.633-0.820)	0.969 (0.850-1.10)	1.16 (1.02-1.32)	1.42 (1.24-1.61)	1.63 (1.41-1.85)	1.85 (1.59-2.09)	2.08 (1.77-2.35)	2.39 (2.02-2.70)	2.64 (2.22-2.99)
60-min	0.688 (0.599-0.782)	0.892 (0.783-1.02)	1.20 (1.05-1.36)	1.44 (1.26-1.63)	1.76 (1.53-1.99)	2.02 (1.74-2.28)	2.29 (1.97-2.59)	2.57 (2.19-2.90)	2.96 (2.50-3.35)	3.27 (2.74-3.71)
2-hr	0.788 (0.694-0.892)	1.02 (0.904-1.16)	1.38 (1.22-1.56)	1.66 (1.46-1.87)	2.05 (1.78-2.30)	2.35 (2.03-2.64)	2.67 (2.29-2.99)	3.00 (2.55-3.37)	3.46 (2.90-3.88)	3.83 (3.17-4.30)
3-hr	0.831 (0.739-0.940)	1.07 (0.951-1.21)	1.43 (1.27-1.61)	1.71 (1.51-1.92)	2.09 (1.84-2.35)	2.40 (2.09-2.69)	2.72 (2.35-3.05)	3.06 (2.62-3.43)	3.52 (2.97-3.95)	3.90 (3.25-4.38)
6-hr	0.949 (0.847-1.06)	1.21 (1.08-1.36)	1.59 (1.42-1.78)	1.88 (1.66-2.09)	2.27 (2.00-2.53)	2.58 (2.26-2.87)	2.89 (2.52-3.22)	3.22 (2.78-3.59)	3.67 (3.13-4.10)	4.03 (3.41-4.51)
12-hr	1.04 (0.932-1.16)	1.32 (1.19-1.48)	1.72 (1.54-1.91)	2.02 (1.80-2.24)	2.41 (2.14-2.68)	2.72 (2.40-3.01)	3.03 (2.66-3.36)	3.34 (2.92-3.71)	3.76 (3.25-4.19)	4.10 (3.51-4.58)
24-hr	1.09 (1.01-1.18)	1.38 (1.27-1.50)	1.82 (1.66-1.99)	2.18 (1.96-2.42)	2.72 (2.37-3.11)	3.18 (2.69-3.74)	3.70 (3.00-4.52)	4.26 (3.33-5.44)	5.11 (3.80-6.97)	5.84 (4.13-8.44)
2-day	1.17 (1.08-1.27)	1.48 (1.37-1.61)	1.94 (1.78-2.12)	2.32 (2.10-2.57)	2.88 (2.53-3.27)	3.35 (2.86-3.91)	3.87 (3.19-4.69)	4.43 (3.53-5.55)	5.26 (3.97-7.03)	6.02 (4.36-8.48)
3-day	1.25 (1.15-1.36)	1.60 (1.47-1.73)	2.09 (1.92-2.28)	2.50 (2.26-2.75)	3.08 (2.71-3.47)	3.54 (3.05-4.10)	4.05 (3.39-4.85)	4.60 (3.72-5.67)	5.44 (4.20-7.10)	6.20 (4.62-8.52)
4-day	1.33 (1.23-1.45)	1.71 (1.57-1.86)	2.24 (2.05-2.45)	2.67 (2.42-2.94)	3.27 (2.89-3.67)	3.74 (3.24-4.30)	4.24 (3.58-5.01)	4.77 (3.91-5.79)	5.62 (4.43-7.16)	6.39 (4.87-8.57)
7-day	1.53 (1.41-1.67)	1.96 (1.81-2.14)	2.58 (2.38-2.81)	3.08 (2.80-3.38)	3.76 (3.34-4.20)	4.30 (3.74-4.92)	4.87 (4.14-5.72)	5.47 (4.53-6.60)	6.32 (5.02-7.96)	6.99 (5.40-9.14)
10-day	1.71 (1.57-1.87)	2.20 (2.02-2.40)	2.91 (2.66-3.17)	3.46 (3.14-3.80)	4.23 (3.76-4.72)	4.83 (4.21-5.52)	5.46 (4.65-6.39)	6.12 (5.08-7.36)	7.04 (5.62-8.79)	7.76 (6.04-10.0)
20-day	2.18 (2.01-2.37)	2.80 (2.58-3.04)	3.65 (3.36-3.96)	4.29 (3.92-4.68)	5.14 (4.61-5.69)	5.79 (5.11-6.53)	6.45 (5.59-7.42)	7.11 (6.04-8.37)	8.01 (6.59-9.76)	8.71 (7.00-10.9)
30-day	2.61 (2.41-2.82)	3.32 (3.06-3.60)	4.27 (3.94-4.63)	4.99 (4.56-5.44)	5.95 (5.34-6.59)	6.67 (5.91-7.52)	7.41 (6.43-8.52)	8.14 (6.92-9.59)	9.12 (7.51-11.1)	9.88 (7.97-12.4)
45-day	3.17 (2.92-3.43)	4.03 (3.73-4.36)	5.12 (4.75-5.54)	5.93 (5.46-6.43)	6.95 (6.32-7.63)	7.70 (6.92-8.58)	8.44 (7.46-9.55)	9.15 (7.95-10.6)	10.1 (8.54-12.0)	10.7 (8.96-13.1)
60-day	3.63 (3.35-3.93)	4.62 (4.28-5.00)	5.87 (5.44-6.34)	6.75 (6.23-7.32)	7.87 (7.18-8.62)	8.67 (7.82-9.62)	9.44 (8.41-10.6)	10.2 (8.90-11.7)	11.1 (9.52-13.1)	11.8 (9.94-14.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

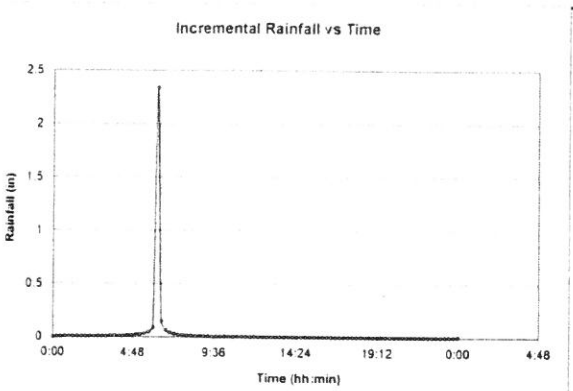
Back to Top

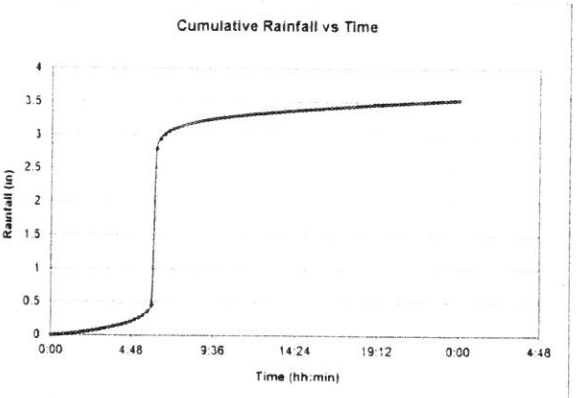
PF graphical

SCS Type II - 75% Rainfall Distribution

2-year total storm depth (in)	1.45	inches in 24 hours

Time	Unit Precipitation (Type II-75)	Unit Precipitation * Storm Depth	Incremental Rainfall (in)
0:00	0	0	0
0:15	0.001	0.00145	0.00145
0:30	0.002	0.0029	0.00145
0:45	0.004	0.0058	0.0029
1:00	0.006	0.0087	0.0029
1:15	0.008	0.0116	0.0029
1:30	0.0104	0.01508	0.00348
1:45	0.0129	0.018705	0.003625
2:00	0.0153	0.022185	0.00348
2:15	0.0177	0.025665	0.00348
2:30	0.0208	0.03016	0.004495
2:45	0.0239	0.034655	0.004495
3:00	0.027	0.03915	0.004495
3:15	0.0301	0.043645	0.004495
3:30	0.0345	0.050025	0.00638
3:45	0.0388	0.05626	0.006235
4:00	0.0432	0.06264	0.00638
4:15	0.0475	0.068875	0.006235
4:30	0.0533	0.077285	0.00841
4:45	0.0591	0.085695	0.00841
5:00	0.0673	0.097585	0.01189
5:15	0.0754	0.10933	0.011745
5:30	0.0863	0.125135	0.015805
5:45	0.1016	0.14732	0.022185
6:00	0.128	0.1856	0.03828
6:15	0.7895	1.144775	0.959175
6:30	0.8323	1.206835	0.06206
6:45	0.8516	1.23482	0.027985
7:00	0.8644	1.25338	0.01856
7:15	0.874	1.2673	0.01392
7:30	0.8808	1.27716	0.00986
7:45	0.8875	1.286875	0.009715
8:00	0.8926	1.29427	0.007395
8:15	0.8977	1.301665	0.007395
8:30	0.9013	1.306885	0.00522
8:45	0.905	1.31225	0.005365
9:00	0.9086	1.31747	0.00522
9:15	0.9122	1.32269	0.00522
9:30	0.9149	1.326605	0.003915
9:45	0.9176	1.33052	0.003915
10:00	0.9203	1.334435	0.003915
10:15	0.923	1.33835	0.003915
10:30	0.9252	1.34154	0.00319
10:45	0.9274	1.34473	0.00319
11:00	0.9296	1.34792	0.00319
11:15	0.9318	1.35111	0.00319
11:30	0.9337	1.353865	0.002755
11:45	0.9355	1.356475	0.00261
12:00	0.9374	1.35923	0.002755
12:15	0.9392	1.36184	0.00261
12:30	0.9409	1.364305	0.002465
12:45	0.9425	1.366625	0.00232
13:00	0.9442	1.36909	0.002465
13:15	0.9458	1.37141	0.00232
13:30	0.9475	1.373875	0.002465
13:45	0.9491	1.376195	0.00232
14:00	0.9508	1.37866	0.002465
14:15	0.9524	1.38098	0.00232
14:30	0.9539	1.383155	0.002175
14:45	0.9553	1.385185	0.00203
15:00	0.9568	1.38736	0.002175
15:15	0.9582	1.38939	0.00203
15:30	0.9596	1.39142	0.00203
15:45	0.9611	1.393595	0.002175
16:00	0.9625	1.395625	0.00203
16:15	0.964	1.3978	0.002175
16:30	0.9653	1.399685	0.001885
16:45	0.9666	1.40157	0.001885
17:00	0.9679	1.403455	0.001885
17:15	0.9692	1.40534	0.001885
17:30	0.9704	1.40708	0.00174
17:45	0.9717	1.408965	0.001885
18:00	0.973	1.41085	0.001885
18:15	0.9743	1.412735	0.001885
18:30	0.9755	1.414475	0.00174
18:45	0.9766	1.41607	0.001595
19:00	0.9778	1.41781	0.00174
19:15	0.979	1.41955	0.00174
19:30	0.9801	1.421145	0.001595
19:45	0.9813	1.422885	0.00174
20:00	0.9824	1.42448	0.001595
20:15	0.9836	1.42622	0.00174
20:30	0.9847	1.427815	0.001595
20:45	0.9858	1.42941	0.001595
21:00	0.9868	1.43086	0.00145
21:15	0.9879	1.432455	0.001595
21:30	0.989	1.43405	0.001595
21:45	0.9901	1.435645	0.001595
22:00	0.9911	1.437095	0.00145
22:15	0.9922	1.43869	0.001595
22:30	0.9932	1.44014	0.00145
22:45	0.9942	1.44159	0.00145
23:00	0.9951	1.442895	0.001305
23:15	0.9961	1.444345	0.00145
23:30	0.9971	1.445795	0.00145
23:45	0.9981	1.447245	0.00145
0:00	1	1.45	0.002755

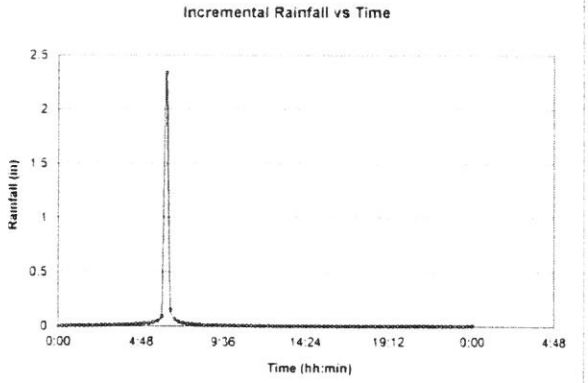


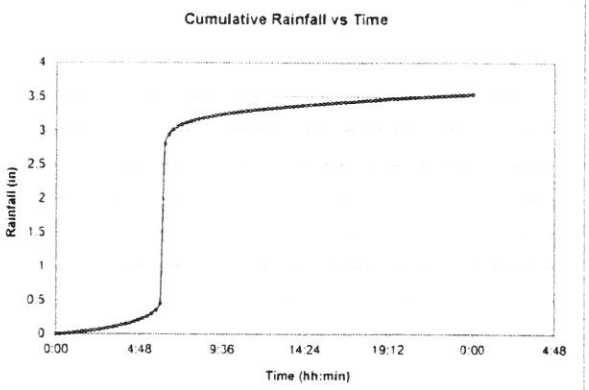


SCS Type II - 75% Rainfall Distribution

10-year total storm depth (in)	2.23	inches in 24 hours

Time	Unit Precipitation (Type II-75)	Unit Precipitation * Storm Depth	Incremental Rainfall (in)
0:00	0	0	0
0:15	0.001	0.00223	0.00223
0:30	0.002	0.00446	0.00223
0:45	0.004	0.00892	0.00446
1:00	0.006	0.01338	0.00446
1:15	0.008	0.01784	0.00446
1:30	0.0104	0.023192	0.005352
1:45	0.0129	0.028767	0.005575
2:00	0.0153	0.034119	0.005352
2:15	0.0177	0.039471	0.005352
2:30	0.0208	0.046384	0.006913
2:45	0.0239	0.053297	0.006913
3:00	0.027	0.06021	0.006913
3:15	0.0301	0.067123	0.006913
3:30	0.0345	0.076935	0.009812
3:45	0.0388	0.086524	0.009589
4:00	0.0432	0.096336	0.009812
4:15	0.0475	0.105925	0.009589
4:30	0.0533	0.118859	0.012934
4:45	0.0591	0.131793	0.012934
5:00	0.0673	0.150079	0.018286
5:15	0.0754	0.168142	0.018063
5:30	0.0863	0.192449	0.024307
5:45	0.1016	0.226568	0.034119
6:00	0.128	0.28544	0.058872
6:15	0.7895	1.760585	1.475145
6:30	0.8323	1.856029	0.095444
6:45	0.8516	1.899068	0.043039
7:00	0.8644	1.927612	0.028544
7:15	0.874	1.94902	0.021408
7:30	0.8808	1.964184	0.015164
7:45	0.8875	1.979125	0.014941
8:00	0.8926	1.990498	0.011373
8:15	0.8977	2.001871	0.011373
8:30	0.9013	2.009899	0.008028
8:45	0.905	2.01815	0.008251
9:00	0.9086	2.026178	0.008028
9:15	0.9122	2.034206	0.008028
9:30	0.9149	2.040227	0.006021
9:45	0.9176	2.046248	0.006021
10:00	0.9203	2.052269	0.006021
10:15	0.923	2.05829	0.006021
10:30	0.9252	2.063196	0.004906
10:45	0.9274	2.068102	0.004906
11:00	0.9296	2.073008	0.004906
11:15	0.9318	2.077914	0.004906
11:30	0.9337	2.082151	0.004237
11:45	0.9355	2.086165	0.004014
12:00	0.9374	2.090402	0.004237
12:15	0.9392	2.094416	0.004014
12:30	0.9409	2.098207	0.003791
12:45	0.9425	2.101775	0.003568
13:00	0.9442	2.105566	0.003791
13:15	0.9458	2.109134	0.003568
13:30	0.9475	2.112925	0.003791
13:45	0.9491	2.116493	0.003568
14:00	0.9508	2.120284	0.003791
14:15	0.9524	2.123852	0.003568
14:30	0.9539	2.127197	0.003345
14:45	0.9553	2.130319	0.003122
15:00	0.9568	2.133664	0.003345
15:15	0.9582	2.136786	0.003122
15:30	0.9596	2.139908	0.003122
15:45	0.9611	2.143253	0.003345
16:00	0.9625	2.146375	0.003122
16:15	0.964	2.14972	0.003345
16:30	0.9653	2.152619	0.002899
16:45	0.9666	2.155518	0.002899
17:00	0.9679	2.158417	0.002899
17:15	0.9692	2.161316	0.002899
17:30	0.9704	2.163992	0.002676
17:45	0.9717	2.166891	0.002899
18:00	0.973	2.16979	0.002899
18:15	0.9743	2.172689	0.002899
18:30	0.9755	2.175365	0.002676
18:45	0.9766	2.177818	0.002453
19:00	0.9778	2.180494	0.002676
19:15	0.979	2.18317	0.002676
19:30	0.9801	2.185623	0.002453
19:45	0.9813	2.188299	0.002676
20:00	0.9824	2.190752	0.002453
20:15	0.9836	2.193428	0.002676
20:30	0.9847	2.195881	0.002453
20:45	0.9858	2.198334	0.002453
21:00	0.9868	2.200564	0.00223
21:15	0.9879	2.203017	0.002453
21:30	0.989	2.20547	0.002453
21:45	0.9901	2.207923	0.002453
22:00	0.9911	2.210153	0.00223
22:15	0.9922	2.212606	0.002453
22:30	0.9932	2.214836	0.00223
22:45	0.9942	2.217066	0.00223
23:00	0.9951	2.219073	0.002007
23:15	0.9961	2.221303	0.00223
23:30	0.9971	2.223533	0.00223
23:45	0.9981	2.225763	0.00223
0:00	1	2.23	0.004237

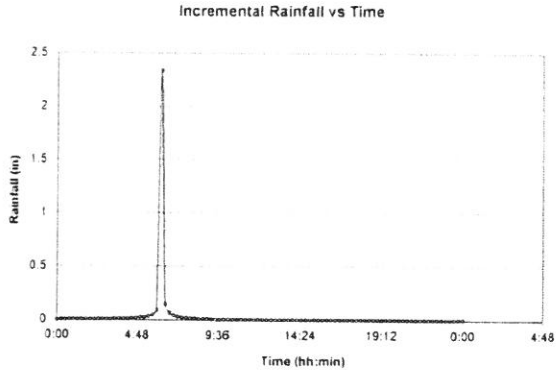




SCS Type II - 75% Rainfall Distribution

100-year total storm depth (in)	3.54	inches in 24 hours

Time	Unit Precipitation (Type II-75)	Unit Precipitation * Storm Depth	Incremental Rainfall (in)
0:00	0	0	0
0:15	0.001	0.00354	0.00354
0:30	0.002	0.00708	0.00354
0:45	0.004	0.01416	0.00708
1:00	0.006	0.02124	0.00708
1:15	0.008	0.02832	0.00708
1:30	0.0104	0.036816	0.008496
1:45	0.0129	0.045666	0.00885
2:00	0.0153	0.054162	0.008496
2:15	0.0177	0.062658	0.008496
2:30	0.0208	0.073632	0.010974
2:45	0.0239	0.084606	0.010974
3:00	0.027	0.09558	0.010974
3:15	0.0301	0.106554	0.010974
3:30	0.0345	0.12213	0.015576
3:45	0.0388	0.137352	0.015222
4:00	0.0432	0.152928	0.015576
4:15	0.0475	0.16815	0.015222
4:30	0.0533	0.188682	0.020532
4:45	0.0591	0.209214	0.020532
5:00	0.0673	0.238242	0.029028
5:15	0.0754	0.266916	0.028674
5:30	0.0863	0.305502	0.038586
5:45	0.1016	0.359664	0.054162
6:00	0.128	0.45312	0.093456
6:15	0.7895	2.79483	2.34171
6:30	0.8323	2.946342	0.151512
6:45	0.8516	3.014664	0.068322
7:00	0.8644	3.059976	0.045312
7:15	0.874	3.09396	0.033984
7:30	0.8808	3.118032	0.024072
7:45	0.8875	3.14175	0.023718
8:00	0.8926	3.159804	0.018054
8:15	0.8977	3.177858	0.018054
8:30	0.9013	3.190602	0.012744
8:45	0.905	3.2037	0.013098
9:00	0.9086	3.216444	0.012744
9:15	0.9122	3.229188	0.012744
9:30	0.9149	3.238746	0.009558
9:45	0.9176	3.248304	0.009558
10:00	0.9203	3.257862	0.009558
10:15	0.923	3.26742	0.009558
10:30	0.9252	3.275208	0.007788
10:45	0.9274	3.282996	0.007788
11:00	0.9296	3.290784	0.007788
11:15	0.9318	3.298572	0.007788
11:30	0.9337	3.305298	0.006726
11:45	0.9355	3.31167	0.006372
12:00	0.9374	3.318396	0.006726
12:15	0.9392	3.324768	0.006372
12:30	0.9409	3.330786	0.006018
12:45	0.9425	3.33645	0.005664
13:00	0.9442	3.342468	0.006018
13:15	0.9458	3.348132	0.005664
13:30	0.9475	3.35415	0.006018
13:45	0.9491	3.359814	0.005664
14:00	0.9508	3.365832	0.006018
14:15	0.9524	3.371496	0.005664
14:30	0.9539	3.376806	0.00531
14:45	0.9553	3.381762	0.004956
15:00	0.9568	3.387072	0.00531
15:15	0.9582	3.392028	0.004956
15:30	0.9596	3.396984	0.004956
15:45	0.9611	3.402294	0.00531
16:00	0.9625	3.40725	0.004956
16:15	0.964	3.41256	0.00531
16:30	0.9653	3.417162	0.004602
16:45	0.9666	3.421764	0.004602
17:00	0.9679	3.426366	0.004602
17:15	0.9692	3.430968	0.004602
17:30	0.9704	3.435216	0.004248
17:45	0.9717	3.439818	0.004602
18:00	0.973	3.44442	0.004602
18:15	0.9743	3.449022	0.004602
18:30	0.9755	3.45327	0.004248
18:45	0.9766	3.457164	0.003894
19:00	0.9778	3.461412	0.004248
19:15	0.979	3.46566	0.004248
19:30	0.9801	3.469554	0.003894
19:45	0.9813	3.473802	0.004248
20:00	0.9824	3.477696	0.003894
20:15	0.9836	3.481944	0.004248
20:30	0.9847	3.485838	0.003894
20:45	0.9858	3.489732	0.003894
21:00	0.9868	3.493272	0.00354
21:15	0.9879	3.497166	0.003894
21:30	0.989	3.50106	0.003894
21:45	0.9901	3.504954	0.003894
22:00	0.9911	3.508494	0.00354
22:15	0.9922	3.512388	0.003894
22:30	0.9932	3.515928	0.00354
22:45	0.9942	3.519468	0.00354
23:00	0.9951	3.522654	0.003186
23:15	0.9961	3.526194	0.00354
23:30	0.9971	3.529734	0.00354
23:45	0.9981	3.533274	0.00354
0:00	1	3.54	0.006726



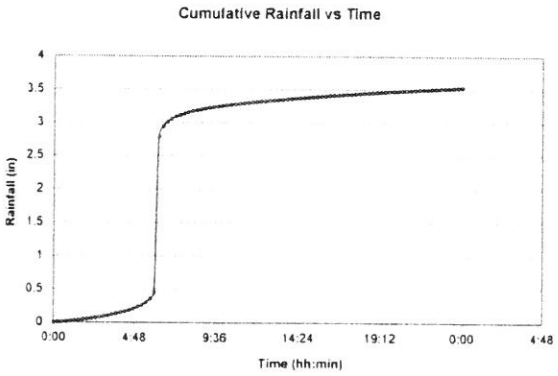


Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands [1/]

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment [2/]	Hydrologic condition [3/]	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

[1] Average runoff condition, and I_a=0.2S

[2] Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

[3] Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor*: <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 2-2d Runoff curve numbers for arid and semiarid rangelands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition [2/]	A [3/]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and I_a, = 0.2S. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.

Table 1.—Manning roughness coefficients, n [1]

	Manning's n range [2]
I. Closed conduits:	
A. Concrete pipe	0.011–0.013
B. Corrugated-metal pipe or pipe-arch:	
1. 2⅔ by ½-in. corrugation (riveted pipe): [3]	
a. Plain or fully coated	0.024
b. Paved invert (range values are for 25 and 50 percent of circumference paved):	
(1) Flow full depth	0.021–0.018
(2) Flow 0.8 depth	0.021–0.016
(3) Flow 0.6 depth	0.019–0.013
2. 6 by 2-in. corrugation (field bolted)	0.03
C. Vitrified clay pipe	0.012–0.014
D. Cast-iron pipe, uncoated	0.013
E. Steel pipe	0.009–0.011
F. Brick	0.014–0.017
G. Monolithic concrete:	
1. Wood forms, rough	0.015–0.017
2. Wood forms, smooth	0.012–0.014
3. Steel forms	0.012–0.013
H. Cemented rubble masonry walls:	
1. Concrete floor and top	0.017–0.022
2. Natural floor	0.019–0.025
I. Laminated treated wood	0.015–0.017
J. Vitrified clay liner plates	0.015
II. Open channels, lined [4] (straight alinement): [5]	
A. Concrete, with surfaces as indicated:	
1. Formed, no finish	0.013–0.017
2. Trowel finish	0.012–0.014
3. Float finish	0.013–0.015
4. Float finish, some gravel on bottom	0.015–0.017
5. Gunite, good section	0.016–0.019
6. Gunite, wavy section	0.018–0.022
B. Concrete, bottom float finished, sides as indicated:	
1. Dressed stone in mortar	0.015–0.017
2. Random stone in mortar	0.017–0.020
3. Cement rubble masonry	0.020–0.025
4. Cement rubble masonry, plastered	0.016–0.020
5. Dry rubble (riprap)	0.020–0.030
C. Gravel bottom, sides as indicated:	
1. Formed concrete	0.017–0.020
2. Random stone in mortar	0.020–0.023
3. Dry rubble (riprap)	0.023–0.033
D. Brick	0.014–0.017
E. Asphalt:	
1. Smooth	0.013
2. Rough	0.016
F. Wood, planed, clean	0.011–0.013
G. Concrete-lined excavated rock:	
1. Good section	0.017–0.020
2. Irregular section	0.022–0.027
III. Open channels, excavated [4] (straight alinement,[5] natural lining):	
A. Earth, uniform section:	
1. Clean, recently completed	0.016–0.018
2. Clean, after weathering	0.018–0.020
3. With short grass, few weeds	0.022–0.027
4. In gravelly soil, uniform section, clean	0.022–0.025
B. Earth, fairly uniform section:	
1. No vegetation	0.022–0.025
2. Grass, some weeds	0.025–0.030
3. Dense weeds or aquatic plants in deep channels	0.030–0.035
4. Sides clean, gravel bottom	0.025–0.030
5. Sides clean, cobble bottom	0.030–0.040
C. Dragline excavated or dredged:	
1. No vegetation	0.028–0.033
2. Light brush on banks	0.035–0.050
D. Rock:	
1. Based on design section	0.035
2. Based on actual mean section:	
a. Smooth and uniform	0.035–0.040
b. Jagged and irregular	0.040–0.045
E. Channels not maintained, weeds and brush uncut:	
1. Dense weeds, high as flow depth	0.08–0.12
2. Clean bottom, brush on sides	0.05–0.08
3. Clean bottom, brush on sides, highest stage of flow	0.07–0.11
4. Dense brush, high stage	0.10–0.14
IV. Highway channels and swales with maintained vegetation [6 7] (values shown are for velocities of 2 and 6 f.p.s.):	
A. Depth of flow up to 0.7 foot:	
1. Bermudagrass, Kentucky bluegrass, buffalograss:	
a. Mowed to 2 inches	0.07–0.045
b. Length 4–6 inches	0.09–0.05
2. Good stand, any grass:	
a. Length about 12 inches	0.18–0.09
b. Length about 24 inches	0.30–0.15
3. Fair stand, any grass:	
a. Length about 12 inches	0.14–0.08
b. Length about 24 inches	0.25–0.13
B. Depth of flow 0.7–1.5 feet:	
1. Bermudagrass, Kentucky bluegrass, buffalograss:	
a. Mowed to 2 inches	0.05–0.035
b. Length 4 to 6 inches	0.06–0.04
2. Good stand, any grass:	
a. Length about 12 inches	0.12–0.07
b. Length about 24 inches	0.20–0.10
3. Fair stand, any grass:	
a. Length about 12 inches	0.10–0.06
b. Length about 24 inches	0.17–0.09
V. Street and expressway gutters:	
A. Concrete gutter, troweled finish	0.012
B. Asphalt pavement:	
1. Smooth texture	0.013
2. Rough texture	0.016
C. Concrete gutter with asphalt pavement:	
1. Smooth	0.013
2. Rough	0.015
D. Concrete pavement:	
1. Float finish	0.014
2. Broom finish	0.016
E. For gutters with small slope, where sediment may accumulate, increase above values of n by	*0.002*
VI. Natural stream channels:[8]	
A. Minor streams [9] (surface width at flood stage less than 100 ft.):	
1. Fairly regular section:	
a. Some grass and weeds, little or no brush	0.030–0.035
b. Dense growth of weeds, depth of flow materially greater than weed height	0.035–0.05
c. Some weeds, light brush on banks	0.035–0.05
d. Some weeds, heavy brush on banks	0.05–0.07
e. Some weeds, dense willows on banks	0.06–0.08
f. For trees within channel, with branches submerged at high stage, increase all above values by	*0.01–0.02*
2. Irregular sections, with pools, slight channel meander; increase values given in 1a–e about	*0.01–0.02*
3. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stage:	
a. Bottom of gravel, cobbles, and few boulders	0.04–0.05
b. Bottom of cobbles, with large boulders	0.05–0.07
B. Flood plains (adjacent to natural streams):	
1. Pasture, no brush:	
a. Short grass	0.030–0.035
b. High grass	0.035–0.05
2. Cultivated areas:	
a. No crop	0.03–0.04
b. Mature row crops	0.035–0.045
c. Mature field crops	0.04–0.05
3. Heavy weeds, scattered brush	0.05–0.07
4. Light brush and trees: [10]	
a. Winter	0.05–0.06
b. Summer	0.06–0.08
5. Medium to dense brush: [10]	
a. Winter	0.07–0.11
b. Summer	0.10–0.16
6. Dense willows, summer, not bent over by current	0.15–0.20
7. Cleared land with tree stumps, 100–150 per acre:	
a. No sprouts	0.04–0.05
b. With heavy growth of sprouts	0.06–0.08
8. Heavy stand of timber, a few down trees, little undergrowth:	
a. Flood depth below branches	0.10–0.12
b. Flood depth reaches branches	0.12–0.16
C. Major streams (surface width at flood stage more than 100 ft.): Roughness coefficient is usually less than for minor streams of similar description on account of less effective resistance offered by irregular banks or vegetation on banks. Values of n may be somewhat reduced. Follow recommendation in publication cited [8] if possible. The value of n for larger streams of most regular section, with no boulders or brush, may be in the range of	0.028–0.033

Footnotes to table 1 appear at the top of page 101.

Manning's Roughness for Overland Flow	
Land Surface Type	**Manning n**
Urban:	
Concrete, Asphalt, or Gravel	0.005 - 0.015
Average Grass Cover	0.40
Rural Residential (1 - 10 acre lots, maintenance or grazing assumed)	0.40
Urban Residential (maintained lawns assumed, with effects of landscaping, driveways, roofs included in combined value):	
1 - 3 building units/acre	0.30
3 - 10 building units/acre	0.20
> 10 building units/acre	0.15
Commercial/Industrial (effects of landscaping, driveways, roofs included in combined value)	0.11
Grass:	
Average Grass Cover	0.40
Poor Grass Cover, Moderately Rough Surface	0.30 - 0.40
Light Turf	0.20
Dense Turf	0.17 - 0.80
Dense Grass	0.17 - 0.30
Bermuda Grass	0.30 - 0.48
Dense Shrubbery and Forest Litter	0.40
Natural:	
Short Grass Prairie	0.10 - 0.20
Poor Grass Cover, Moderately Rough Surface	0.30 - 0.40
Sparse Vegetation	0.05 - 0.13
Oak Grasslands, Open Grasslands	0.60
Dense Cover of Trees and Bushes	0.80
Rangeland:	
Typical	0.13
No Debris Cover	0.09 - 0.34
20% Debris Cover	0.05 - 0.25
Woods:	
Light Underbrush	0.40
Dense Underbrush	0.80
Rural Residential (1 - 10 acre lots, maintenance or grazing assumed)	0.40
Cultivated Areas:	
Bare Packed Soil (free of stone)	0.10
Fallow (no residue)	0.05
Conventional Tillage:	
No Residue	0.06 - 0.12
With Residue	0.16 - 0.22
Chisel Plow:	
No Residue	0.06 - 0.12
With Residue	0.10 - 0.16
Fall Disking (with residue)	0.30 - 0.50
No Till:	
No Residue Cover	0.04 - 0.10
20 - 40% Residue Cover	0.07 - 0.17
60 - 100% Residue Cover	0.17 - 0.47
Rural Residential (1 - 10 acre lots, maintenance or grazing assumed)	0.40

Sources:
-USACE, 1998, HEC-1 Flood Hydrograph Package User's Manual, Hydrologic Engineering Center, Davis, CA
-Soil Conservation Service, 1986, Urban Hydrology for Small Watersheds, Technical Release 55, U.S. Department of Agriculture, Washington, DC

Sheet flow

Sheet flow is flow over plane surfaces. It usually occurs in the headwater of streams. With sheet flow, the friction value (Manning's n) is an effective roughness coefficient that includes the effect of raindrop impact; drag over the plane surface; obstacles such as litter, crop ridges, and rocks; and erosion and transportation of sediment. These n values are for very shallow flow depths of about 0.1 foot or so. Table 3-1 gives Manning's n values for sheet flow for various surface conditions.

Table 3-1 Roughness coefficients (Manning's n) for sheet flow

Surface description	n [1/]
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover ≤20%	0.06
Residue cover >20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses [2/]	0.24
Bermudagrass .	0.41
Range (natural)	0.13
Woods:[3/]	
Light underbrush	0.40
Dense underbrush	0.80

1 The n values are a composite of information compiled by Engman (1986).

2 Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass, and native grass mixtures.

3 When selecting n , consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

For sheet flow of less than 300 feet, use Manning's kinematic solution (Overtop and Meadows 1976) to compute T_t:

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}} \qquad \text{[eq. 3-3]}$$

where:

T_t = travel time (hr),
n = Manning's roughness coefficient (table 3-1)
L = flow length (ft)
P_2 = 2-year, 24-hour rainfall (in)
s = slope of hydraulic grade line (land slope, ft/ft)

This simplified form of the Manning's kinematic solution is based on the following: (1) shallow steady uniform flow, (2) constant intensity of rainfall excess (that part of a rain available for runoff), (3) rainfall duration of 24 hours, and (4) minor effect of infiltration on travel time. Rainfall depth can be obtained from appendix B.

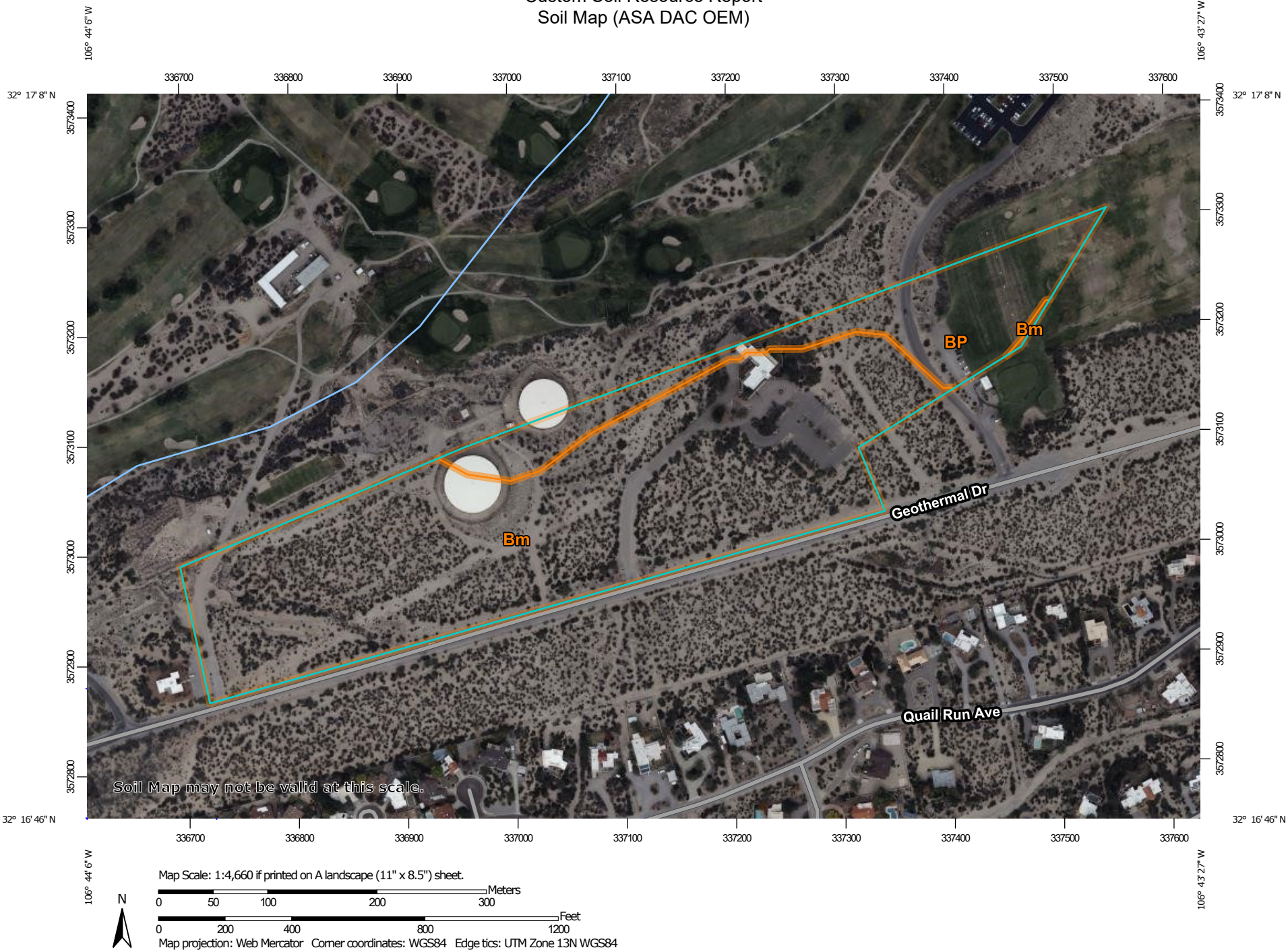
Shallow concentrated flow

After a maximum of 300 feet, sheet flow usually becomes shallow concentrated flow. The average velocity for this flow can be determined from figure 3-1, in which average velocity is a function of watercourse slope and type of channel. For slopes less than 0.005 ft/ft, use equations given in appendix F for figure 3-1. Tillage can affect the direction of shallow concentrated flow. Flow may not always be directly down the watershed slope if tillage runs across the slope.

After determining average velocity in figure 3-1, use equation 3-1 to estimate travel time for the shallow concentrated flow segment.

Open channels

Open channels are assumed to begin where surveyed cross section information has been obtained, where channels are visible on aerial photographs, or where blue lines (indicating streams) appear on United States Geological Survey (USGS) quadrangle sheets. Manning's equation or water surface profile information can be used to estimate average flow velocity. Average flow velocity is usually determined for bankfull elevation.



Map Scale: 1:4,660 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

LAND USE SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

PROJECT: ASA DAC Emergency Mgmt Facility
PROJECT#: 9331490
CLIENT: ASA Architects
LAND STATUS: Pre-Development A1-A3 10/14/2024

RUNOFF CURVE NUMBERS

Soil Group	Impervious	Natural Cover	Cleared Area	Desert L/S Area	Gravel Area
A	98	63	77	63	76
B	98	77	86	77	85
C	98	85	91	85	89
D	98	88	94	88	91

LAND USE AREA SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
A1	R/W	0.00	0%	0.0	0%	0.0	0%	0.0	0%	0.0	0%	0.0
	Lots	0.00	0%	0.0	0%	0.0	0%	0.0	0%	0.0	0%	0.0
	Community Development	0.00	0%	0.0	0%	0.0	0%	0.0	0%	0.0	0%	0.0
ACRES	Existing Conditions	0.60	0%	0.0	80%	0.5	20%	0.1	0%	0.0	0%	0.0
0.60	TOTAL	0.60		0.00		0.48		0.12		0.00		0.00

		Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
HSC	% Area		Acres		Acres		Acres		Acres		Acres
A	100%		0.0		0.5		0.1		0.0		0.0
B	0%		0.0		0.0		0.0		0.0		0.0
C	0%		0.0		0.0		0.0		0.0		0.0
D	0%		0.0		0.0		0.0		0.0		0.0
TOTAL			0.00		0.48		0.12		0.00		0.00
									Weighted CN		**66**

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
A2	R/W	0.00	0%	0.0	0%	0.0	0%	0.0	0%	0.0	0%	0.0
	Lots	0.00	0%	0.0	0%	0.0	0%	0.0	0%	0.0	0%	0.0
	Community Development	0.00	0%	0.0	0%	0.0	0%	0.0	0%	0.0	0%	0.0
ACRES	Existing Conditions	6.69	0%	0.0	80%	5.35	20%	1.3	0%	0.0	0%	0.0
6.69	TOTAL	6.69		0.00		5.35		1.34		0.00		0.00

		Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
HSC	% Area		Acres		Acres		Acres		Acres		Acres
A	100%		0.0		5.4		1.3		0.0		0.0
B	0%		0.0		0.00		0.0		0.0		0.0
C	0%		0.0		0.0		0.0		0.0		0.0
D	0%		0.0		0.0		0.0		0.0		0.0
TOTAL			0.00		5.35		1.34		0.00		0.00
									Weighted CN		**66**

LAND USE SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

PROJECT: ASA DAC Emergency Mgmt Facility
PROJECT#: 9331490
CLIENT: ASA Architects
LAND STATUS: Pre-Development A1-A3 10/14/2024

RUNOFF CURVE NUMBERS

Soil Group	Impervious	Natural Cover	Cleared Area	Desert L/S Area	Gravel Area
A	98	63	77	63	76
B	98	77	86	77	85
C	98	85	91	85	89
D	98	88	94	88	91

LAND USE AREA SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
A3	R/W	0.00	0%	0.0	0%	0.0	0%	0.0	0%	0.0	0%	0.0
	Lots	0.00	0%	0.0	0%	0.0	0%	0.0	0%	0.0	0%	0.0
	Community Development	0.00	0%	0.0	0%	0.0	0%	0.0	0%	0.0	0%	0.0
ACRES	Existing Conditions	11.34	20%	2.3	77%	8.73	0%	0.0	3%	0.3	0%	0.0
11.34	TOTAL	11.34		2.27		8.73		0.00		0.35		0.00

		Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
HSC	% Area		Acres		Acres		Acres		Acres		Acres
A	100%		2.3		8.7		0.0		0.3		0.0
B	0%		0.0		0.00		0.0		0.0		0.0
C	0%		0.0		0.0		0.0		0.0		0.0
D	0%		0.0		0.0		0.0		0.0		0.0
TOTAL			2.27		8.73		0.00		0.35		0.00
									Weighted CN		**70**

LAND USE SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

PROJECT: ASA DAC Emergency Mgmt Facility
PROJECT#: 9331490
CLIENT: ASA Architects
LAND STATUS: Post-Development B1-B10 11/6/2024

RUNOFF CURVE NUMBERS

Soil Group	Impervious	Natural Cover	Cleared Area	Desert L/S Area	Gravel Area
A	98	63	77	63	76
B	98	77	86	77	85
C	98	85	91	85	89
D	98	88	94	88	91

LAND USE AREA SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
B1	R/W	0.00	0%	0.00	0%	0.00	0%	0.00	10%	0.00	0%	0.00
	Lots	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Community Development	0.23	0%	0.00	0%	0.00	0%	0.00	100%	0.23	0%	0.00
ACRES	Existing Conditions	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
0.23	TOTAL	0.23		0.00		0.00		0.00		0.23		0.00

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
	HSC	% Area		Acres		Acres		Acres		Acres		Acres
	A	100%		0.00		0.00		0.00		0.23		0.00
	B	0%		0.00		0.00		0.00		0.00		0.00
	C	0%		0.00		0.00		0.00		0.00		0.00
	D	0%		0.00		0.00		0.00		0.00		0.00
	TOTAL	100%		0.00		0.00		0.00		0.23		0.00
									Weighted CN			**63**

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
B2	R/W	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Lots	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Community Development	0.36	0%	0.00	0%	0.00	95%	0.35	5%	0.02	0%	0.00
ACRES	Existing Conditions	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
0.36	TOTAL	0.36		0.00		0.00		0.35		0.02		0.00

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
	HSC	% Area		Acres		Acres		Acres		Acres		Acres
	A	100%		0.00		0.00		0.35		0.02		0.00
	B	0%		0.00		0.00		0.00		0.00		0.00
	C	0%		0.00		0.00		0.00		0.00		0.00
	D	0%		0.00		0.00		0.00		0.00		0.00
	TOTAL	100%		0.00		0.00		0.35		0.02		0.00
									Weighted CN			**76**

LAND USE SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

PROJECT: ASA DAC Emergency Mgmt Facility
PROJECT#: 9331490
CLIENT: ASA Architects
LAND STATUS: Post-Development B1-B10 11/6/2024

RUNOFF CURVE NUMBERS

Soil Group	Impervious	Natural Cover	Cleared Area	Desert L/S Area	Gravel Area
A	98	63	77	63	76
B	98	77	86	77	85
C	98	85	91	85	89
D	98	88	94	88	91

LAND USE AREA SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
B3	R/W	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Lots	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Community Development	0.41	0%	0.00	0%	0.00	50%	0.21	50%	0.21	0%	0.00
ACRES	Existing Conditions	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
0.41	TOTAL	0.41		0.00		0.00		0.21		0.21		0.00

		Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
HSC	% Area		Acres		Acres		Acres		Acres		Acres
A	100%		0.00		0.00		0.21		0.21		0.00
B	0%		0.00		0.00		0.00		0.00		0.00
C	0%		0.00		0.00		0.00		0.00		0.00
D	0%		0.00		0.00		0.00		0.00		0.00
TOTAL	100%		0.00		0.00		0.21		0.21		0.00
									Weighted CN		**70**

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
B4	R/W	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Lots	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Community Development	0.25	0%	0.00	0%	0.00	0%	0.00	100%	0.25	0%	0.00
ACRES	Existing Conditions	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
0.25	TOTAL	0.25		0.00		0.00		0.00		0.25		0.00

		Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
HSC	% Area		Acres		Acres		Acres		Acres		Acres
A	100%		0.00		0.00		0.00		0.25		0.00
B	0%		0.00		0.00		0.00		0.00		0.00
C	0%		0.00		0.00		0.00		0.00		0.00
D	0%		0.00		0.00		0.00		0.00		0.00
TOTAL	100%		0.00		0.00		0.00		0.25		0.00
									Weighted CN		**63**

LAND USE SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

PROJECT: ASA DAC Emergency Mgmt Facility
PROJECT#: 9331490
CLIENT: ASA Architects
LAND STATUS: Post-Development B1-B10 11/6/2024

RUNOFF CURVE NUMBERS

Soil Group	Impervious	Natural Cover	Cleared Area	Desert L/S Area	Gravel Area
A	98	63	77	63	76
B	98	77	86	77	85
C	98	85	91	85	89
D	98	88	94	88	91

LAND USE AREA SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
B5	R/W	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Lots	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Community Development	1.53	0%	0.00	0%	0.00	10%	0.15	40%	0.61	50%	0.76
ACRES	Existing Conditions	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1.53	TOTAL	1.53		0.00		0.00		0.15		0.61		0.76

		Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
HSC	% Area		Acres		Acres		Acres		Acres		Acres
A	100%		0.00		0.00		0.15		0.61		0.76
B	0%		0.00		0.00		0.00		0.00		0.00
C	0%		0.00		0.00		0.00		0.00		0.00
D	0%		0.00		0.00		0.00		0.00		0.00
TOTAL	100%		0.00		0.00		0.15		0.61		0.76

Weighted CN **71**

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
B6	R/W	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Lots	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Community Development	2.28	81%	1.85	0%	0.00	0%	0.00	19%	0.43	0%	0.00
ACRES	Existing Conditions	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
2.28	TOTAL	2.28		1.85		0.00		0.00		0.43		0.00

		Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
HSC	% Area		Acres		Acres		Acres		Acres		Acres
A	100%		1.85		0.00		0.00		0.43		0.00
B	0%		0.00		0.00		0.00		0.00		0.00
C	0%		0.00		0.00		0.00		0.00		0.00
D	0%		0.00		0.00		0.00		0.00		0.00
TOTAL	100%		1.85		0.00		0.00		0.43		0.00

Weighted CN **91**

LAND USE SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

PROJECT: ASA DAC Emergency Mgmt Facility
PROJECT#: 9331490
CLIENT: ASA Architects
LAND STATUS: Post-Development B1-B10 11/6/2024

RUNOFF CURVE NUMBERS

Soil Group	Impervious	Natural Cover	Cleared Area	Desert L/S Area	Gravel Area
A	98	63	77	63	76
B	98	77	86	77	85
C	98	85	91	85	89
D	98	88	94	88	91

LAND USE AREA SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
B7	R/W	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Lots	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Community Development	0.45	75%	0.34	0%	0.00	0%	0.00	25%	0.11	0%	0.00
ACRES	Existing Conditions	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
0.45	TOTAL	0.45		0.34		0.00		0.00		0.11		0.00

		Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
HSC	% Area		Acres		Acres		Acres		Acres		Acres
A	100%		0.34		0.00		0.00		0.11		0.00
B	0%		0.00		0.00		0.00		0.00		0.00
C	0%		0.00		0.00		0.00		0.00		0.00
D	0%		0.00		0.00		0.00		0.00		0.00
TOTAL	100%		0.34		0.00		0.00		0.11		0.00

Weighted CN 89

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
B8	R/W	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Lots	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Community Development	0.67	92%	0.61	0%	0.00	0%	0.00	8%	0.05	0%	0.00
ACRES	Existing Conditions	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
0.67	TOTAL	0.67		0.61		0.00		0.00		0.05		0.00

		Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
HSC	% Area		Acres		Acres		Acres		Acres		Acres
A	100%		0.61		0.00		0.00		0.05		0.00
B	0%		0.00		0.00		0.00		0.00		0.00
C	0%		0.00		0.00		0.00		0.00		0.00
D	0%		0.00		0.00		0.00		0.00		0.00
TOTAL	100%		0.61		0.00		0.00		0.05		0.00

Weighted CN 95

LAND USE SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

PROJECT: ASA DAC Emergency Mgmt Facility
PROJECT#: 9331490
CLIENT: ASA Architects
LAND STATUS: Post-Development B1-B10 11/6/2024

RUNOFF CURVE NUMBERS

Soil Group	Impervious	Natural Cover	Cleared Area	Desert L/S Area	Gravel Area
A	98	63	77	63	76
B	98	77	86	77	85
C	98	85	91	85	89
D	98	88	94	88	91

LAND USE AREA SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
B9	R/W	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Lots	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Community Development	1.20	35%	0.42	0%	0.00	0%	0.00	65%	0.78	0%	0.00
ACRES	Existing Conditions	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1.20	TOTAL	1.20		0.42		0.00		0.00		0.78		0.00

		Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
HSC	% Area		Acres		Acres		Acres		Acres		Acres
A	100%		0.42		0.00		0.00		0.78		0.00
B	0%		0.00		0.00		0.00		0.00		0.00
C	0%		0.00		0.00		0.00		0.00		0.00
D	0%		0.00		0.00		0.00		0.00		0.00
TOTAL	100%		0.42		0.00		0.00		0.78		0.00

Weighted CN **75**

			Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
Basin	Land Use	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
B10	R/W	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Lots	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	Community Development	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
ACRES	Existing Conditions	11.23	18%	2.02	73%	8.20	0%	0.00	9%	1.01	0%	0.00
11.23	TOTAL	11.23		2.02		8.20		0.00		1.01		0.00

		Impervious		Natural Cover		Cleared Cover		Desert Landscape		Gravel Cover	
HSC	% Area		Acres		Acres		Acres		Acres		Acres
A	100%		2.02		8.20		0.00		1.01		0.00
B	0%		0.00		0.00		0.00		0.00		0.00
C	0%		0.00		0.00		0.00		0.00		0.00
D	0%		0.00		0.00		0.00		0.00		0.00
TOTAL	100%		2.02		8.20		0.00		1.01		0.00

Weighted CN **69**

LAND USE SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

PROJECT: ASA DAC Emergency Mgmt Facility
PROJECT#: 9331490
CLIENT: ASA Architects

LAND STATUS: Post-Development B1-B10 11/6/2024

RUNOFF CURVE NUMBERS

Soil Group	Impervious	Natural Cover	Cleared Area	Desert L/S Area	Gravel Area
A	98	63	77	63	76
B	98	77	86	77	85
C	98	85	91	85	89
D	98	88	94	88	91

LAND USE AREA SUMMARY & WEIGHTED CURVE NUMBER CALCULATIONS

APPENDIX D.R.3

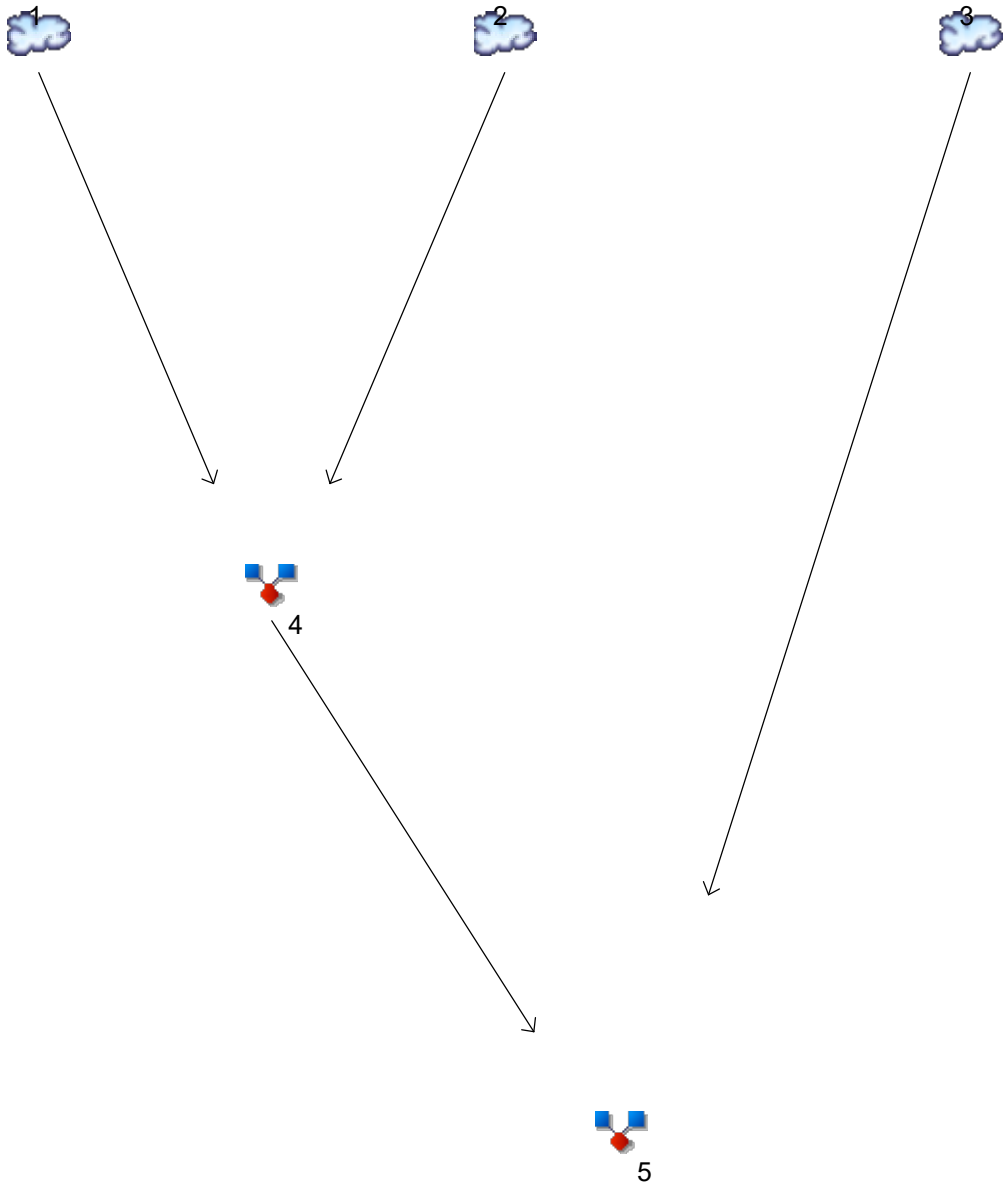
PRE-DEVELOPMENT ANALYSIS

POST-DEVELOPMENT ANALYSIS

PRE-DEVELOPMENT

SCHEMATIC MAP

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	A1
2	SCS Runoff	A2
3	SCS Runoff	A3
4	Combine	AP 1 - Northwest Offsite Flow
5	Combine	Total

PRE-DEVELOPMENT

BASIN HYDROGRAPHS AND TC CALCULATIONS

10-YEAR STORM EVENT

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

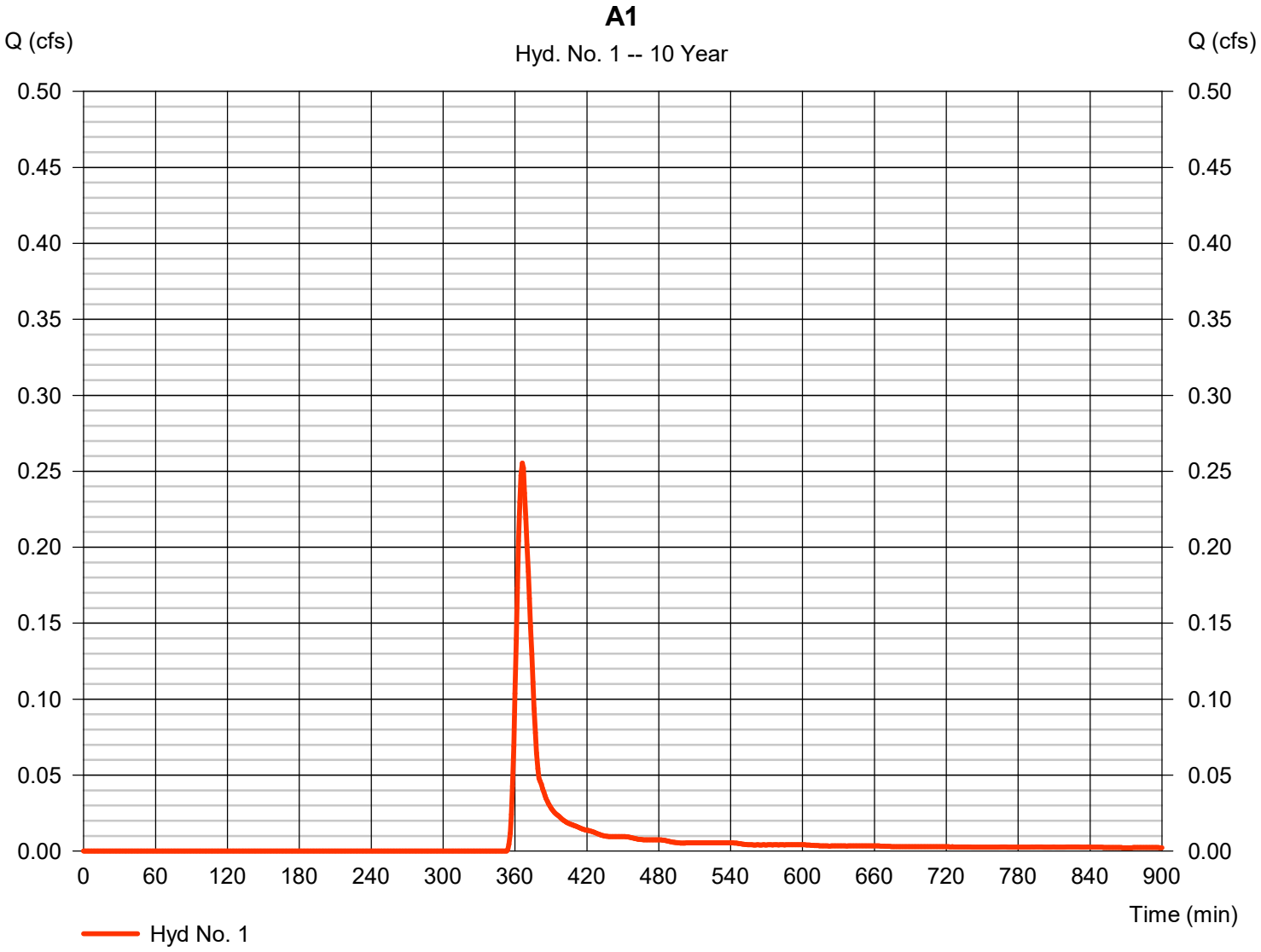
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.255	1	366	450	------	------	------	A1
2	SCS Runoff	2.208	1	369	5,035	------	------	------	A2
3	SCS Runoff	4.701	1	374	12,944	------	------	------	A3
4	Combine	2.426	1	369	5,484	1, 2,	------	------	AP 1 - Northwest Offsite Flow
5	Combine	6.731	1	373	18,429	3, 4	------	------	Total

Hydrograph Report

Hyd. No. 1

A1

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.255 cfs
Storm frequency	=	10 yrs	Time to peak	=	366 min
Time interval	=	1 min	Hyd. volume	=	450 cuft
Drainage area	=	0.600 ac	Curve number	=	66
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.50 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

Hyd. No. 1

A1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.090		0.011		0.011		
Flow length (ft)	= 249.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 1.38		0.00		0.00		
Land slope (%)	= 7.00		0.00		0.00		
Travel Time (min)	**= 12.46**	**+**	**0.00**	**+**	**0.00**	**=**	**12.46**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00		0.00		0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

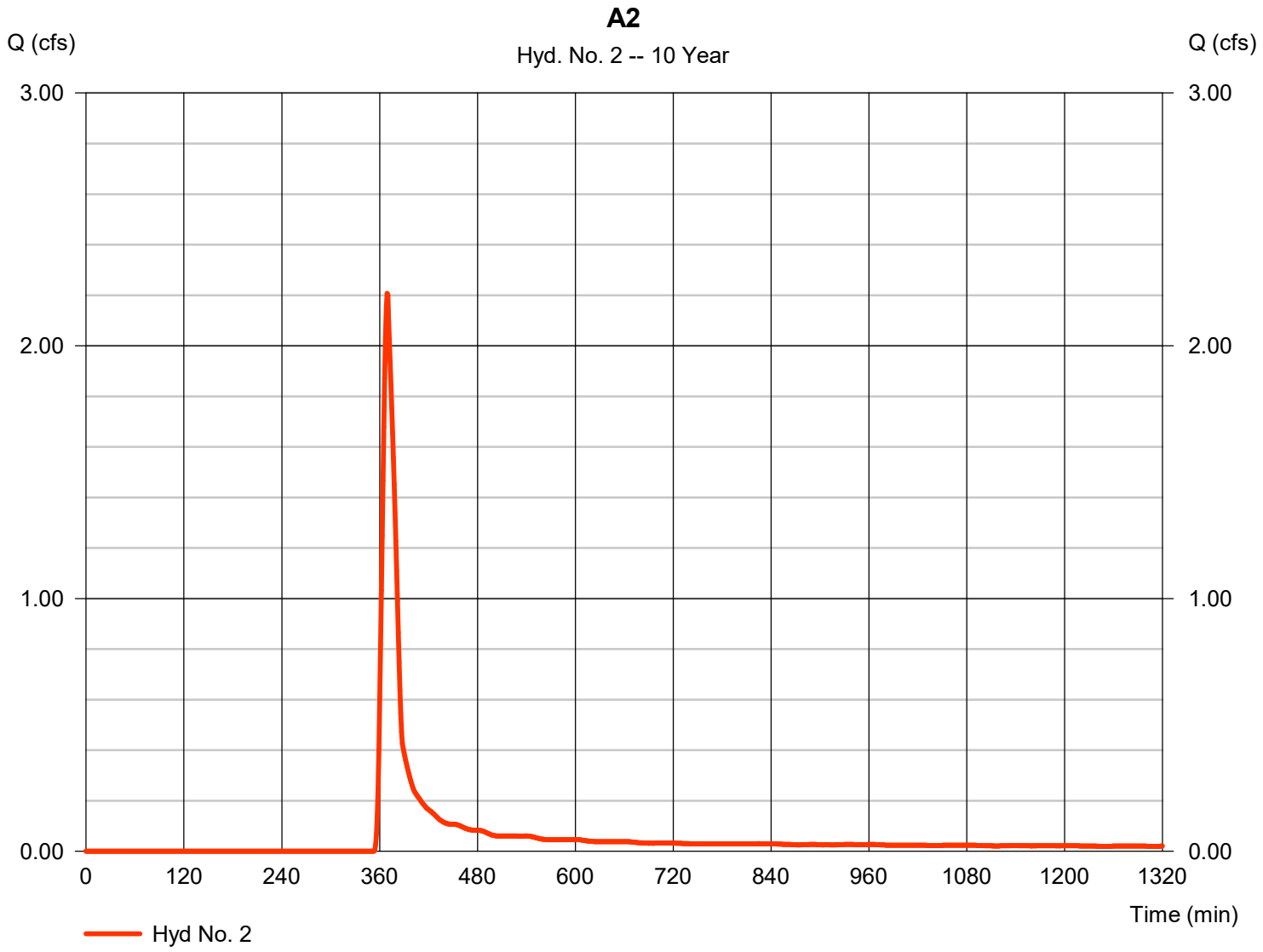
Total Travel Time, Tc ..... 12.50 min

Hydrograph Report

Hyd. No. 2

A2

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.208 cfs
Storm frequency	=	10 yrs	Time to peak	=	369 min
Time interval	=	1 min	Hyd. volume	=	5,035 cuft
Drainage area	=	6.690 ac	Curve number	=	66
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	18.40 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\4 Final Drainage Repor	Shape factor	=	484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

Hyd. No. 2

A2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.090		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 1.38		1.38		0.00		
Land slope (%)	= 6.50		0.00		0.00		
Travel Time (min)	**= 14.90**	**+**	**0.00**	**+**	**0.00**	**=**	**14.90**
Shallow Concentrated Flow							
Flow length (ft)	= 799.00		0.00		0.00		
Watercourse slope (%)	= 5.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.78		0.00		0.00		
Travel Time (min)	**= 3.52**	**+**	**0.00**	**+**	**0.00**	**=**	**3.52**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

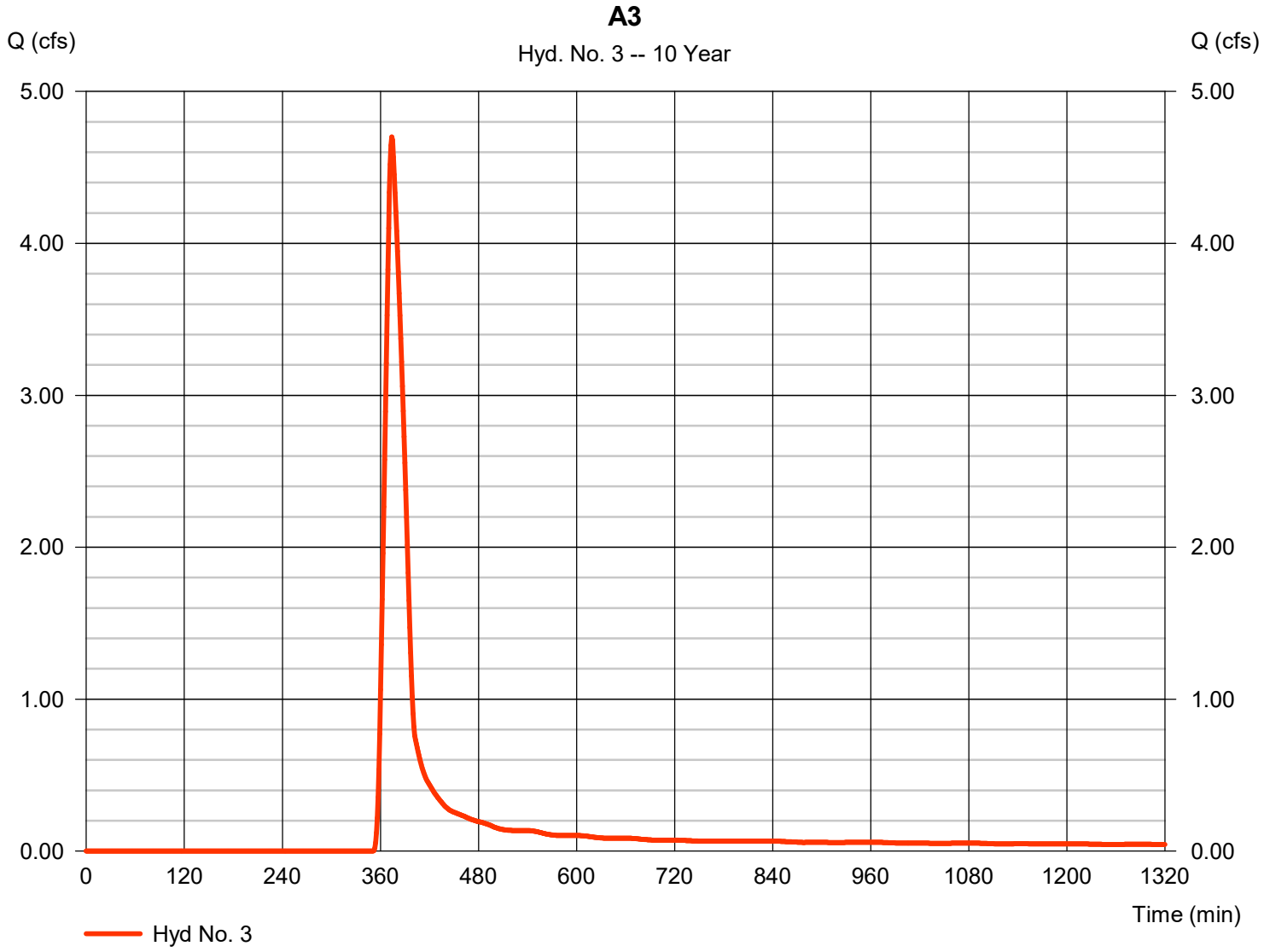
Total Travel Time, Tc ..... 18.40 min

Hydrograph Report

Hyd. No. 3

A3

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.701 cfs
Storm frequency	=	10 yrs	Time to peak	=	374 min
Time interval	=	1 min	Hyd. volume	=	12,944 cuft
Drainage area	=	11.340 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	26.40 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\4 Final Drainage Repor	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 3

A3

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.090		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 1.38		0.00		0.00		
Land slope (%)	= 4.00		0.00		0.00		
Travel Time (min)	**= 18.10**	**+**	**0.00**	**+**	**0.00**	**=**	**18.10**
Shallow Concentrated Flow							
Flow length (ft)	= 621.00		1321.00		0.00		
Watercourse slope (%)	= 5.00		4.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.61		4.07		0.00		
Travel Time (min)	**= 2.87**	**+**	**5.42**	**+**	**0.00**	**=**	**8.28**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

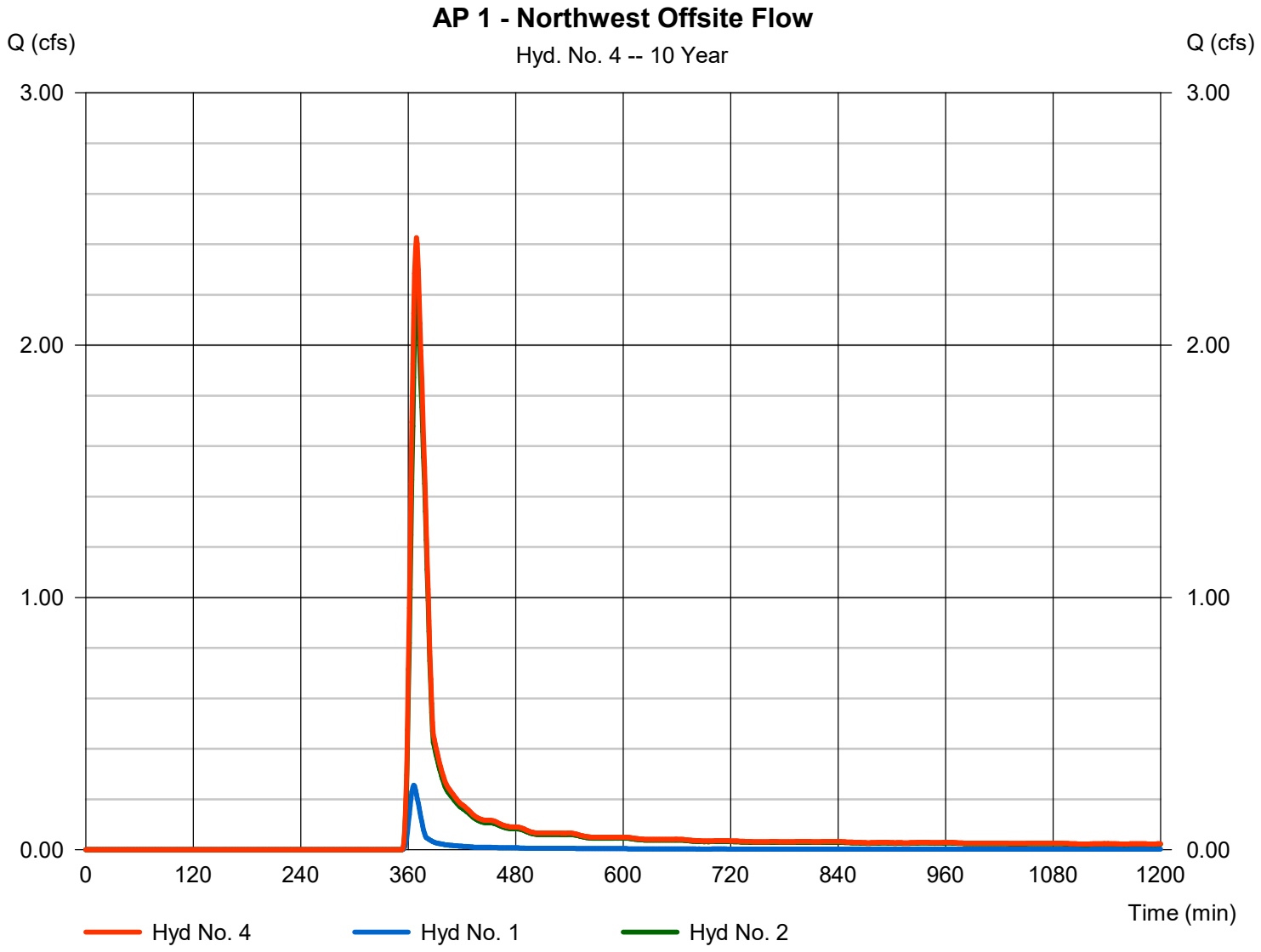
Total Travel Time, Tc ..... 26.40 min

Hydrograph Report

Hyd. No. 4

AP 1 - Northwest Offsite Flow

Hydrograph type	=	Combine	Peak discharge	=	2.426 cfs
Storm frequency	=	10 yrs	Time to peak	=	369 min
Time interval	=	1 min	Hyd. volume	=	5,484 cuft
Inflow hyds.	=	1, 2	Contrib. drain. area	=	7.290 ac

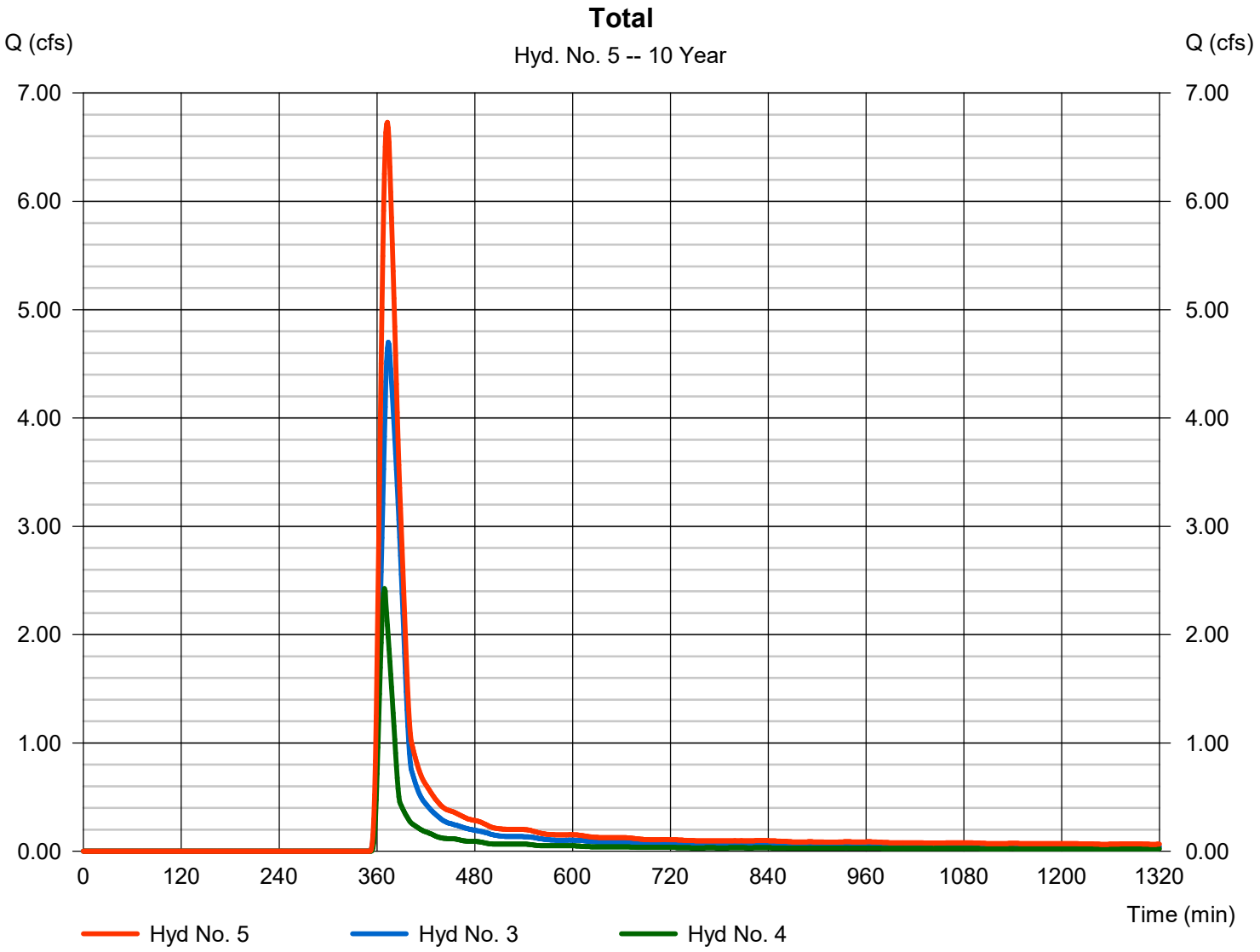


Hydrograph Report

Hyd. No. 5

Total

Hydrograph type	=	Combine	Peak discharge	=	6.731 cfs
Storm frequency	=	10 yrs	Time to peak	=	373 min
Time interval	=	1 min	Hyd. volume	=	18,429 cuft
Inflow hyds.	=	3, 4	Contrib. drain. area	=	11.340 ac



PRE-DEVELOPMENT

BASIN HYDROGRAPHS AND TC CALCULATIONS

100-YEAR STORM EVENT

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

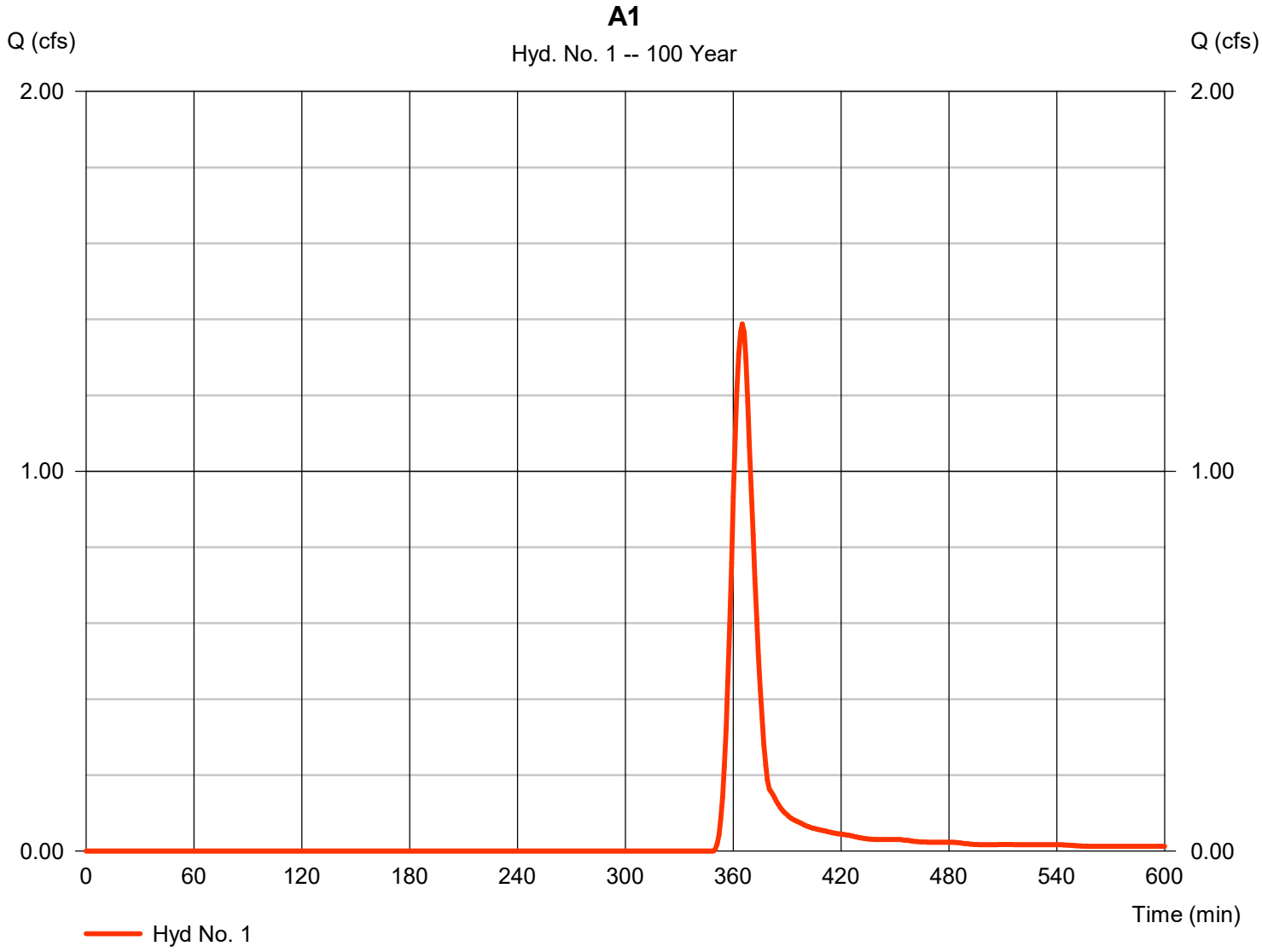
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.388	1	365	1,952	------	------	------	A1
2	SCS Runoff	12.27	1	368	21,857	------	------	------	A2
3	SCS Runoff	20.11	1	373	47,001	------	------	------	A3
4	Combine	13.45	1	368	23,809	1, 2,	------	------	AP 1 - Northwest Offsite Flow
5	Combine	31.79	1	370	70,810	3, 4	------	------	Total

Hydrograph Report

Hyd. No. 1

A1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.388 cfs
Storm frequency	=	100 yrs	Time to peak	=	365 min
Time interval	=	1 min	Hyd. volume	=	1,952 cuft
Drainage area	=	0.600 ac	Curve number	=	66
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.50 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484

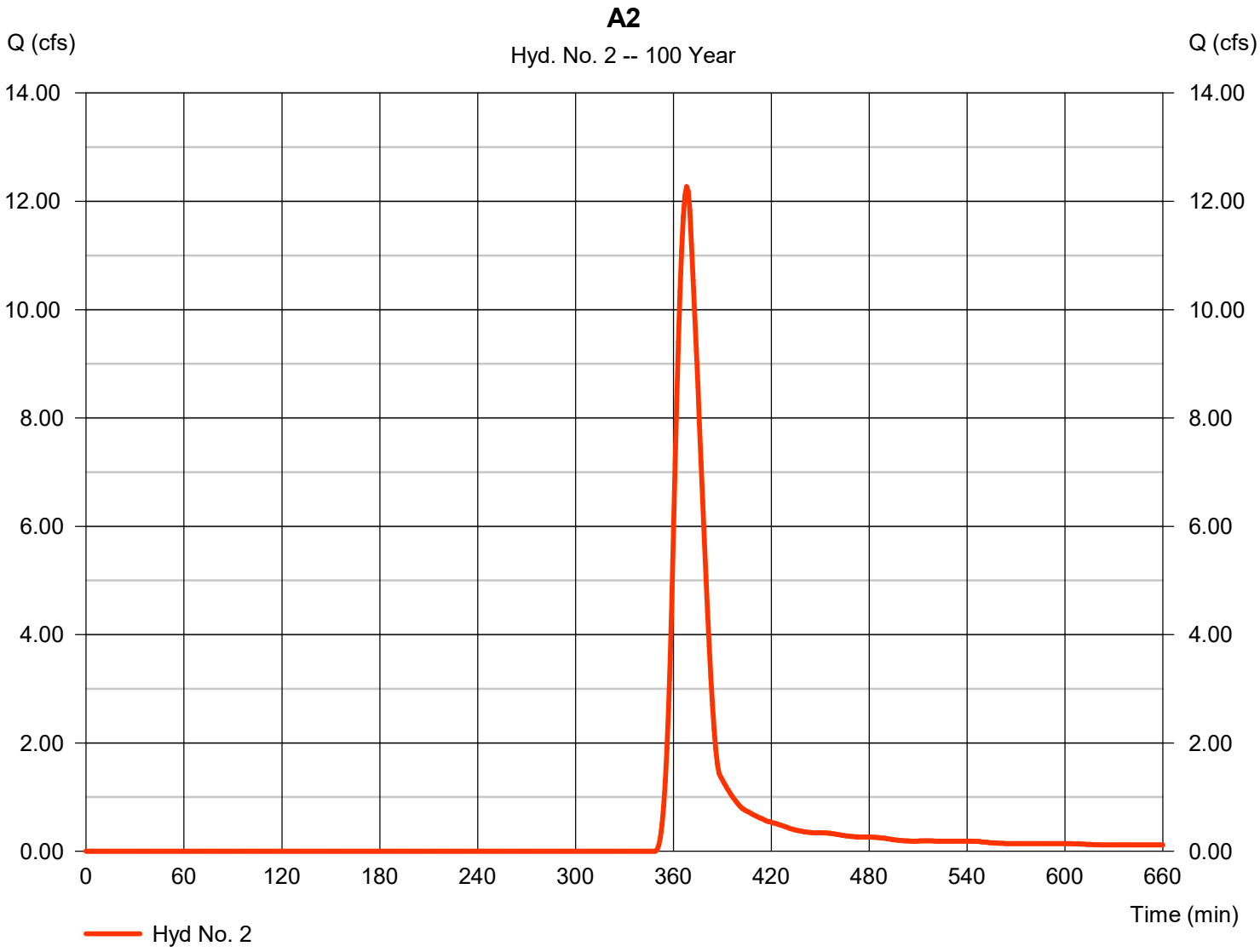


Hydrograph Report

Hyd. No. 2

A2

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.27 cfs
Storm frequency	=	100 yrs	Time to peak	=	368 min
Time interval	=	1 min	Hyd. volume	=	21,857 cuft
Drainage area	=	6.690 ac	Curve number	=	66
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	18.40 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484

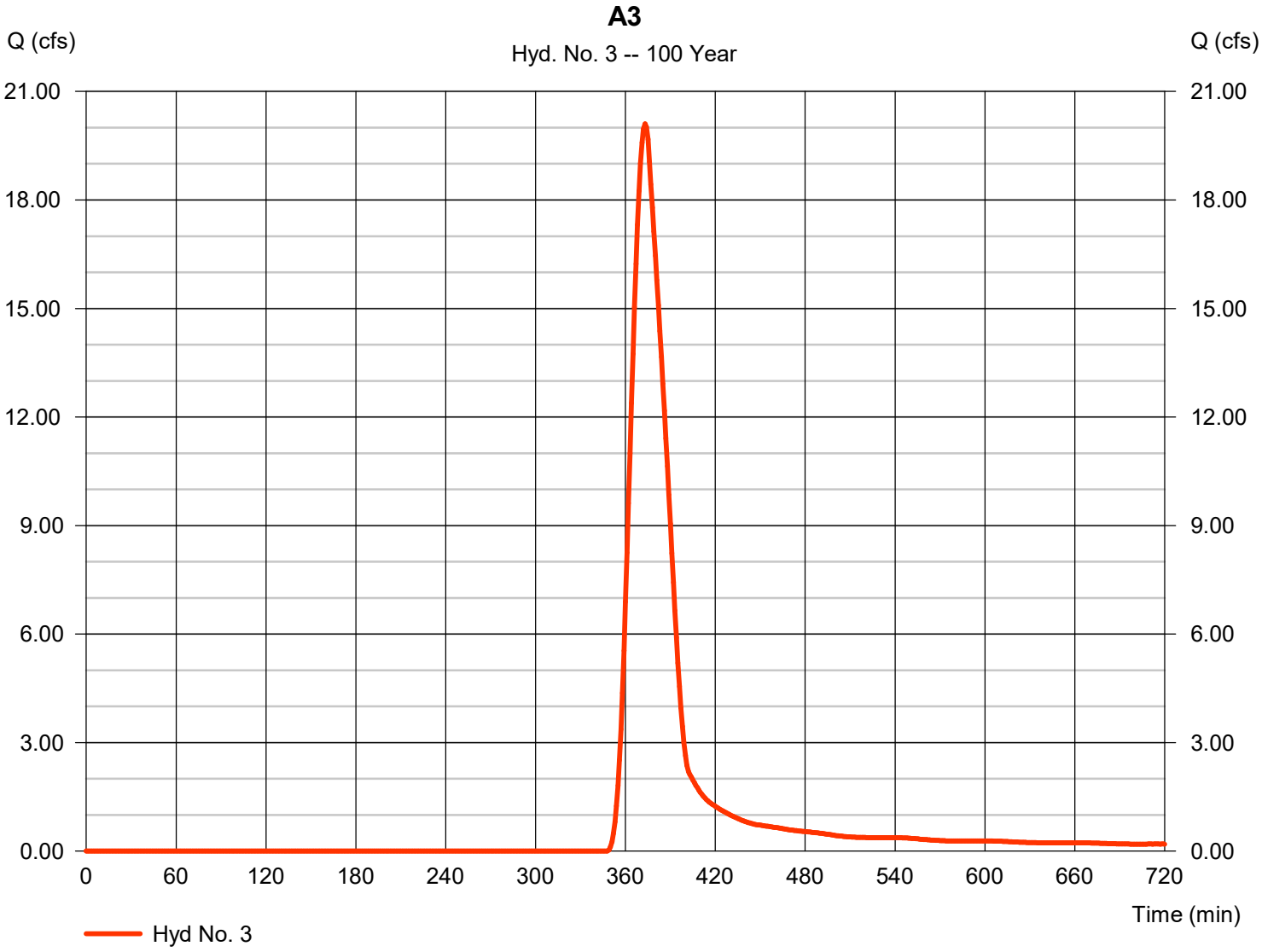


Hydrograph Report

Hyd. No. 3

A3

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.11 cfs
Storm frequency	=	100 yrs	Time to peak	=	373 min
Time interval	=	1 min	Hyd. volume	=	47,001 cuft
Drainage area	=	11.340 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	26.40 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484

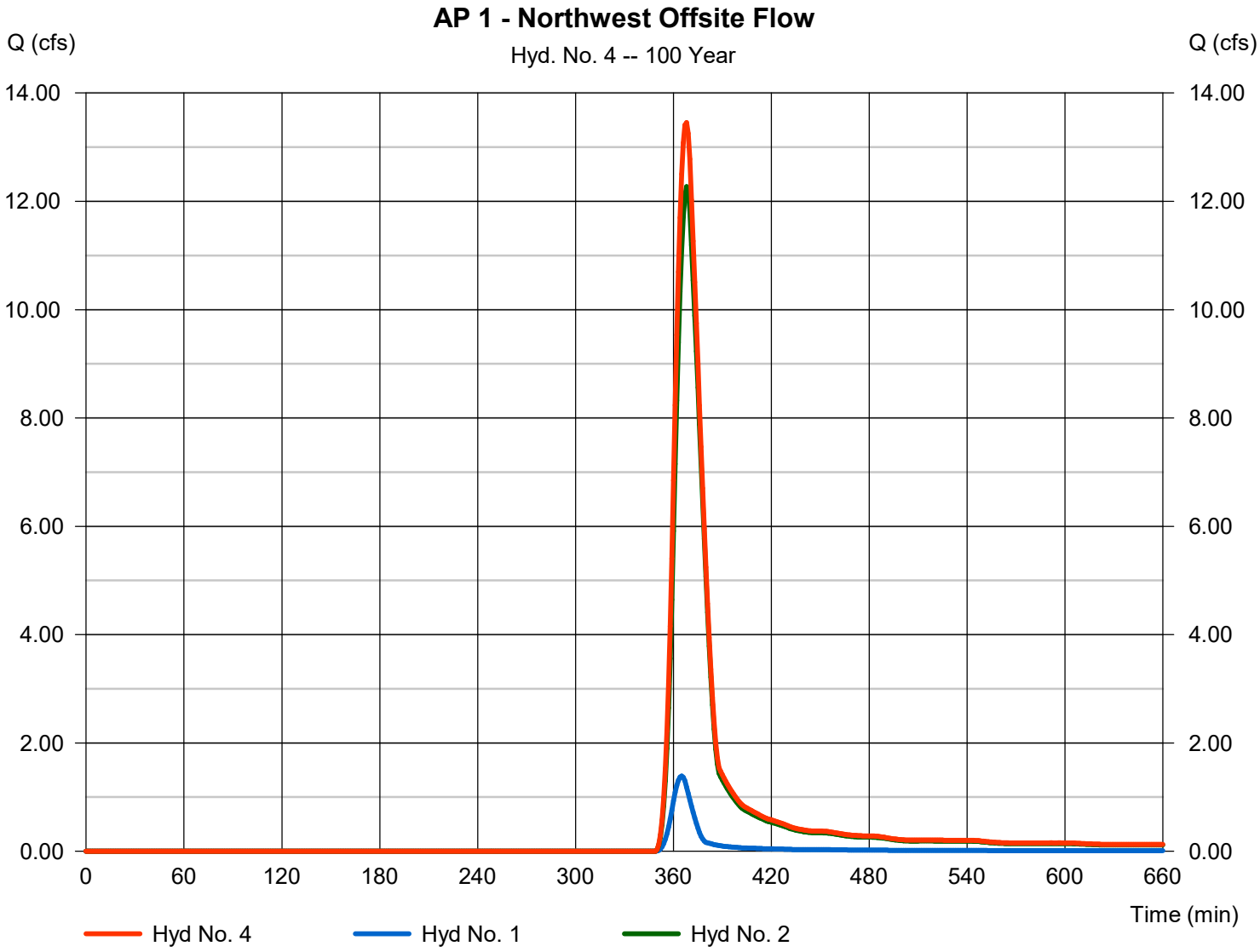


Hydrograph Report

Hyd. No. 4

AP 1 - Northwest Offsite Flow

Hydrograph type	= Combine	Peak discharge	= 13.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 368 min
Time interval	= 1 min	Hyd. volume	= 23,809 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 7.290 ac

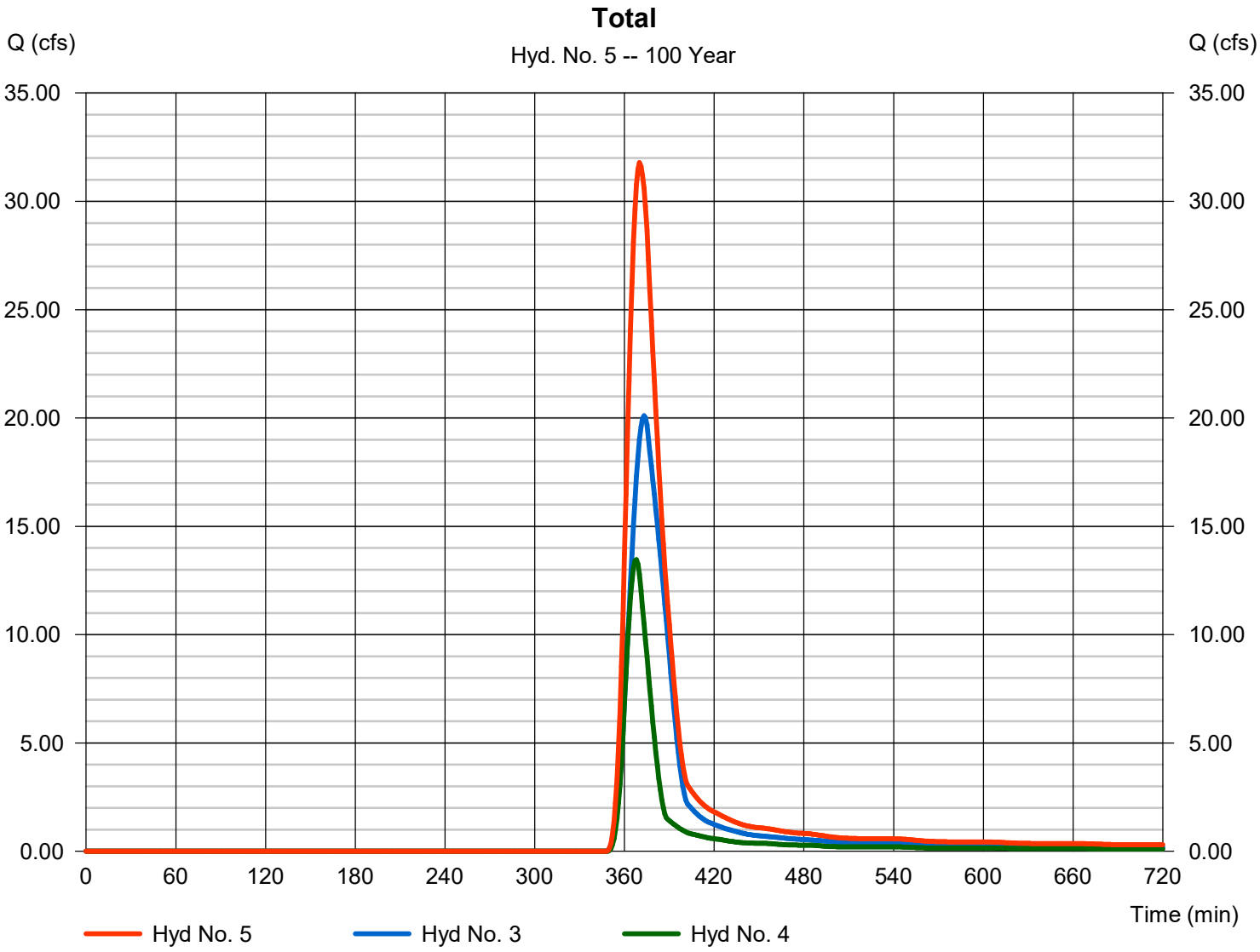


Hydrograph Report

Hyd. No. 5

Total

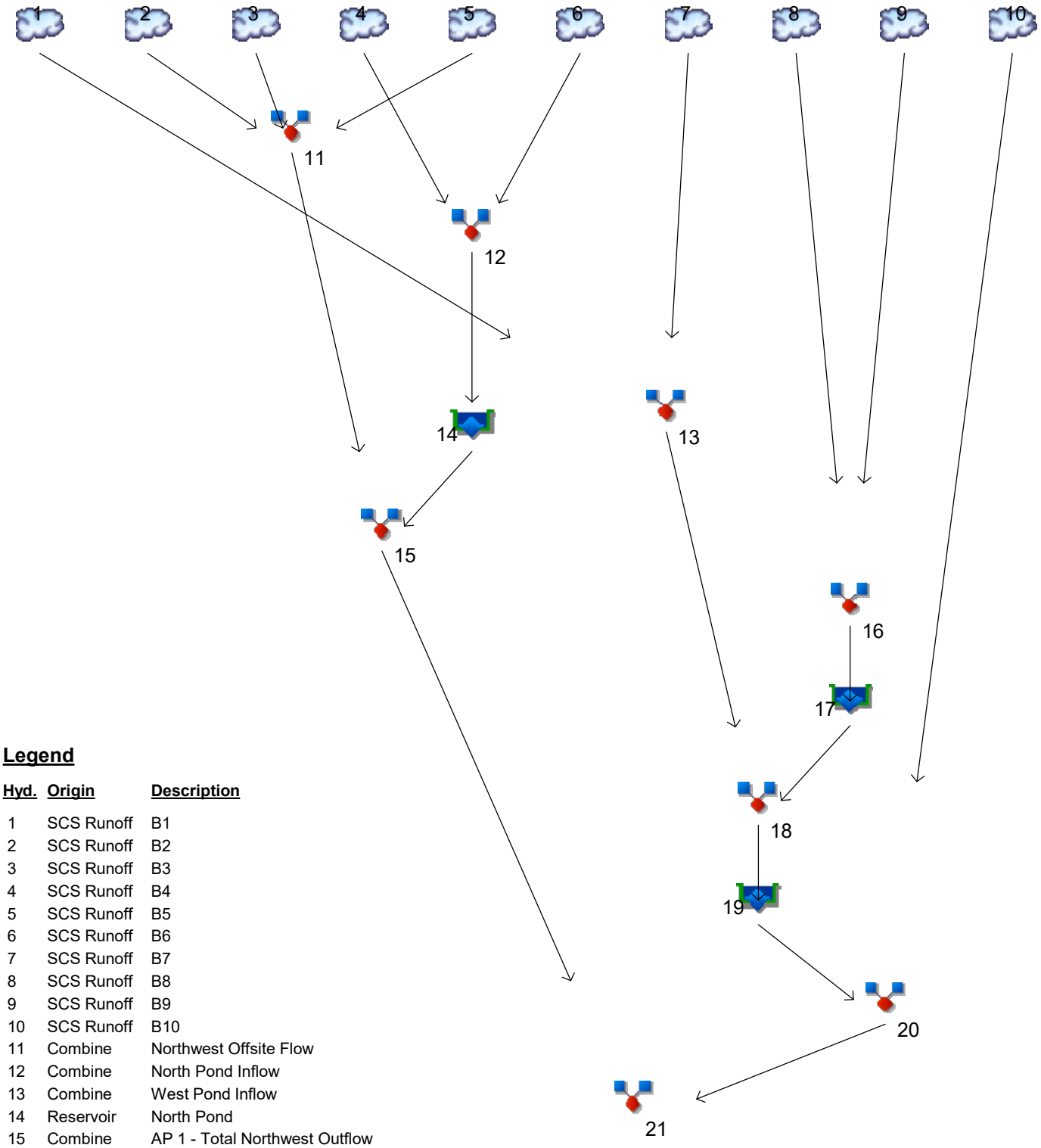
Hydrograph type	=	Combine	Peak discharge	=	31.79 cfs
Storm frequency	=	100 yrs	Time to peak	=	370 min
Time interval	=	1 min	Hyd. volume	=	70,810 cuft
Inflow hyds.	=	3, 4	Contrib. drain. area	=	11.340 ac



POST-DEVELOPMENT

SCHEMATIC MAP

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	B1
2	SCS Runoff	B2
3	SCS Runoff	B3
4	SCS Runoff	B4
5	SCS Runoff	B5
6	SCS Runoff	B6
7	SCS Runoff	B7
8	SCS Runoff	B8
9	SCS Runoff	B9
10	SCS Runoff	B10
11	Combine	Northwest Offsite Flow
12	Combine	North Pond Inflow
13	Combine	West Pond Inflow
14	Reservoir	North Pond
15	Combine	AP 1 - Total Northwest Outflow
16	Combine	South Pond Inflow
17	Reservoir	South Pond
18	Combine	Total West Pond Inflow
19	Reservoir	West Pond
20	Combine	AP 2 - Total Southwest Outflow
21	Combine	AP 3 - Total Off Site Flow

POST-DEVELOPMENT

BASIN HYDROGRAPHS AND TC CALCULATIONS

10-YEAR STORM EVENT

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

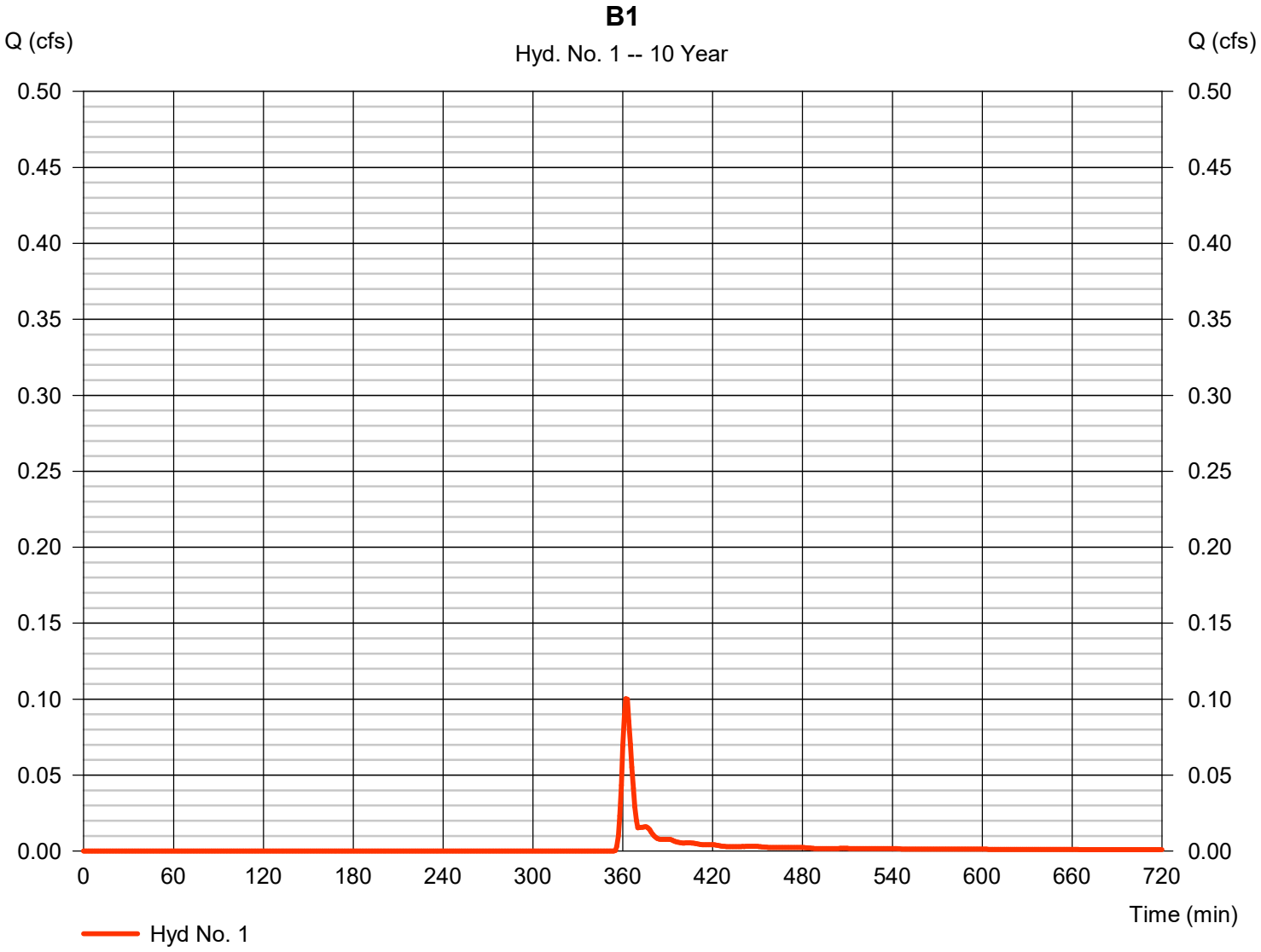
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.100	1	362	126	------	------	------	B1
2	SCS Runoff	0.696	1	361	686	------	------	------	B2
3	SCS Runoff	0.471	1	362	479	------	------	------	B3
4	SCS Runoff	0.109	1	362	137	------	------	------	B4
5	SCS Runoff	0.709	1	374	1,907	------	------	------	B5
6	SCS Runoff	9.542	1	361	10,671	------	------	------	B6
7	SCS Runoff	1.711	1	361	1,878	------	------	------	B7
8	SCS Runoff	3.617	1	360	4,151	------	------	------	B8
9	SCS Runoff	0.640	1	380	2,070	------	------	------	B9
10	SCS Runoff	4.120	1	374	11,667	------	------	------	B10
11	Combine	1.406	1	362	3,072	2, 3, 5,	------	------	Northwest Offsite Flow
12	Combine	9.639	1	361	10,808	4, 6,	------	------	North Pond Inflow
13	Combine	1.800	1	361	2,004	1, 7,	------	------	West Pond Inflow
14	Reservoir	0.000	1	n/a	0	12	103.39	10,808	North Pond
15	Combine	1.406	1	362	3,072	11, 14	------	------	AP 1 - Total Northwest Outflow
16	Combine	3.743	1	360	6,221	8, 9,	------	------	South Pond Inflow
17	Reservoir	0.360	1	404	2,013	16	103.59	4,434	South Pond
18	Combine	1.800	1	361	4,017	13, 17	------	------	Total West Pond Inflow
19	Reservoir	0.000	1	n/a	0	18	101.47	4,017	West Pond
20	Combine	4.120	1	374	11,667	10, 19	------	------	AP 2 - Total Southwest Outflow
21	Combine	4.945	1	374	14,739	15, 20	------	------	AP 3 - Total Off Site Flow

Hydrograph Report

Hyd. No. 1

B1

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.100 cfs
Storm frequency	=	10 yrs	Time to peak	=	362 min
Time interval	=	1 min	Hyd. volume	=	126 cuft
Drainage area	=	0.230 ac	Curve number	=	63
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484

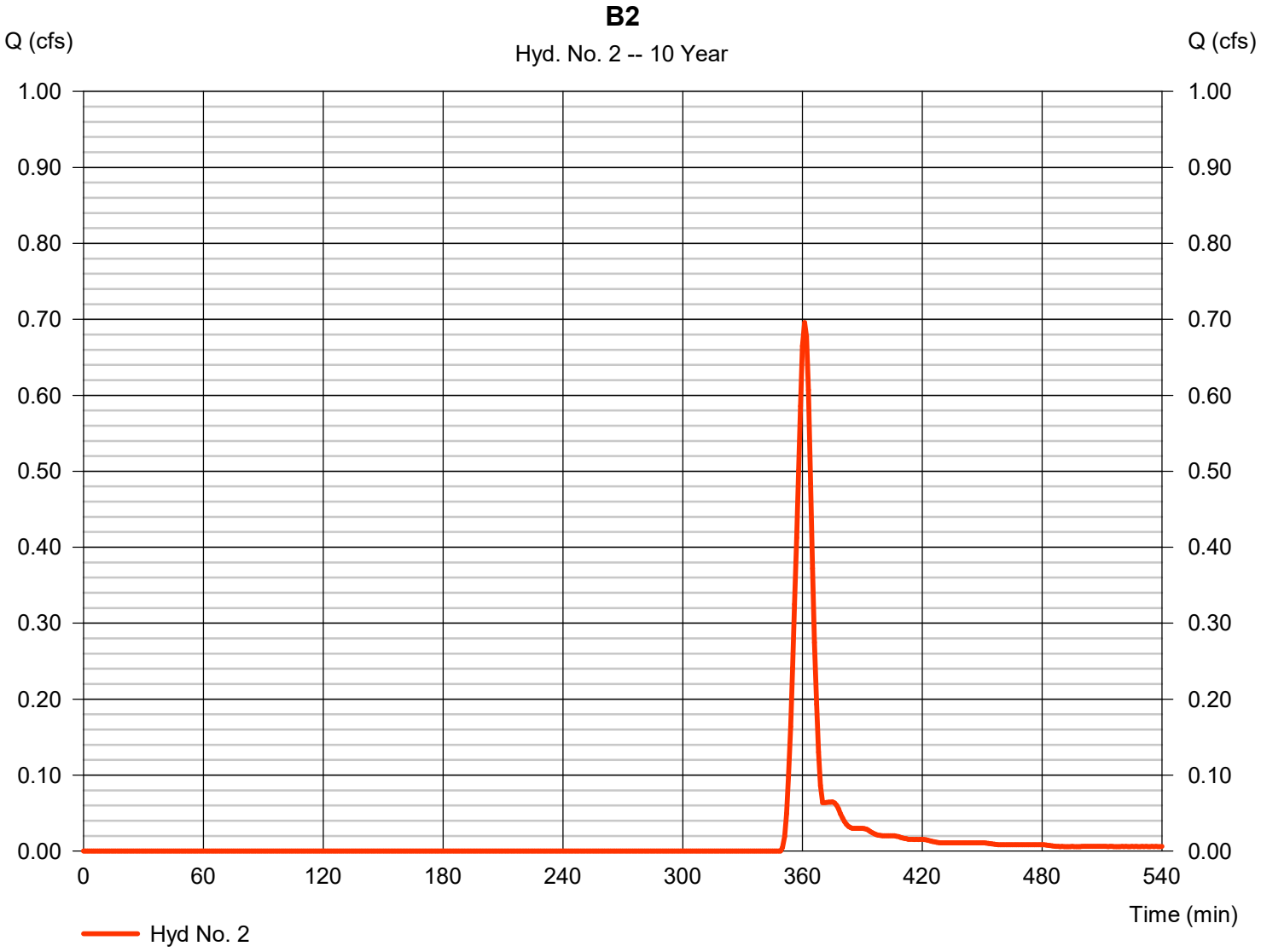


Hydrograph Report

Hyd. No. 2

B2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.696 cfs
Storm frequency	=	10 yrs	Time to peak	=	361 min
Time interval	=	1 min	Hyd. volume	=	686 cuft
Drainage area	=	0.360 ac	Curve number	=	76
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484

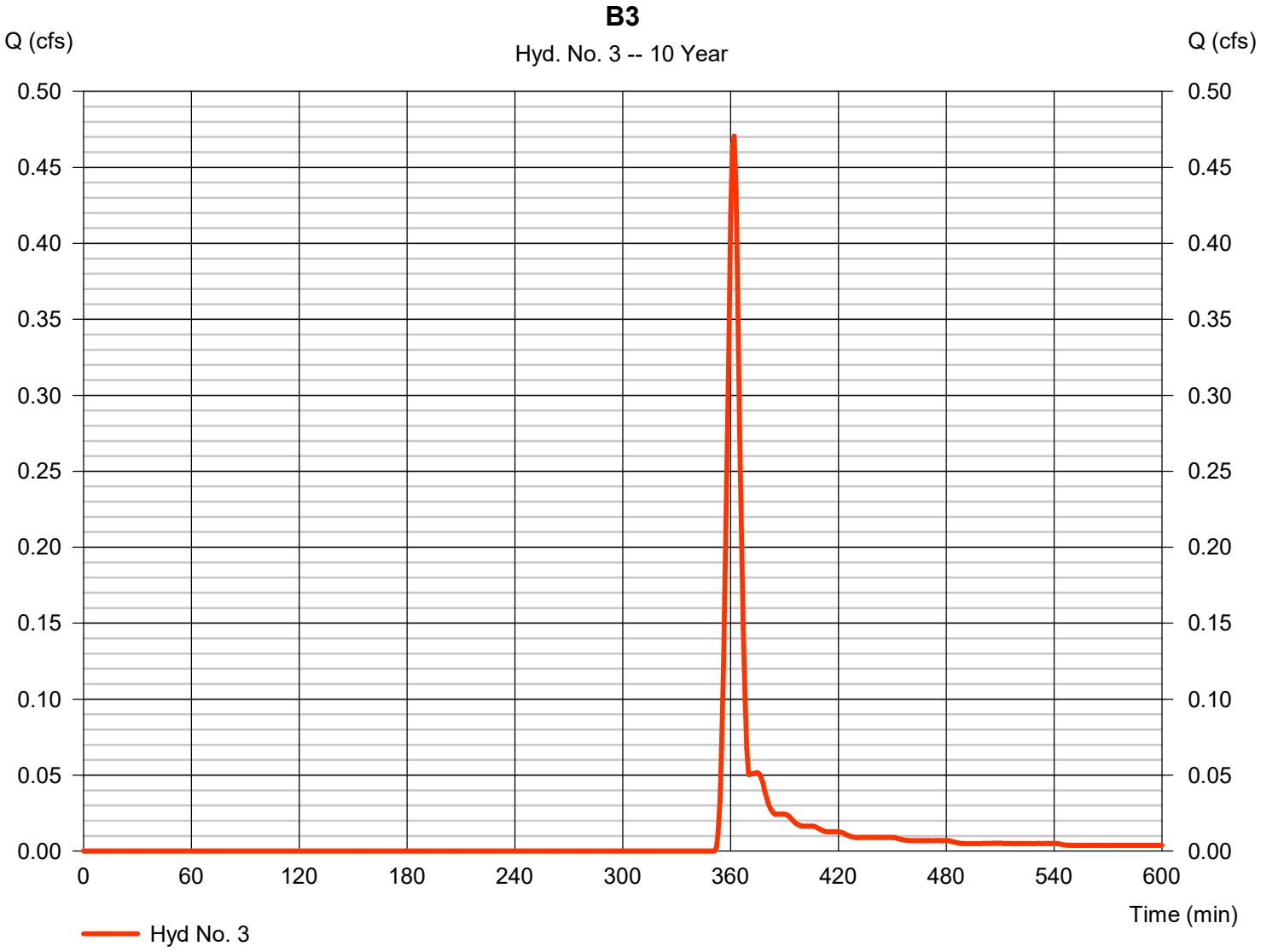


Hydrograph Report

Hyd. No. 3

B3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.471 cfs
Storm frequency	=	10 yrs	Time to peak	=	362 min
Time interval	=	1 min	Hyd. volume	=	479 cuft
Drainage area	=	0.410 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484

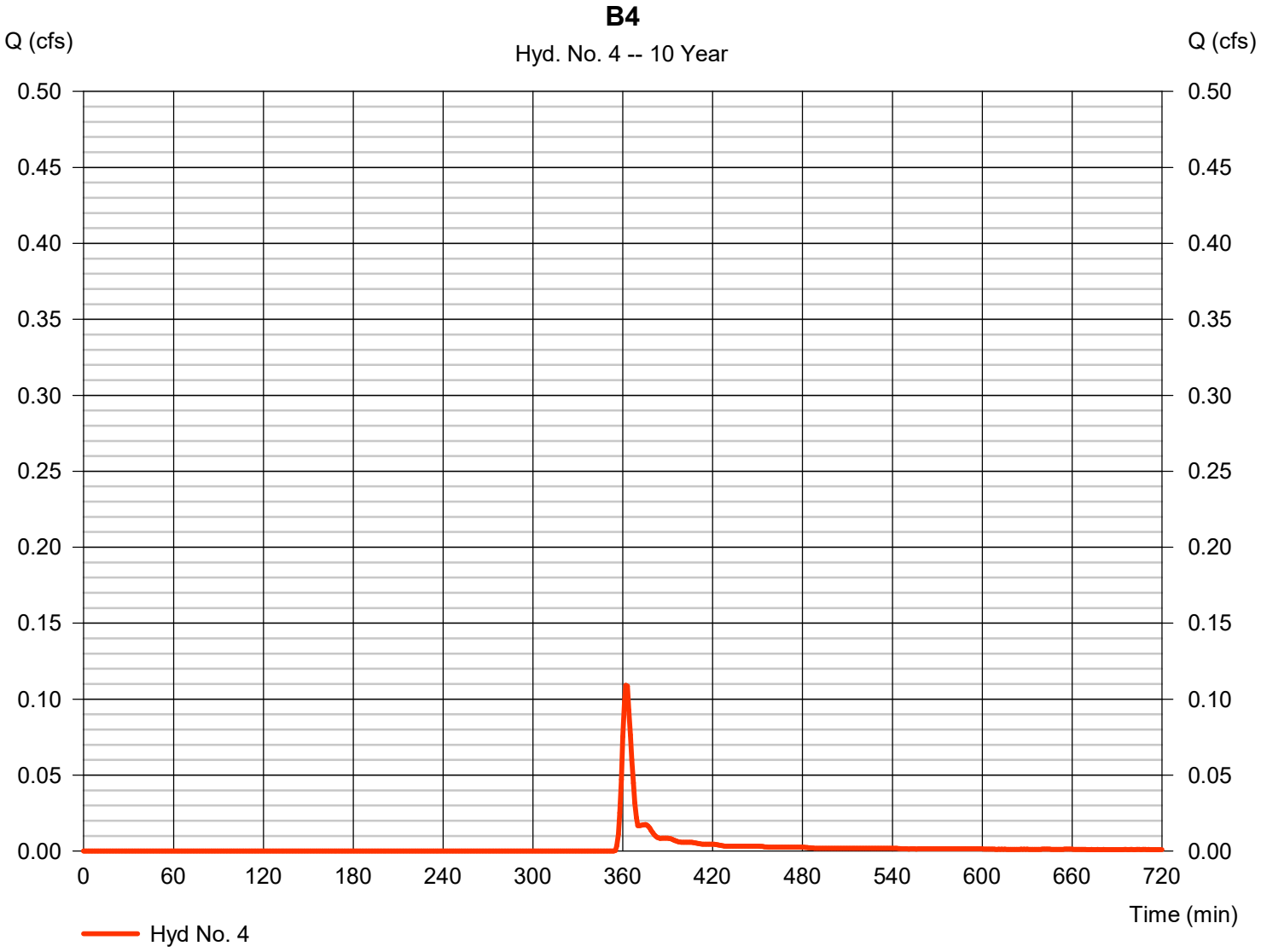


Hydrograph Report

Hyd. No. 4

B4

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.109 cfs
Storm frequency	=	10 yrs	Time to peak	=	362 min
Time interval	=	1 min	Hyd. volume	=	137 cuft
Drainage area	=	0.250 ac	Curve number	=	63
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\4 Final Drainage Repor	Shape factor	=	484

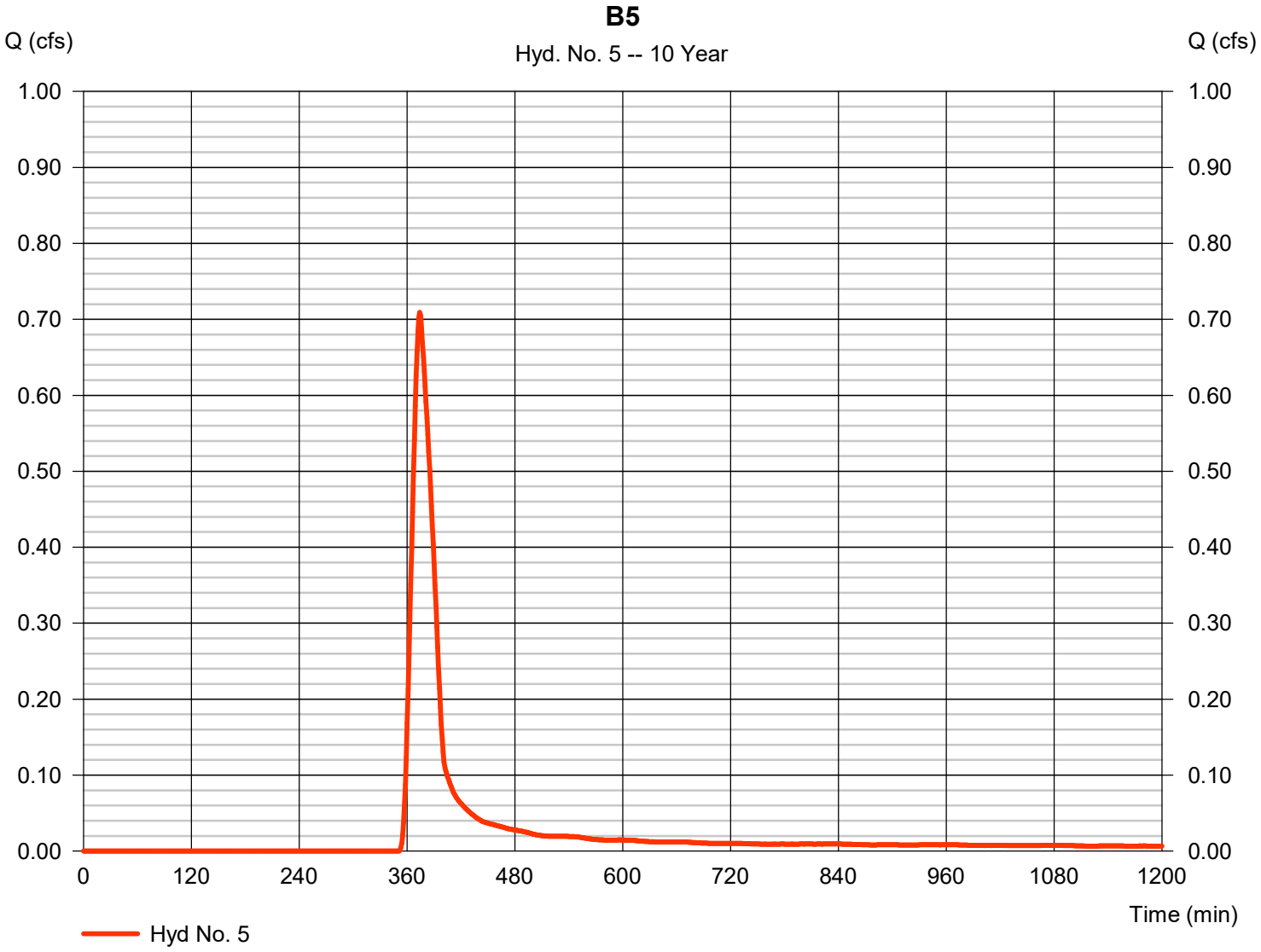


Hydrograph Report

Hyd. No. 5

B5

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.709 cfs
Storm frequency	=	10 yrs	Time to peak	=	374 min
Time interval	=	1 min	Hyd. volume	=	1,907 cuft
Drainage area	=	1.530 ac	Curve number	=	71
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	25.80 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\4 Final Drainage Repor	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 5

B5

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.100		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 1.38		0.00		0.00		
Land slope (%)	= 2.50		0.00		0.00		
Travel Time (min)	**= 23.76**	**+**	**0.00**	**+**	**0.00**	**=**	**23.76**
Shallow Concentrated Flow							
Flow length (ft)	= 334.00		0.00		0.00		
Watercourse slope (%)	= 3.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.79		0.00		0.00		
Travel Time (min)	**= 1.99**	**+**	**0.00**	**+**	**0.00**	**=**	**1.99**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

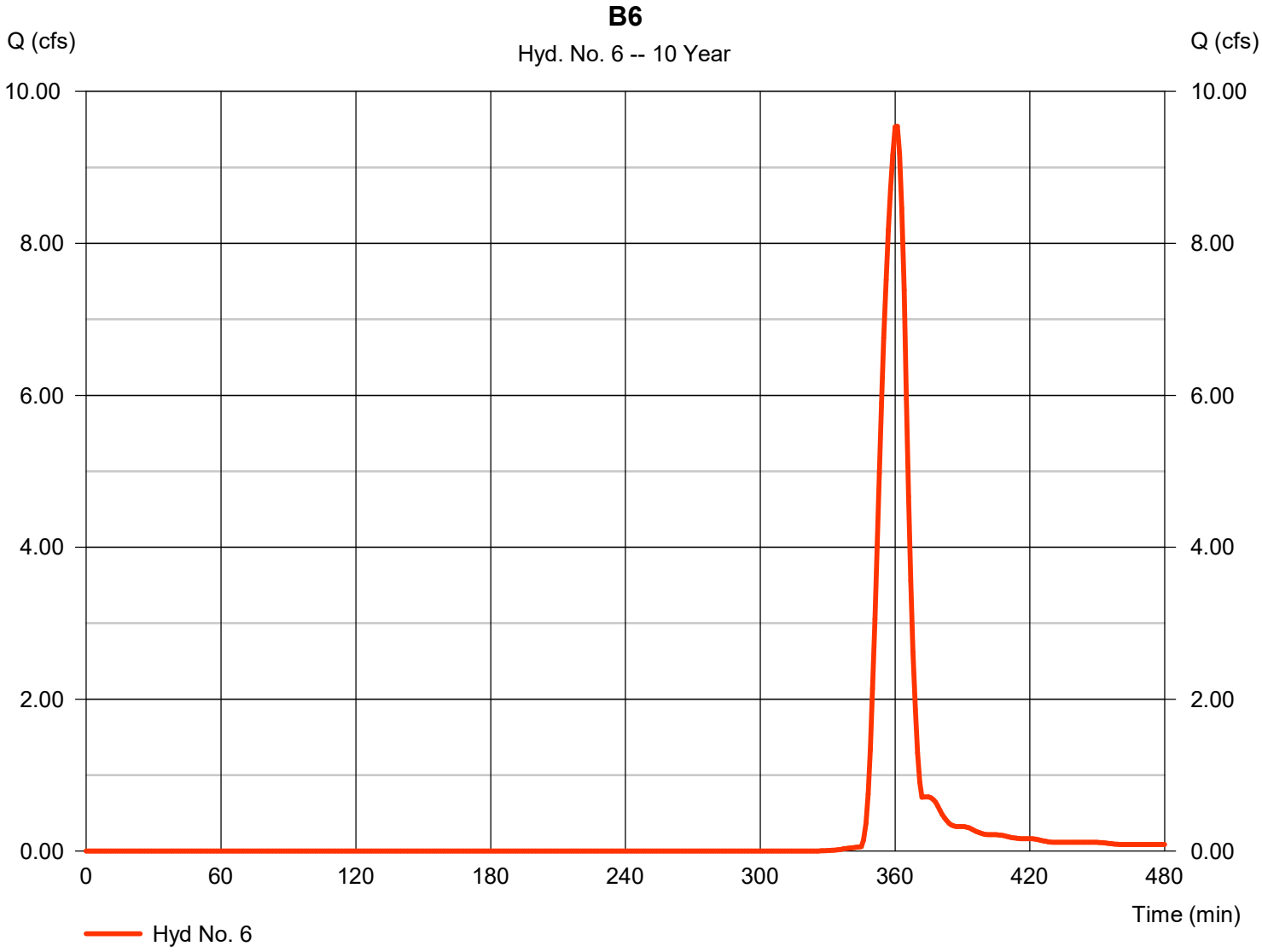
Total Travel Time, Tc ..... 25.80 min

Hydrograph Report

Hyd. No. 6

B6

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.542 cfs
Storm frequency	=	10 yrs	Time to peak	=	361 min
Time interval	=	1 min	Hyd. volume	=	10,671 cuft
Drainage area	=	2.280 ac	Curve number	=	91
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.70 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 6

B6

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.013		0.021		0.011		
Flow length (ft)	= 105.0		1.0		0.0		
Two-year 24-hr precip. (in)	= 1.38		1.38		0.00		
Land slope (%)	= 0.50		1.00		0.00		
Travel Time (min)	**= 3.82**	**+**	**0.10**	**+**	**0.00**	**=**	**3.92**
Shallow Concentrated Flow							
Flow length (ft)	= 34.00		294.00		0.00		
Watercourse slope (%)	= 0.50		0.50		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=1.44		1.44		0.00		
Travel Time (min)	**= 0.39**	**+**	**3.41**	**+**	**0.00**	**=**	**3.80**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

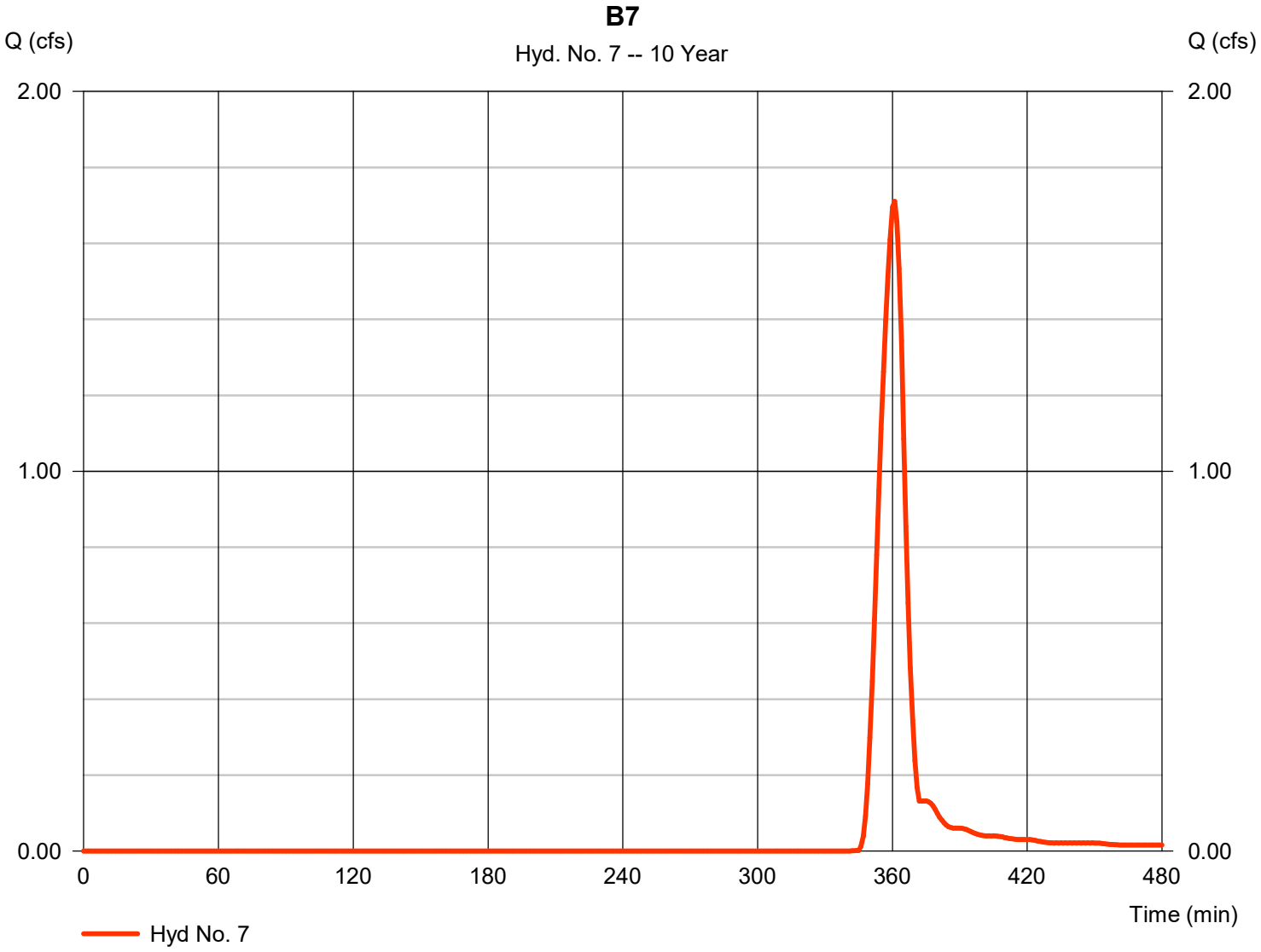
Total Travel Time, Tc ..... 7.70 min

Hydrograph Report

Hyd. No. 7

B7

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.711 cfs
Storm frequency	=	10 yrs	Time to peak	=	361 min
Time interval	=	1 min	Hyd. volume	=	1,878 cuft
Drainage area	=	0.450 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.70 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 7

B7

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.013		0.013		0.011		
Flow length (ft)	= 108.0		300.0		0.0		
Two-year 24-hr precip. (in)	= 1.38		1.38		0.00		
Land slope (%)	= 0.50		5.00		0.00		
Travel Time (min)	**= 3.90**	**+**	**3.52**	**+**	**0.00**	**=**	**7.43**
Shallow Concentrated Flow							
Flow length (ft)	= 72.00		0.00		0.00		
Watercourse slope (%)	= 5.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=4.55		0.00		0.00		
Travel Time (min)	**= 0.26**	**+**	**0.00**	**+**	**0.00**	**=**	**0.26**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

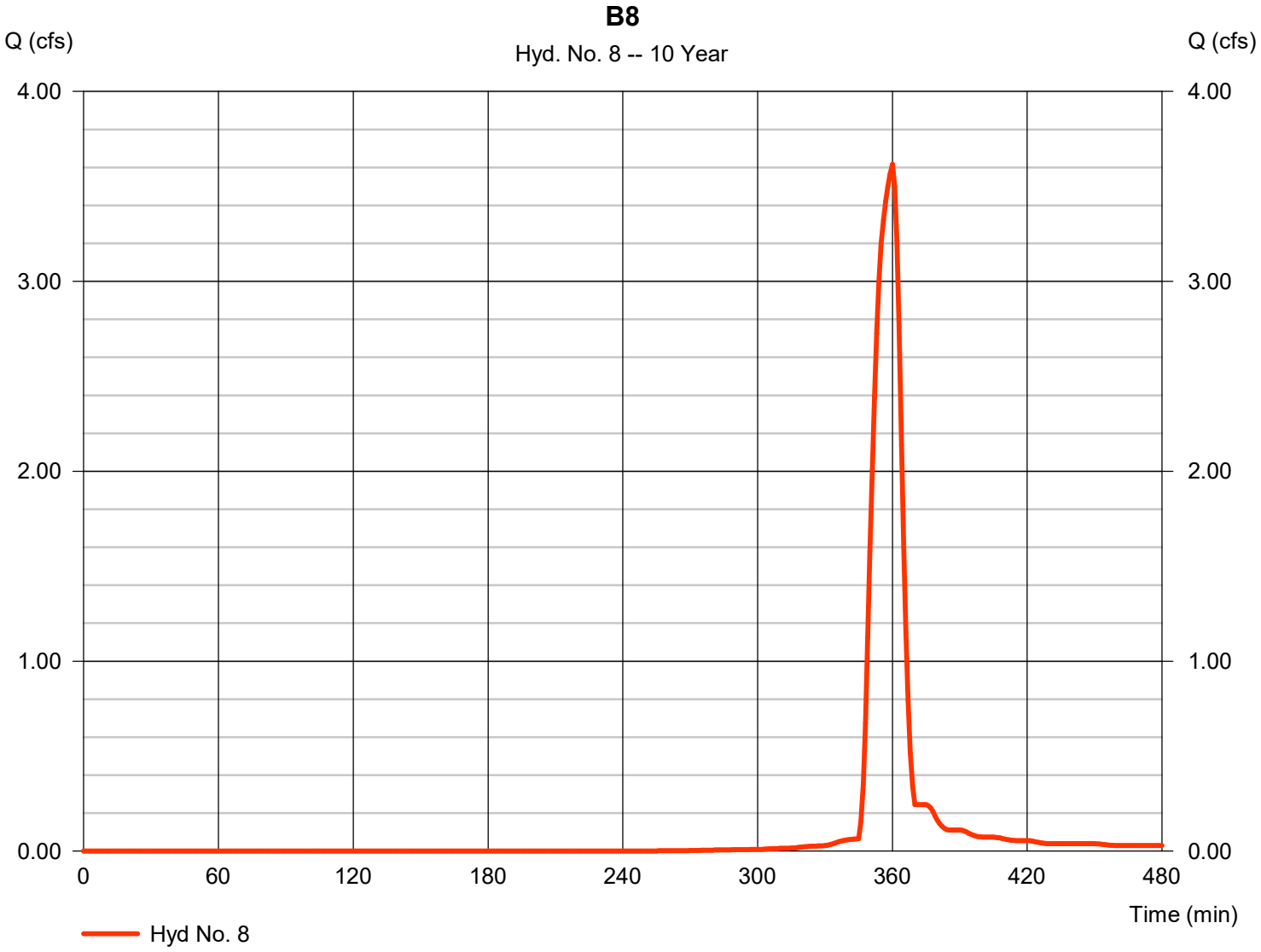
Total Travel Time, Tc ..... 7.70 min

Hydrograph Report

Hyd. No. 8

B8

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.617 cfs
Storm frequency	=	10 yrs	Time to peak	=	360 min
Time interval	=	1 min	Hyd. volume	=	4,151 cuft
Drainage area	=	0.670 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\4 Final Drainage Repor	Shape factor	=	484

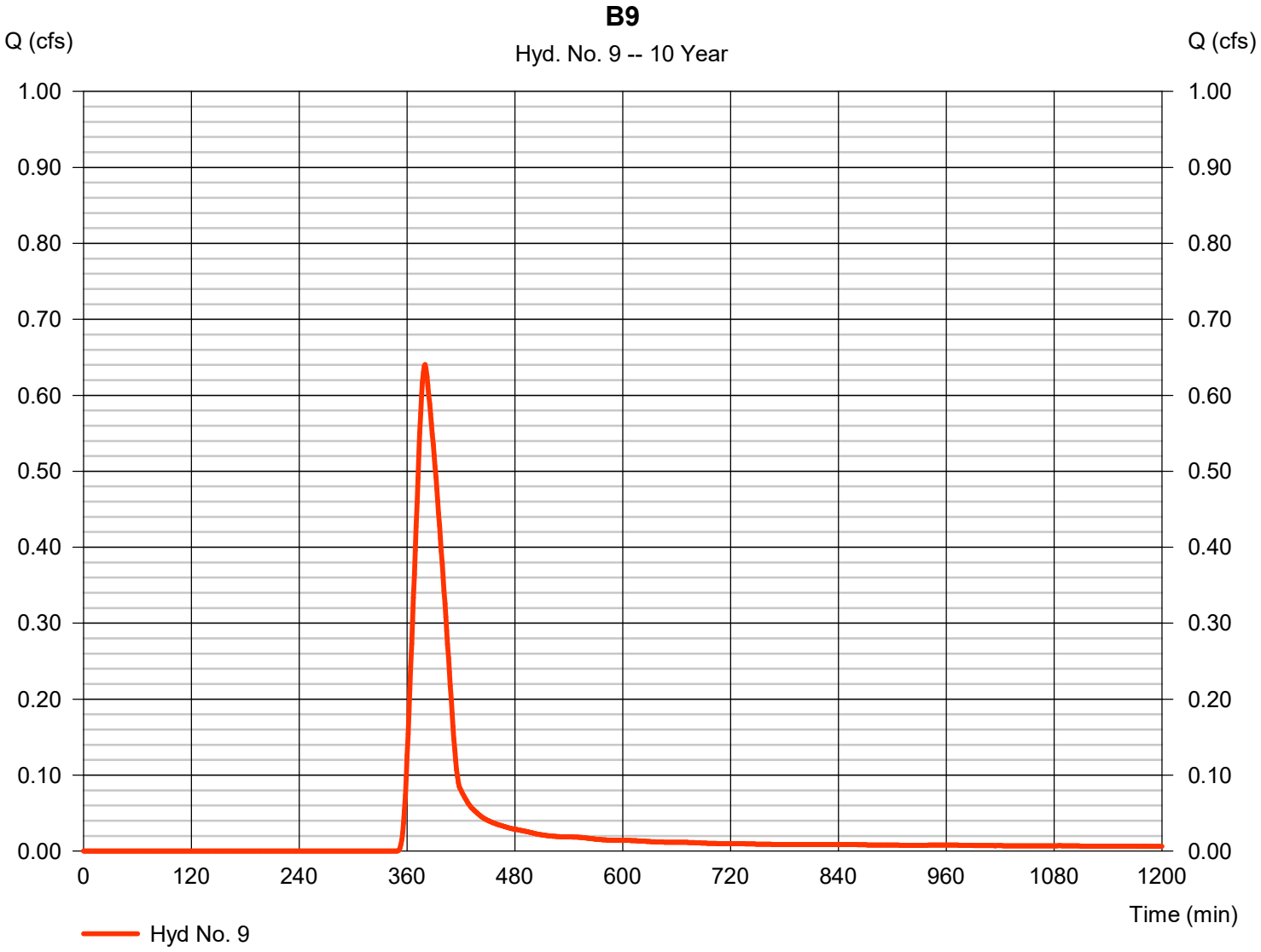


Hydrograph Report

Hyd. No. 9

B9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.640 cfs
Storm frequency	=	10 yrs	Time to peak	=	380 min
Time interval	=	1 min	Hyd. volume	=	2,070 cuft
Drainage area	=	1.200 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	36.10 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\4 Final Drainage Repor	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 9

B9

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.110		0.013		0.020		
Flow length (ft)	= 124.0		16.0		33.0		
Two-year 24-hr precip. (in)	= 1.38		1.38		1.38		
Land slope (%)	= 0.20		2.00		5.00		
Travel Time (min)	**= 34.73**	**+**	**0.49**	**+**	**0.85**	**=**	**36.07**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

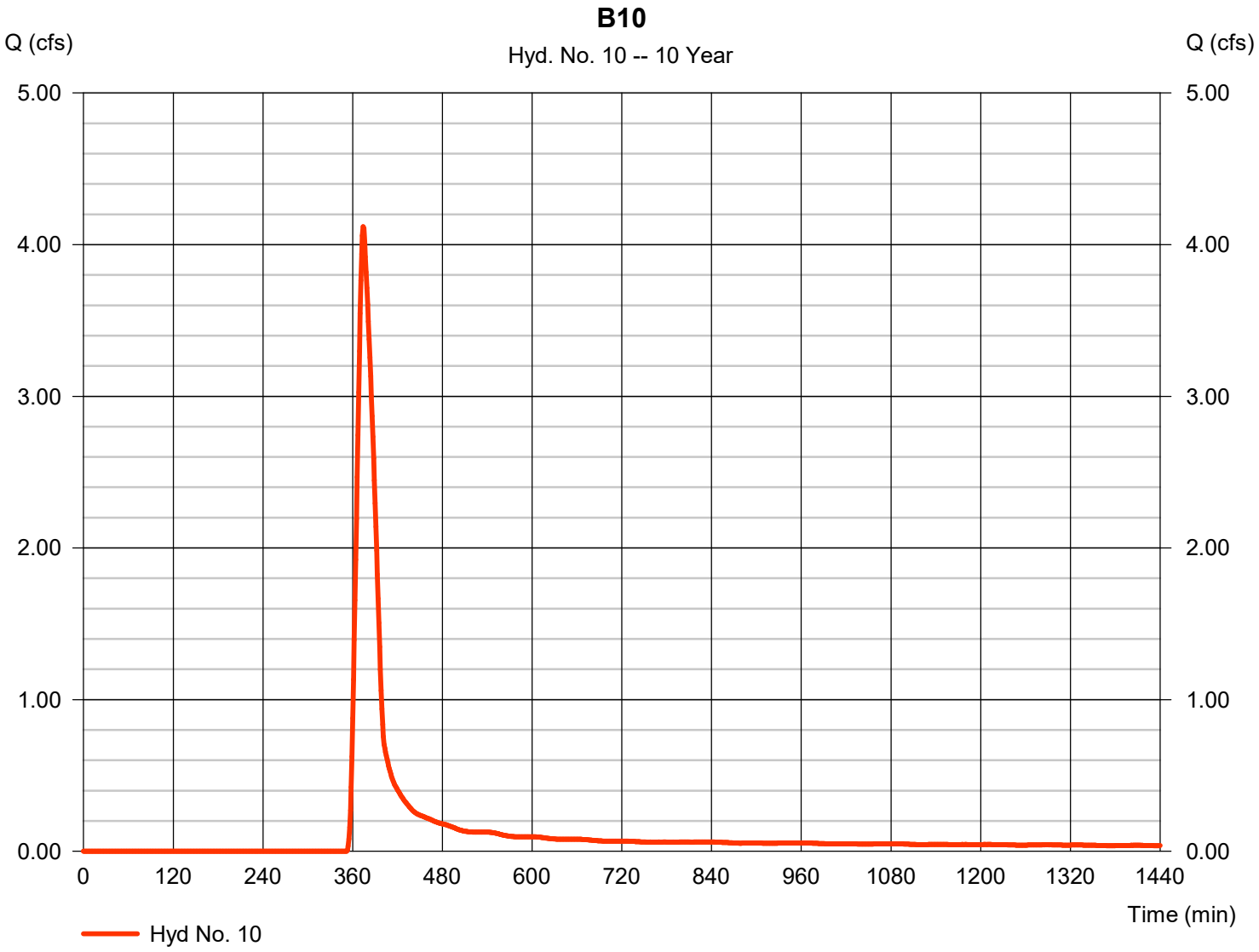
Total Travel Time, Tc ..... 36.10 min

Hydrograph Report

Hyd. No. 10

B10

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.120 cfs
Storm frequency	=	10 yrs	Time to peak	=	374 min
Time interval	=	1 min	Hyd. volume	=	11,667 cuft
Drainage area	=	11.230 ac	Curve number	=	69
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	26.40 min
Total precip.	=	2.18 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\4 Final Drainage Repor	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 10

B10

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.090		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 1.38		0.00		0.00		
Land slope (%)	= 4.00		0.00		0.00		
Travel Time (min)	**= 18.10**	**+**	**0.00**	**+**	**0.00**	**=**	**18.10**
Shallow Concentrated Flow							
Flow length (ft)	= 621.00		1321.00		0.00		
Watercourse slope (%)	= 5.00		4.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.61		4.07		0.00		
Travel Time (min)	**= 2.87**	**+**	**5.42**	**+**	**0.00**	**=**	**8.28**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

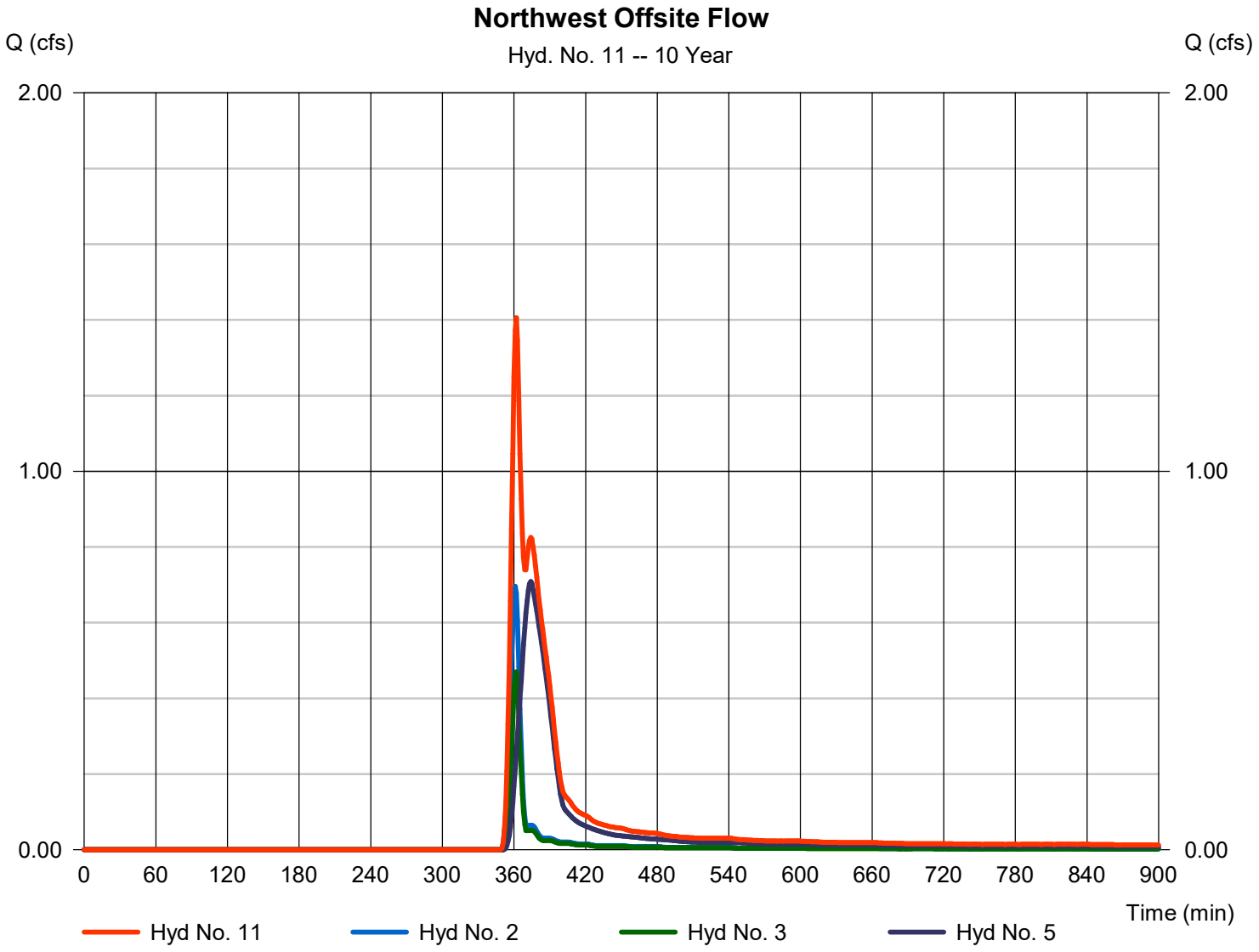
Total Travel Time, Tc ..... 26.40 min

Hydrograph Report

Hyd. No. 11

Northwest Offsite Flow

Hydrograph type	=	Combine	Peak discharge	=	1.406 cfs
Storm frequency	=	10 yrs	Time to peak	=	362 min
Time interval	=	1 min	Hyd. volume	=	3,072 cuft
Inflow hyds.	=	2, 3, 5	Contrib. drain. area	=	2.300 ac

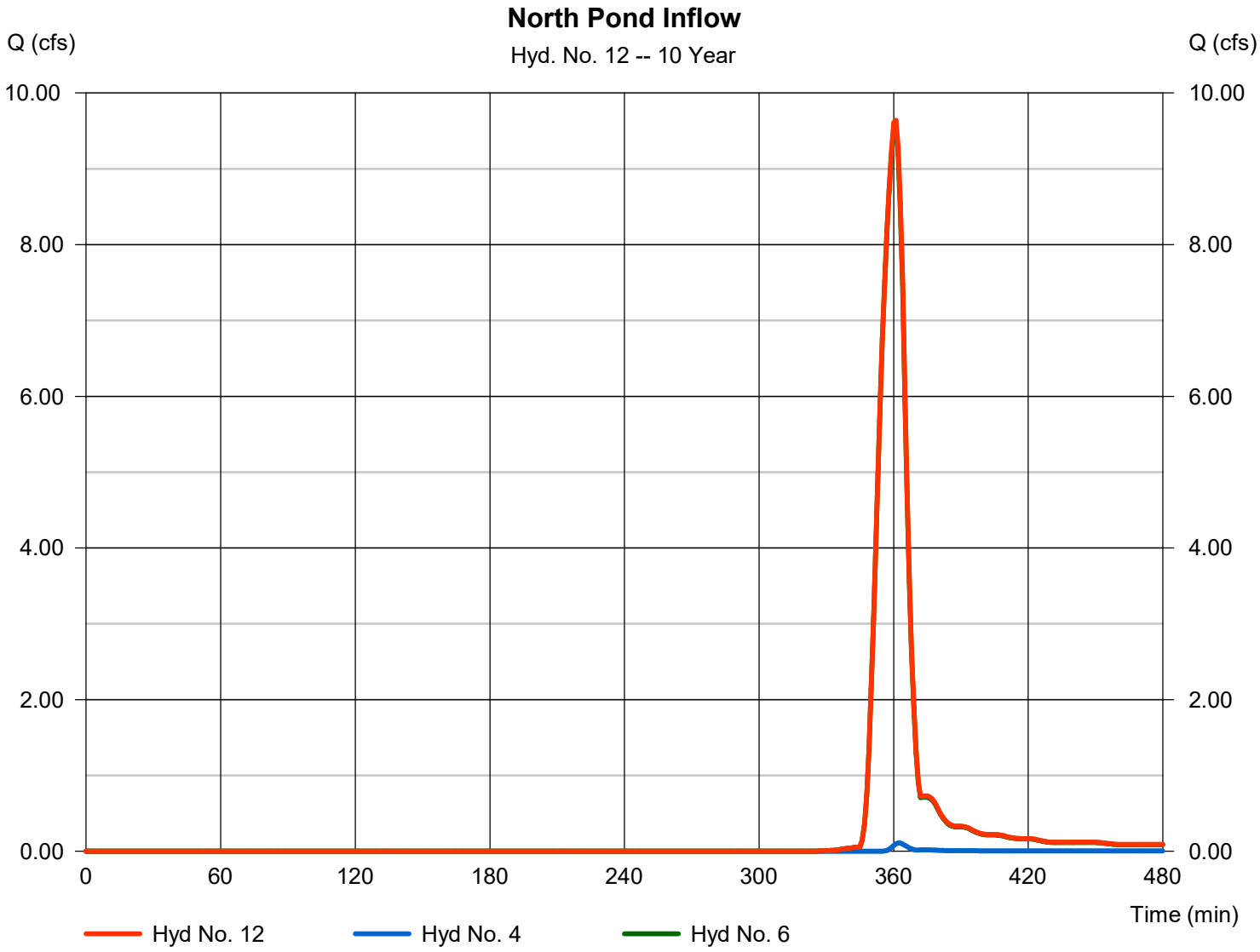


Hydrograph Report

Hyd. No. 12

North Pond Inflow

Hydrograph type	=	Combine	Peak discharge	=	9.639 cfs
Storm frequency	=	10 yrs	Time to peak	=	361 min
Time interval	=	1 min	Hyd. volume	=	10,808 cuft
Inflow hyds.	=	4, 6	Contrib. drain. area	=	2.530 ac

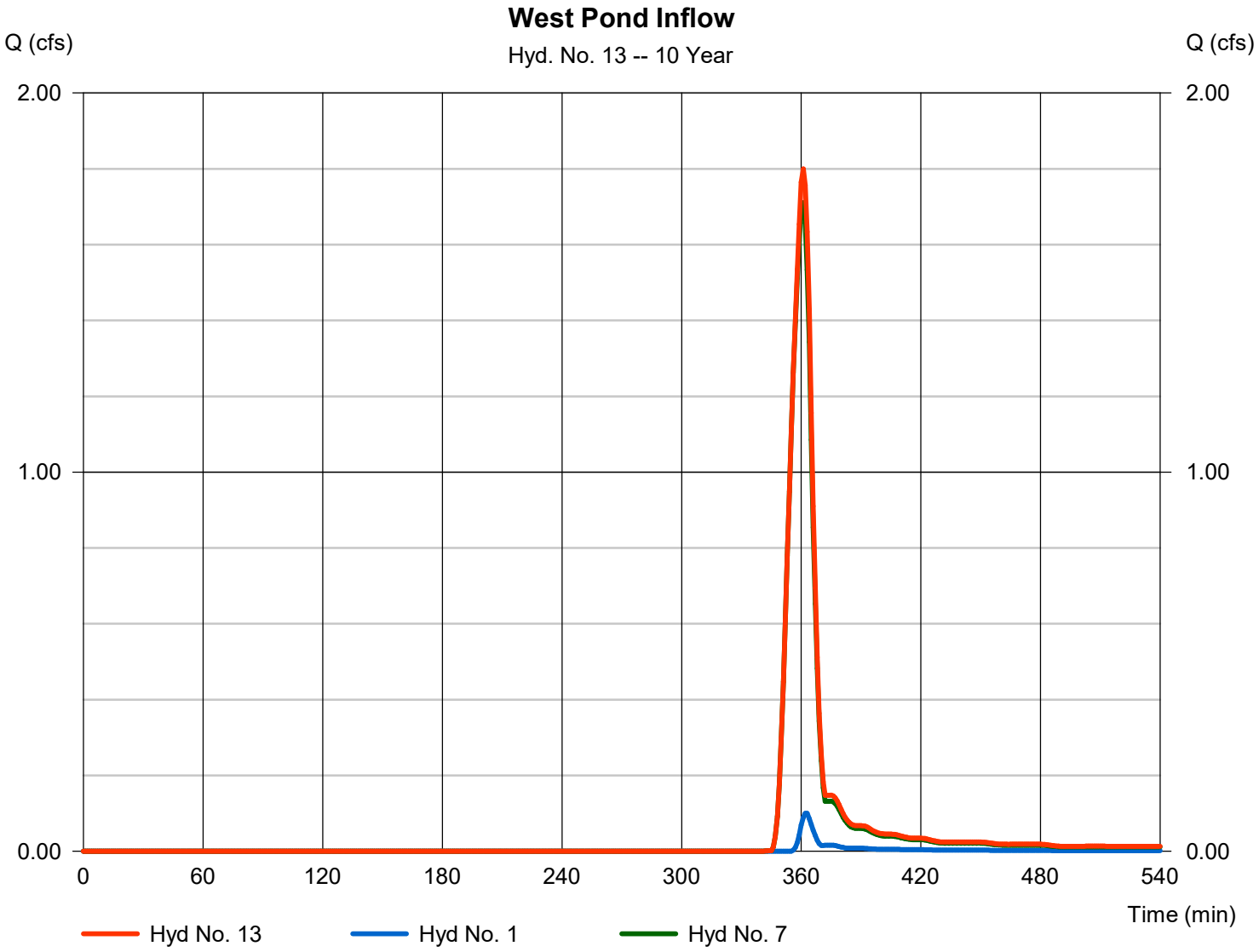


Hydrograph Report

Hyd. No. 13

West Pond Inflow

Hydrograph type	=	Combine	Peak discharge	=	1.800 cfs
Storm frequency	=	10 yrs	Time to peak	=	361 min
Time interval	=	1 min	Hyd. volume	=	2,004 cuft
Inflow hyds.	=	1, 7	Contrib. drain. area	=	0.680 ac



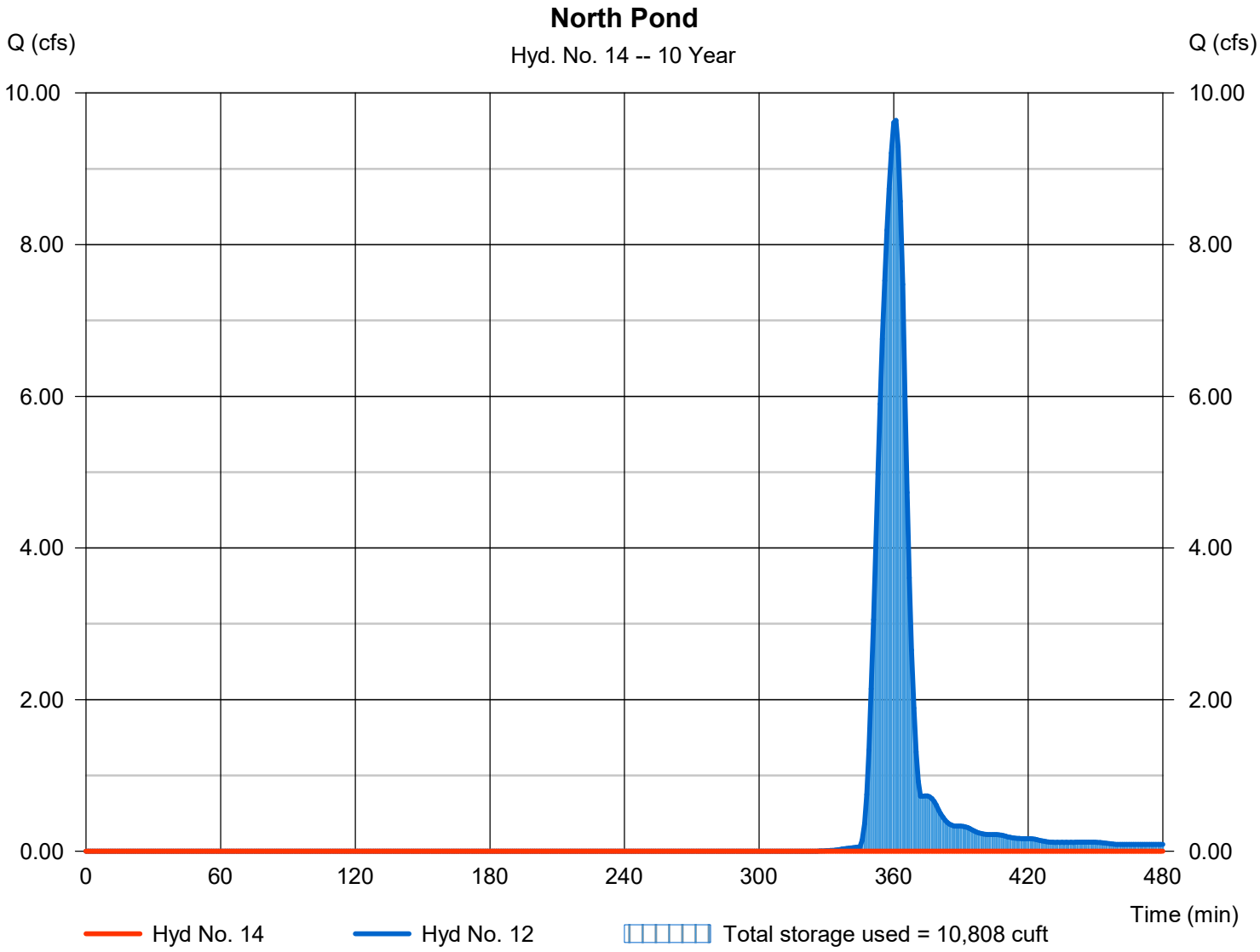
Hydrograph Report

Hyd. No. 14

North Pond

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	10 yrs	Time to peak	=	n/a
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	12 - North Pond Inflow	Max. Elevation	=	103.39 ft
Reservoir name	=	North Pond 1	Max. Storage	=	10,808 cuft

Storage Indication method used.

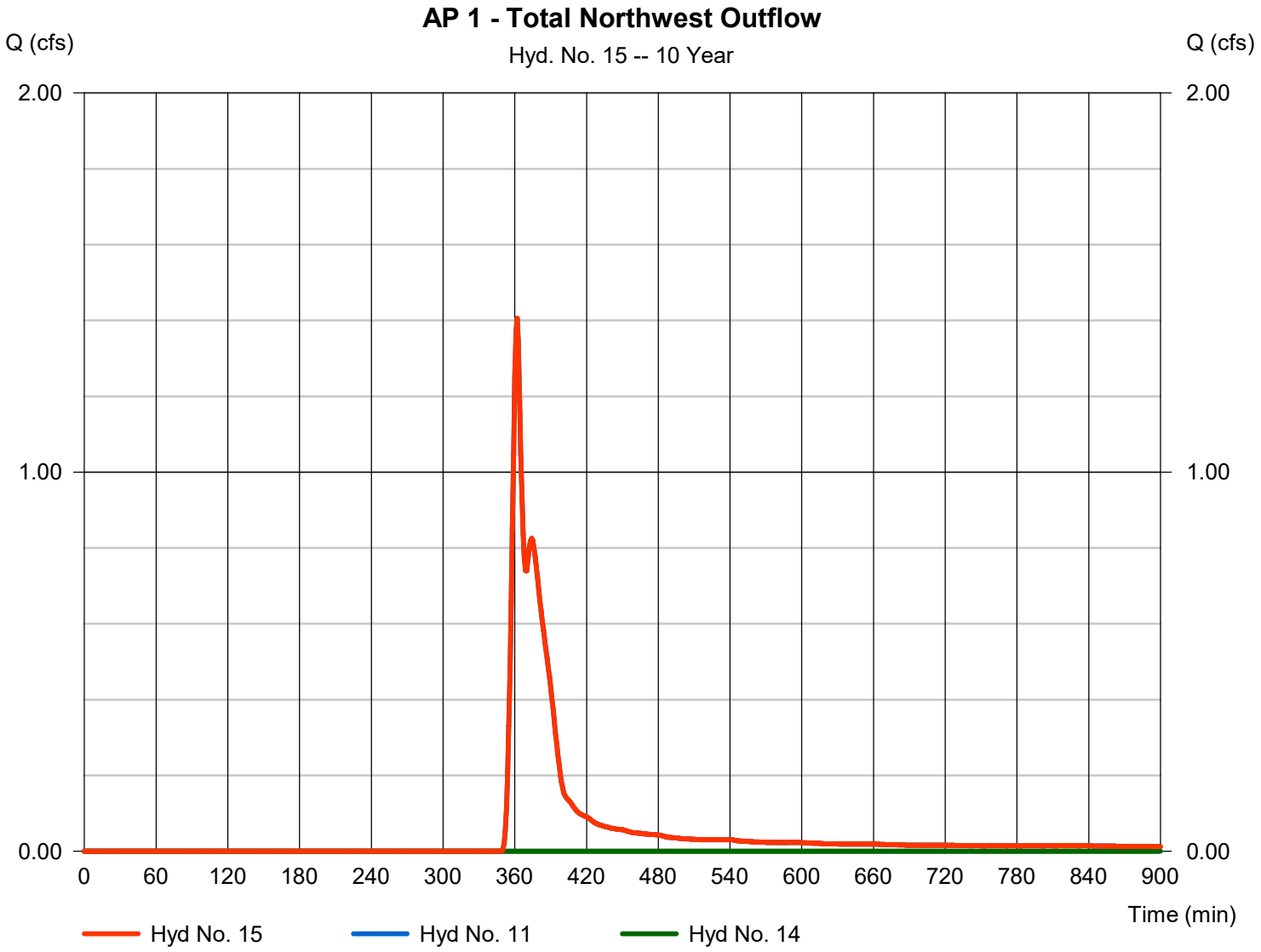


Hydrograph Report

Hyd. No. 15

AP 1 - Total Northwest Outflow

Hydrograph type	=	Combine	Peak discharge	=	1.406 cfs
Storm frequency	=	10 yrs	Time to peak	=	362 min
Time interval	=	1 min	Hyd. volume	=	3,072 cuft
Inflow hyds.	=	11, 14	Contrib. drain. area	=	0.000 ac

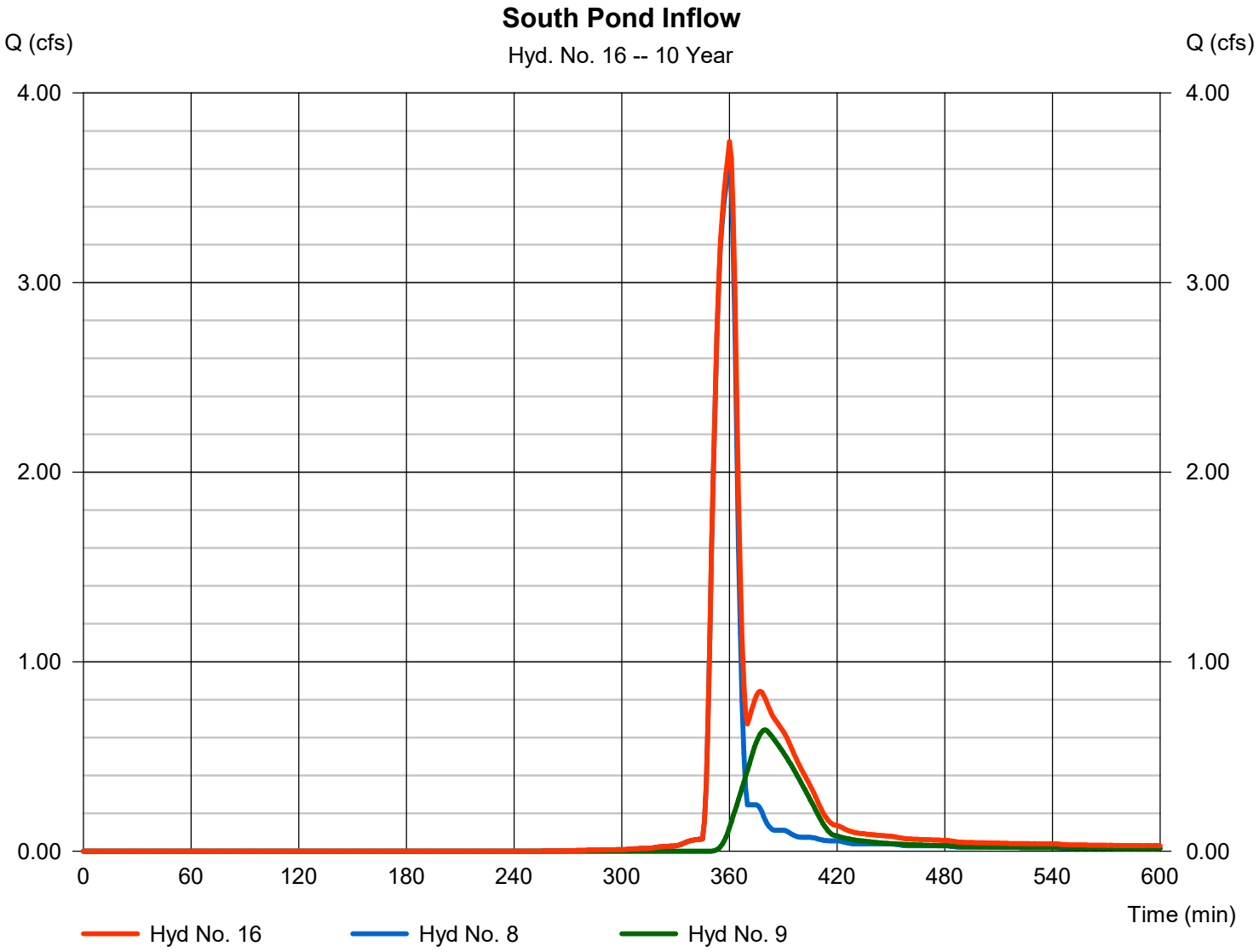


Hydrograph Report

Hyd. No. 16

South Pond Inflow

Hydrograph type	=	Combine	Peak discharge	=	3.743 cfs
Storm frequency	=	10 yrs	Time to peak	=	360 min
Time interval	=	1 min	Hyd. volume	=	6,221 cuft
Inflow hyds.	=	8, 9	Contrib. drain. area	=	1.870 ac



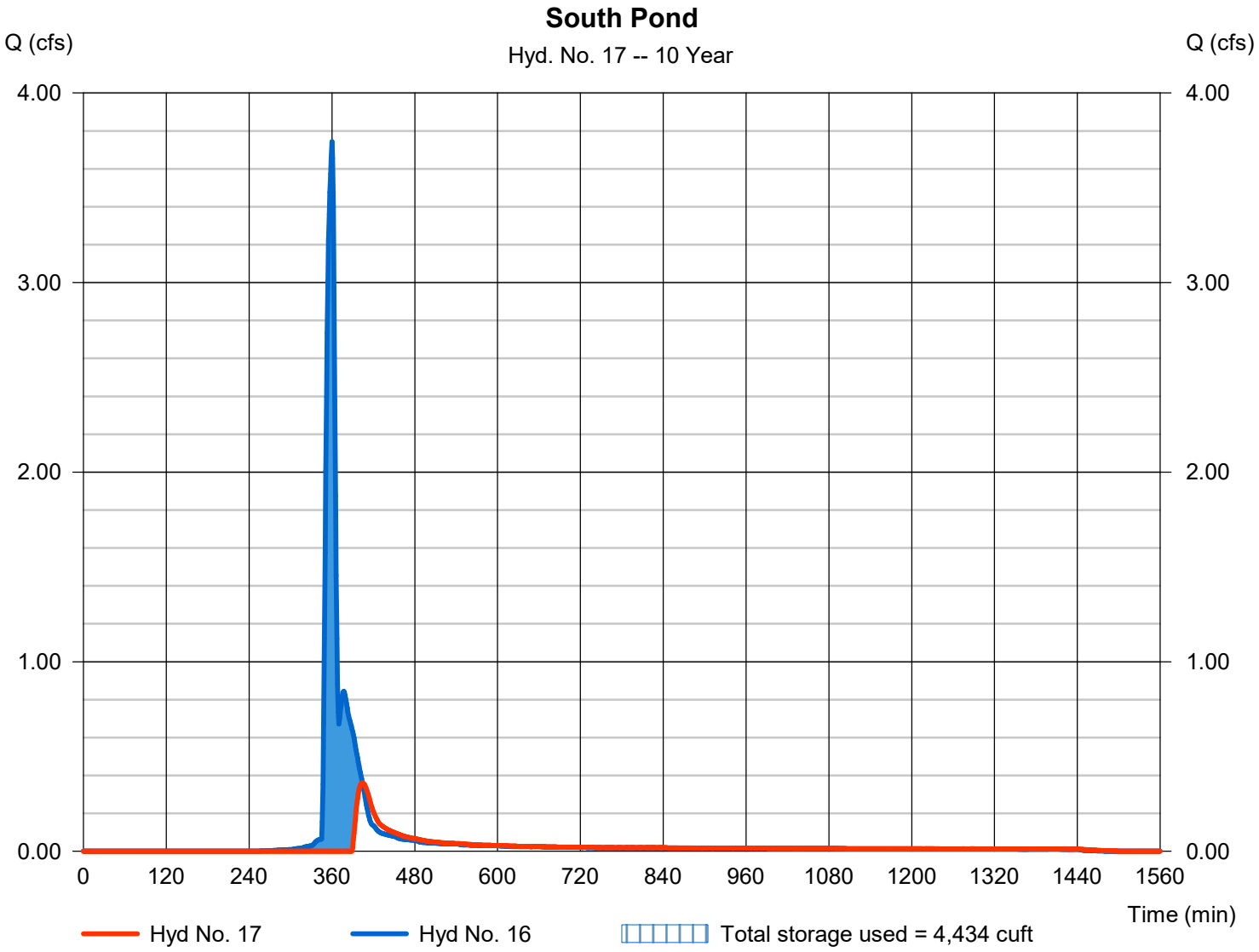
Hydrograph Report

Hyd. No. 17

South Pond

Hydrograph type	=	Reservoir	Peak discharge	=	0.360 cfs
Storm frequency	=	10 yrs	Time to peak	=	404 min
Time interval	=	1 min	Hyd. volume	=	2,013 cuft
Inflow hyd. No.	=	16 - South Pond Inflow	Max. Elevation	=	103.59 ft
Reservoir name	=	South Pond	Max. Storage	=	4,434 cuft

Storage Indication method used.

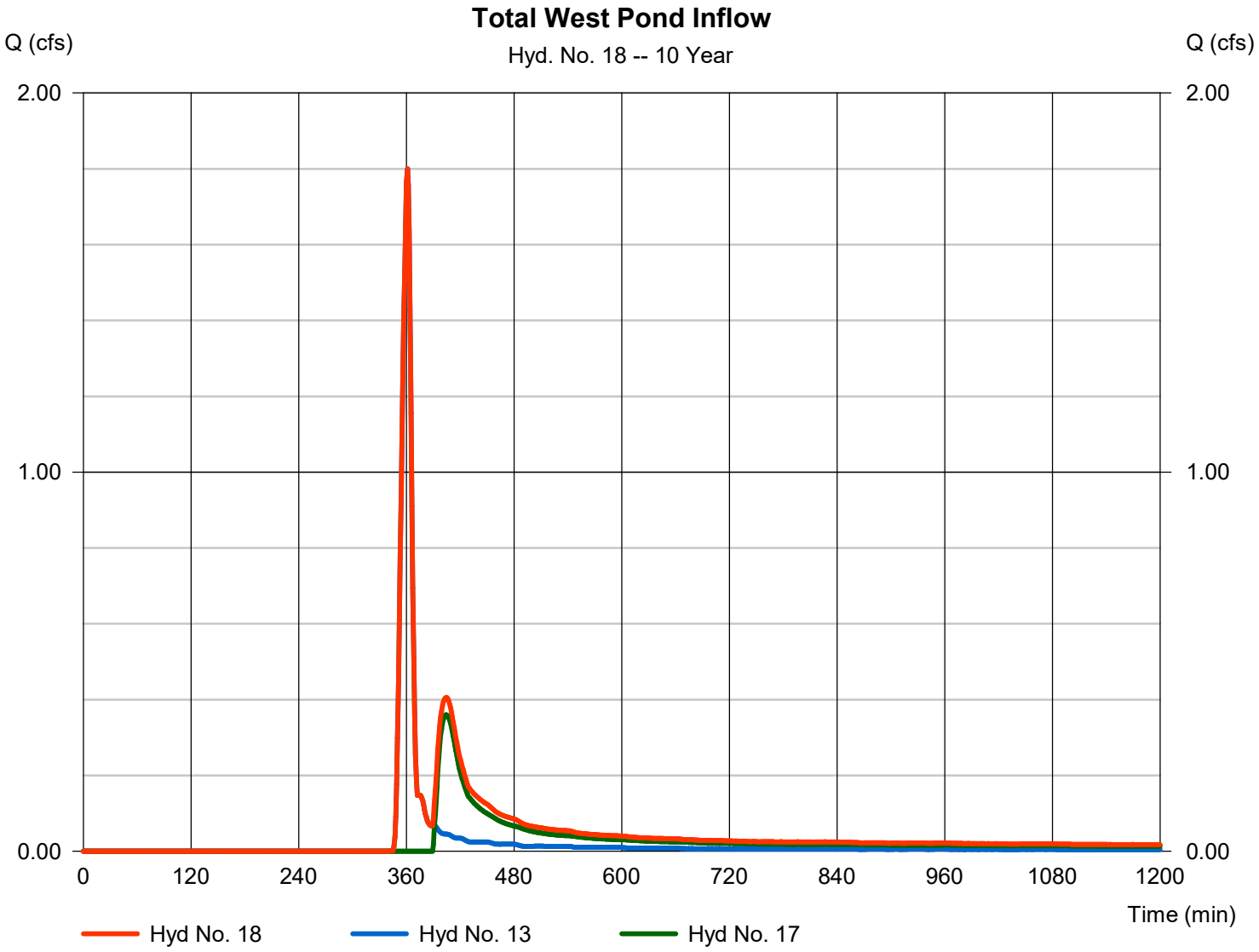


Hydrograph Report

Hyd. No. 18

Total West Pond Inflow

Hydrograph type	=	Combine	Peak discharge	=	1.800 cfs
Storm frequency	=	10 yrs	Time to peak	=	361 min
Time interval	=	1 min	Hyd. volume	=	4,017 cuft
Inflow hyds.	=	13, 17	Contrib. drain. area	=	0.000 ac



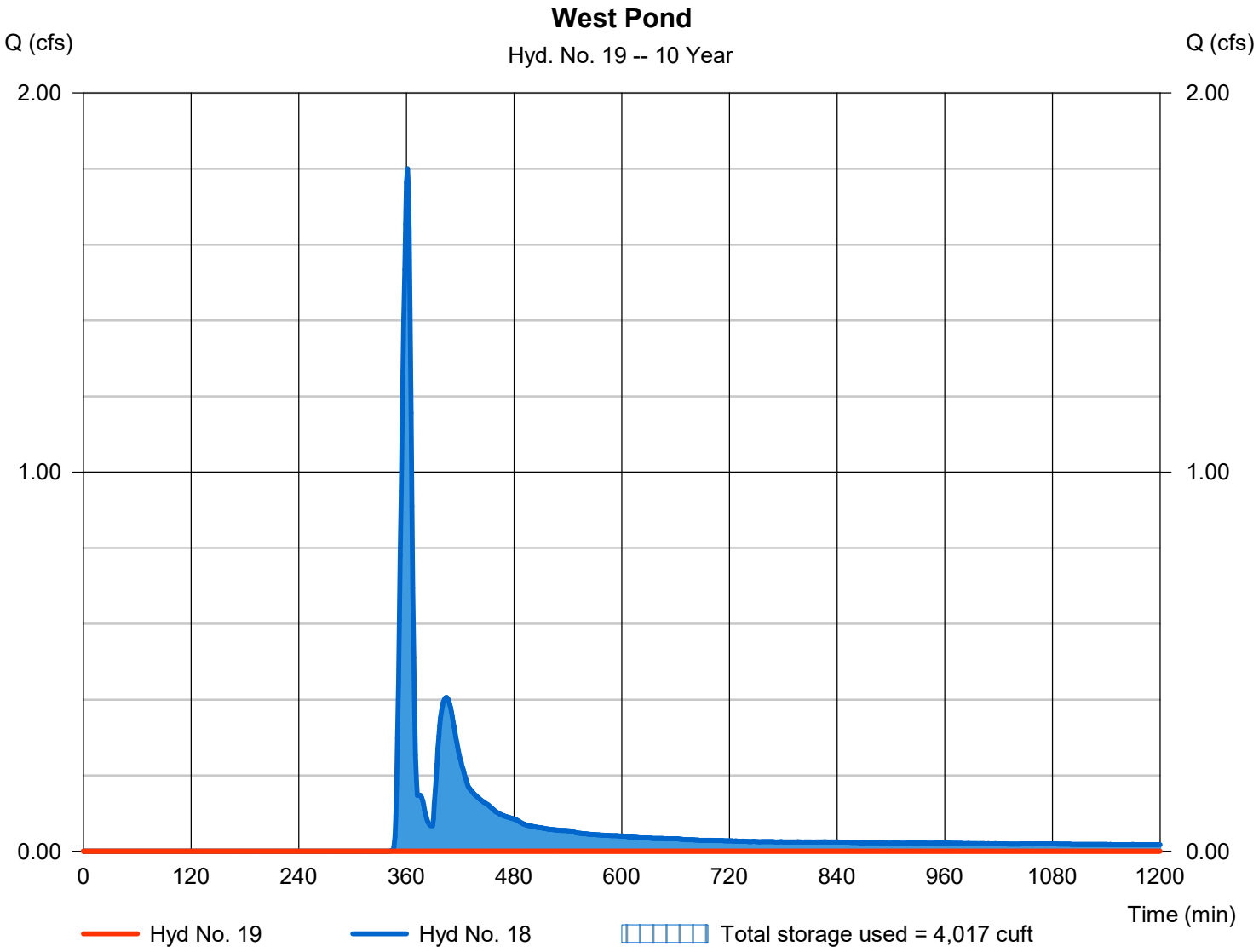
Hydrograph Report

Hyd. No. 19

West Pond

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 18 - Total West Pond Inflow	Max. Elevation	= 101.47 ft
Reservoir name	= West Pond	Max. Storage	= 4,017 cuft

Storage Indication method used.

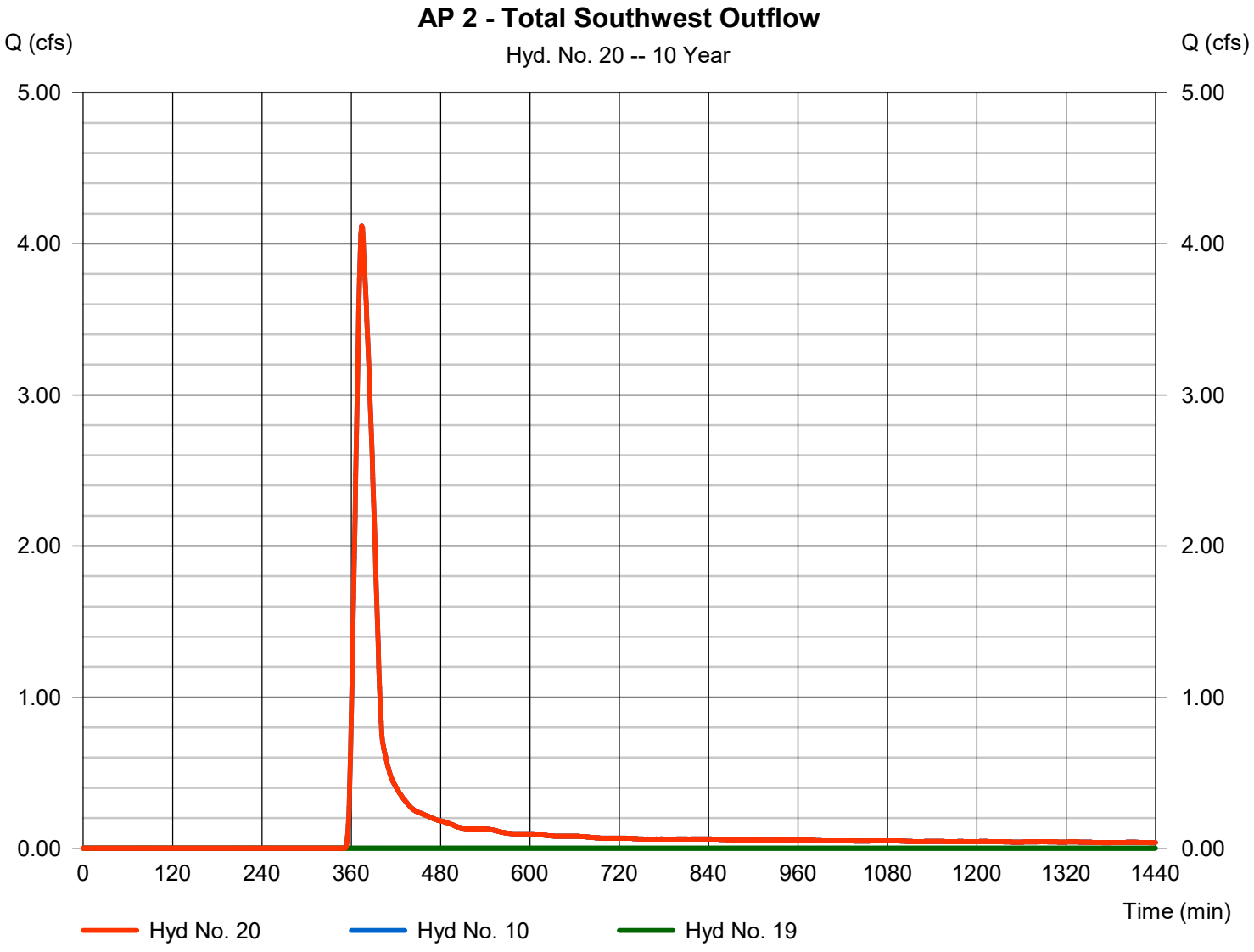


Hydrograph Report

Hyd. No. 20

AP 2 - Total Southwest Outflow

Hydrograph type	=	Combine	Peak discharge	=	4.120 cfs
Storm frequency	=	10 yrs	Time to peak	=	374 min
Time interval	=	1 min	Hyd. volume	=	11,667 cuft
Inflow hyds.	=	10, 19	Contrib. drain. area	=	11.230 ac

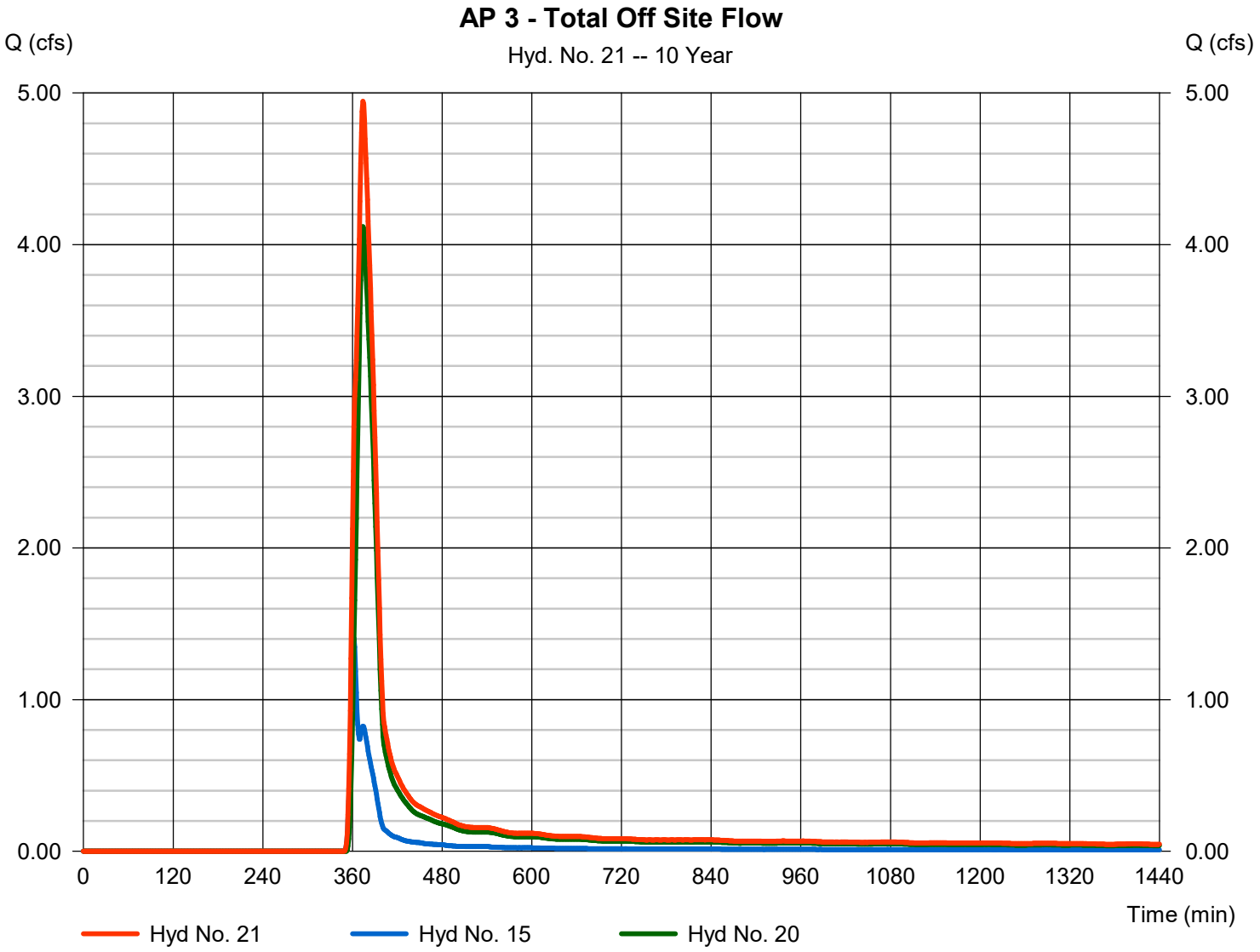


Hydrograph Report

Hyd. No. 21

AP 3 - Total Off Site Flow

Hydrograph type	=	Combine	Peak discharge	=	4.945 cfs
Storm frequency	=	10 yrs	Time to peak	=	374 min
Time interval	=	1 min	Hyd. volume	=	14,739 cuft
Inflow hyds.	=	15, 20	Contrib. drain. area	=	0.000 ac



POST-DEVELOPMENT

BASIN HYDROGRAPHS AND TC CALCULATIONS

100-YEAR STORM EVENT

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

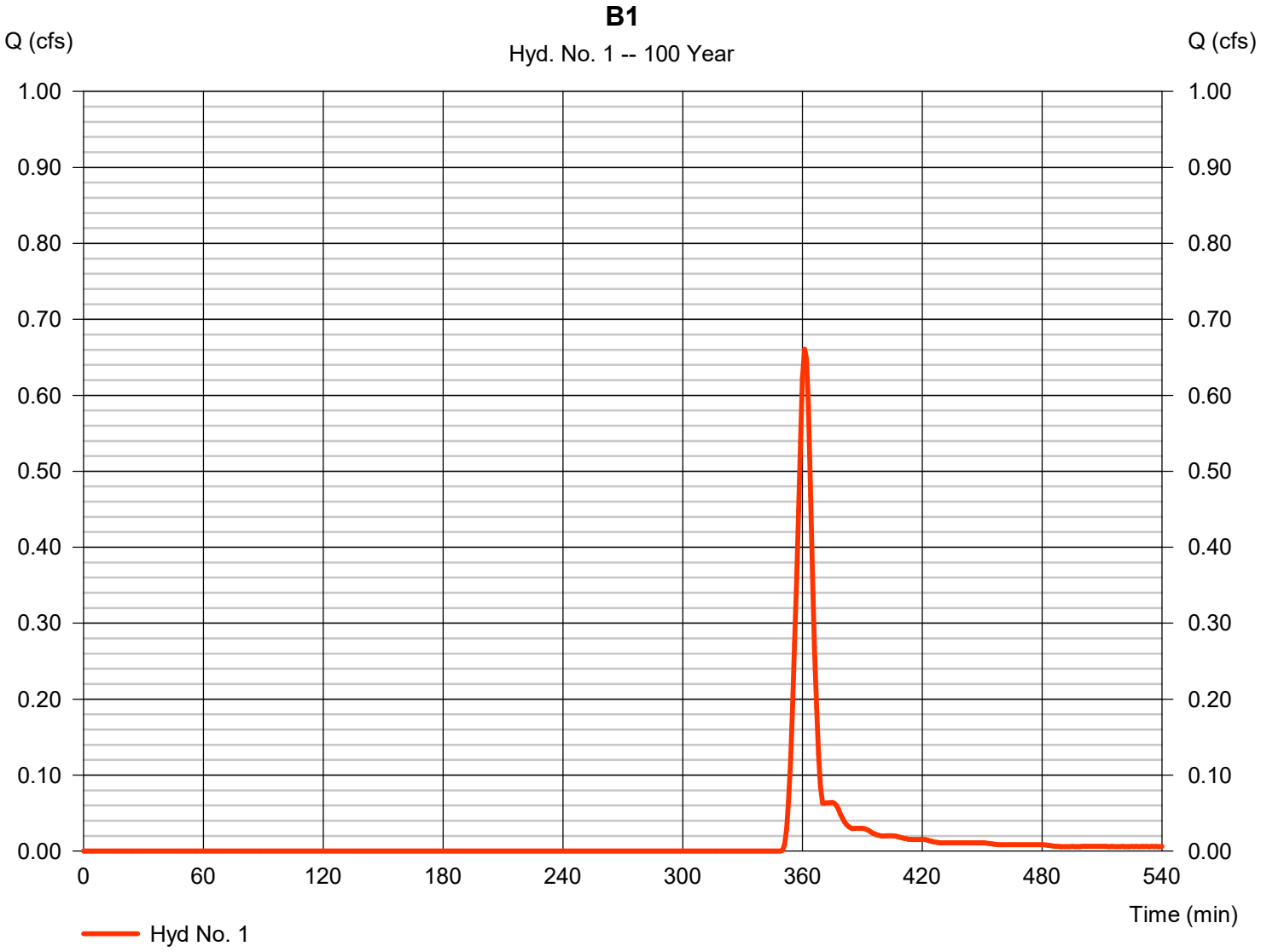
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.660	1	361	653	------	------	------	B1
2	SCS Runoff	1.995	1	361	2,038	------	------	------	B2
3	SCS Runoff	1.750	1	361	1,739	------	------	------	B3
4	SCS Runoff	0.718	1	361	710	------	------	------	B4
5	SCS Runoff	2.881	1	373	6,677	------	------	------	B5
6	SCS Runoff	19.01	1	360	22,038	------	------	------	B6
7	SCS Runoff	3.550	1	360	4,050	------	------	------	B7
8	SCS Runoff	6.524	1	360	7,864	------	------	------	B8
9	SCS Runoff	2.176	1	379	6,330	------	------	------	B9
10	SCS Runoff	18.72	1	373	44,166	------	------	------	B10
11	Combine	4.968	1	362	10,454	2, 3, 5,	------	------	Northwest Offsite Flow
12	Combine	19.69	1	360	22,748	4, 6,	------	------	North Pond Inflow
13	Combine	4.181	1	361	4,703	1, 7,	------	------	West Pond Inflow
14	Reservoir	9.789	1	366	11,447	12	104.00	13,783	North Pond
15	Combine	13.39	1	365	21,901	11, 14	------	------	AP 1 - Total Northwest Outflow
16	Combine	7.104	1	360	14,194	8, 9,	------	------	South Pond Inflow
17	Reservoir	3.923	1	365	9,987	16	103.95	5,338	South Pond
18	Combine	6.911	1	364	14,690	13, 17	------	------	Total West Pond Inflow
19	Reservoir	0.072	1	631	2,477	18	103.52	12,342	West Pond
20	Combine	18.72	1	373	46,642	10, 19	------	------	AP 2 - Total Southwest Outflow
21	Combine	27.55	1	367	68,543	15, 20	------	------	AP 3 - Total Off Site Flow

Hydrograph Report

Hyd. No. 1

B1

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.660 cfs
Storm frequency	=	100 yrs	Time to peak	=	361 min
Time interval	=	1 min	Hyd. volume	=	653 cuft
Drainage area	=	0.230 ac	Curve number	=	63
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484

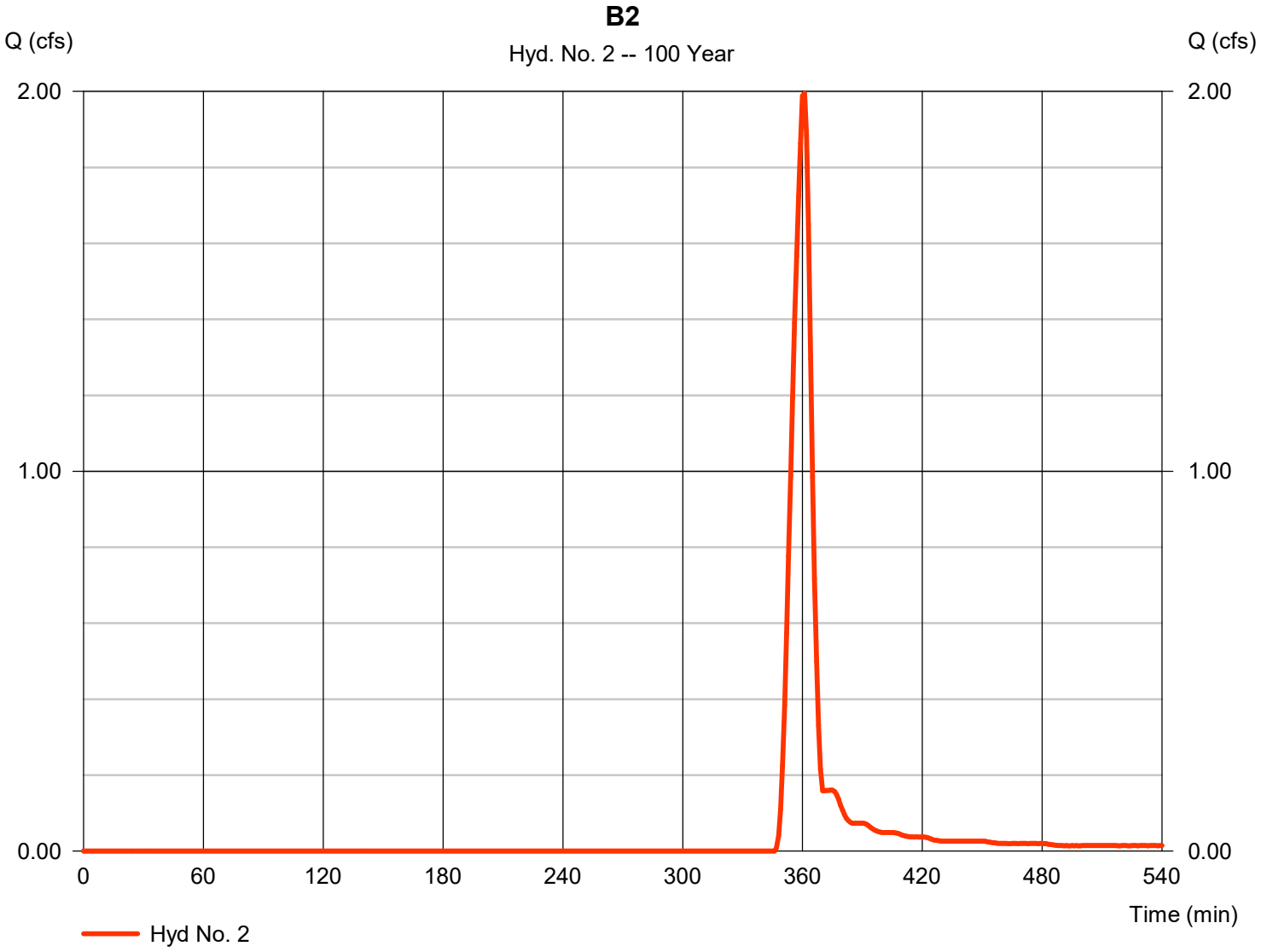


Hydrograph Report

Hyd. No. 2

B2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.995 cfs
Storm frequency	=	100 yrs	Time to peak	=	361 min
Time interval	=	1 min	Hyd. volume	=	2,038 cuft
Drainage area	=	0.360 ac	Curve number	=	76
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484

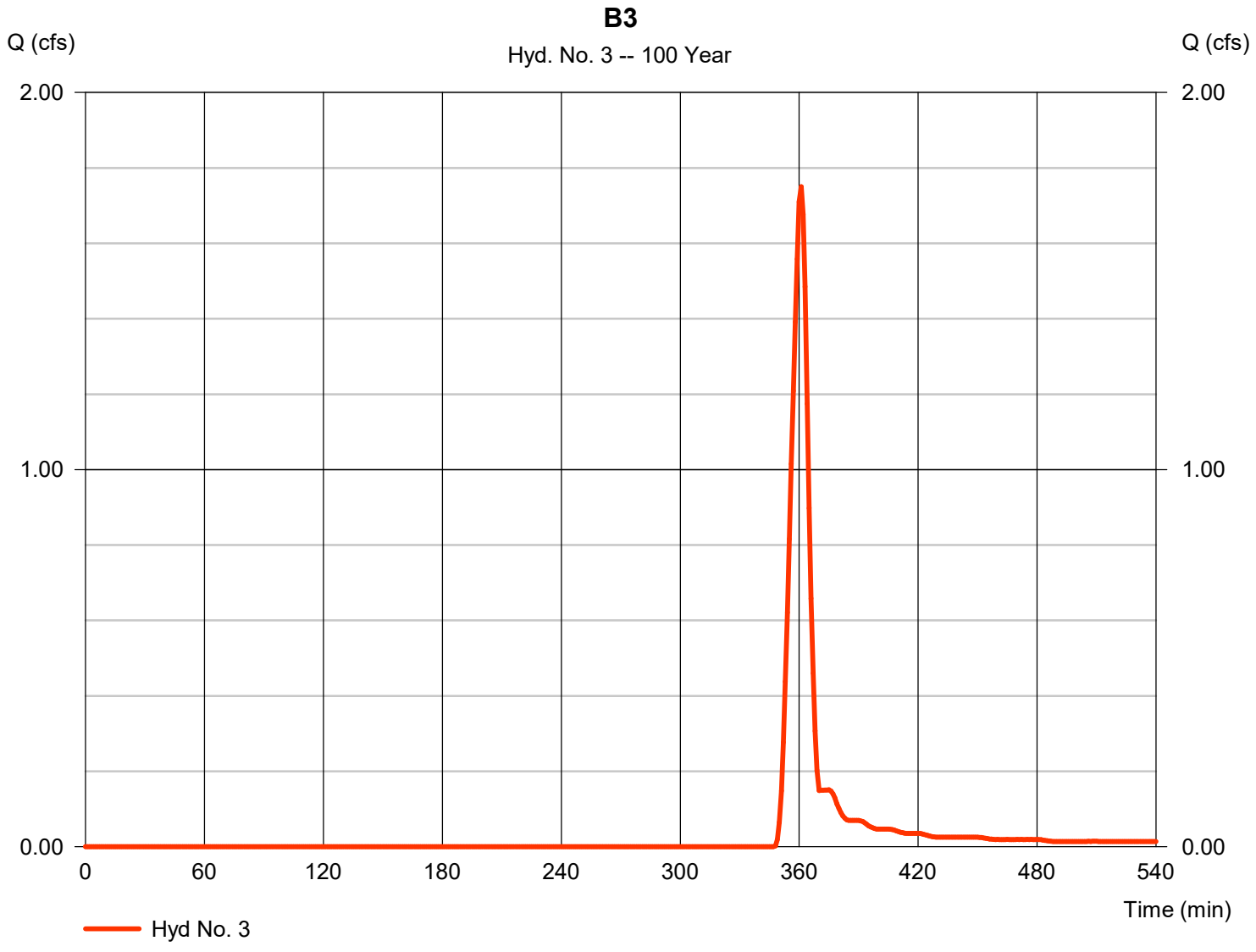


Hydrograph Report

Hyd. No. 3

B3

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.750 cfs
Storm frequency	=	100 yrs	Time to peak	=	361 min
Time interval	=	1 min	Hyd. volume	=	1,739 cuft
Drainage area	=	0.410 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484

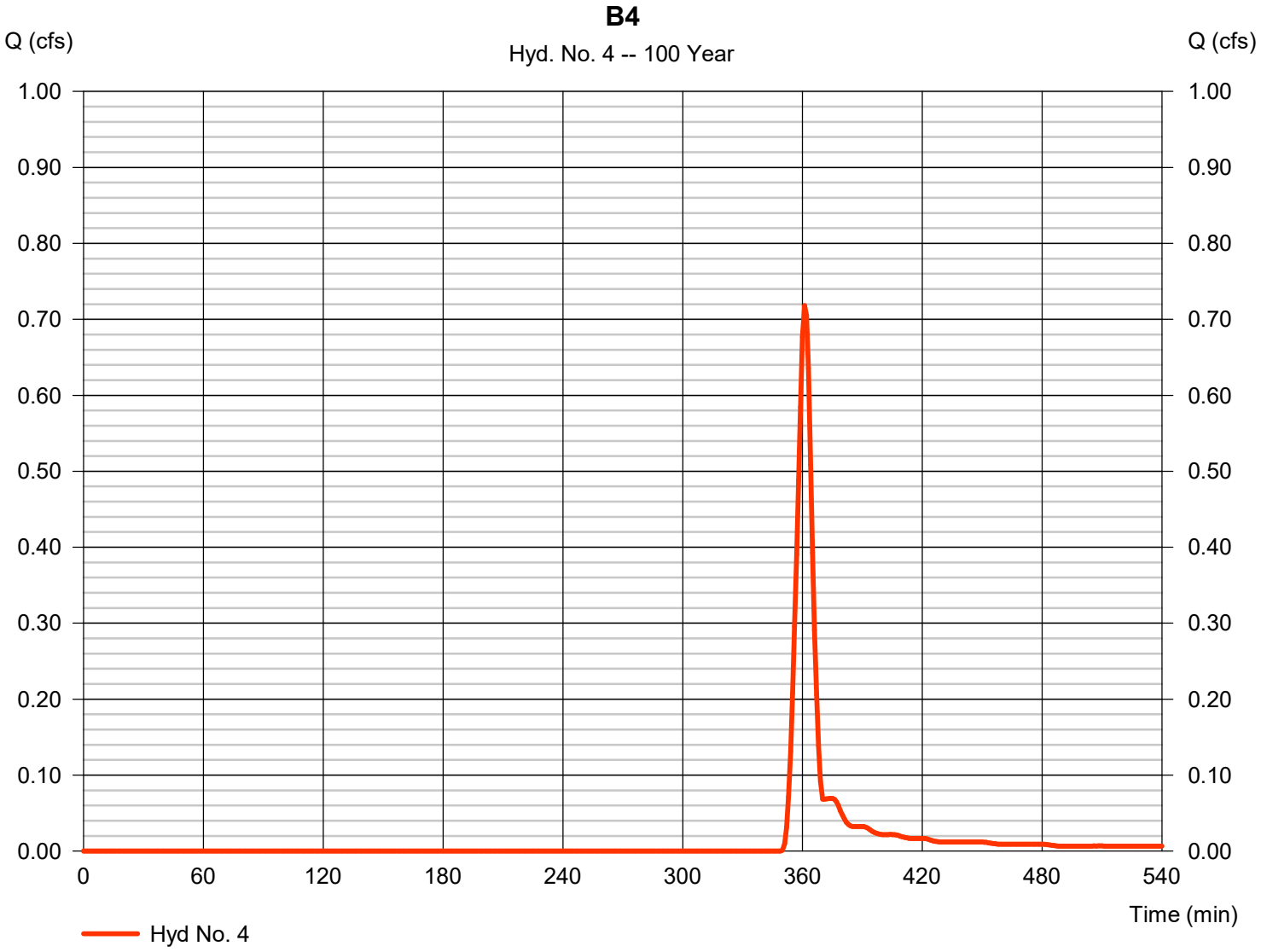


Hydrograph Report

Hyd. No. 4

B4

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.718 cfs
Storm frequency	=	100 yrs	Time to peak	=	361 min
Time interval	=	1 min	Hyd. volume	=	710 cuft
Drainage area	=	0.250 ac	Curve number	=	63
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\4 Final Drainage Repor	Shape factor	=	484

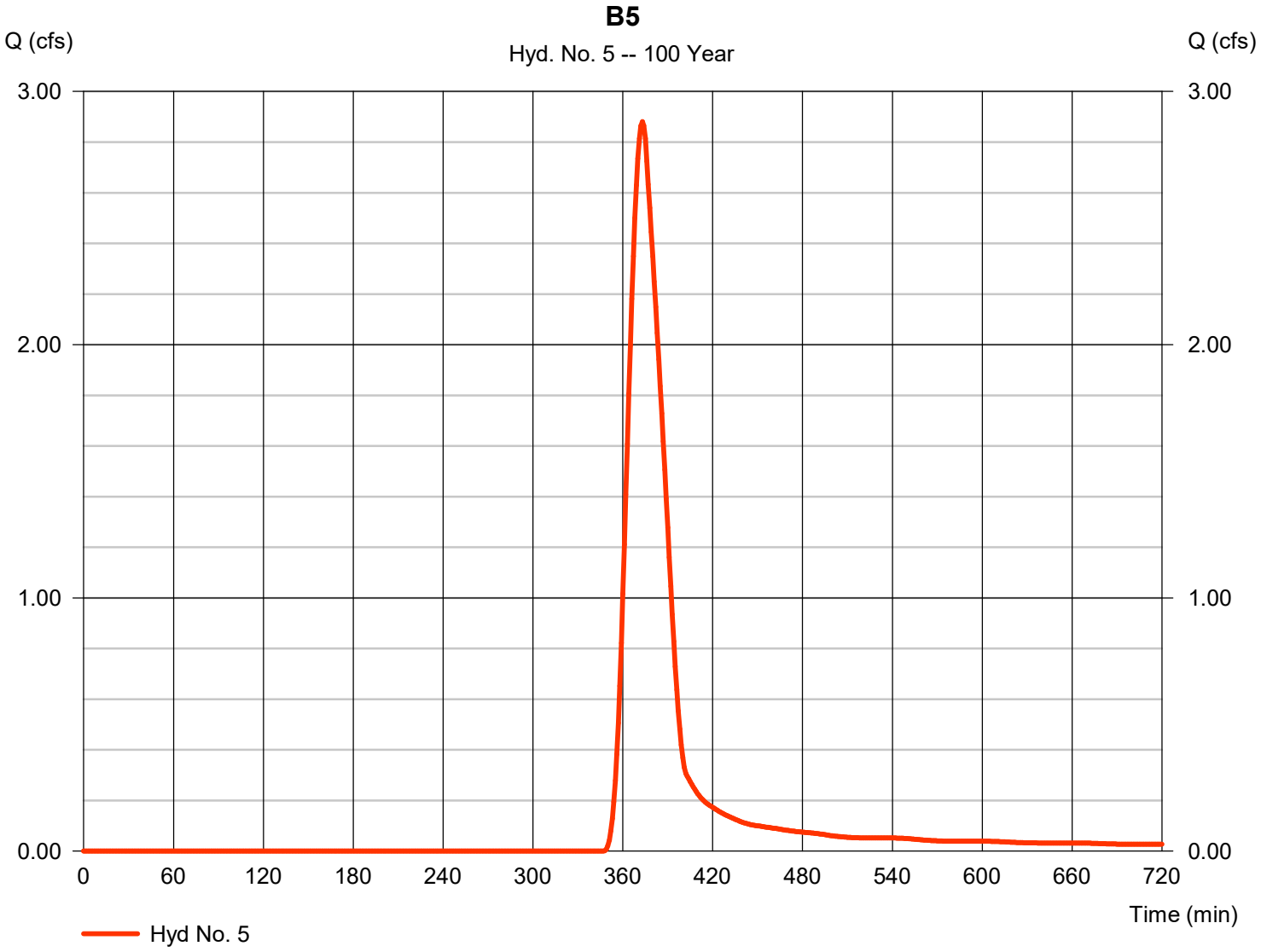


Hydrograph Report

Hyd. No. 5

B5

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.881 cfs
Storm frequency	=	100 yrs	Time to peak	=	373 min
Time interval	=	1 min	Hyd. volume	=	6,677 cuft
Drainage area	=	1.530 ac	Curve number	=	71
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	25.80 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\4 Final Drainage Repor	Shape factor	=	484

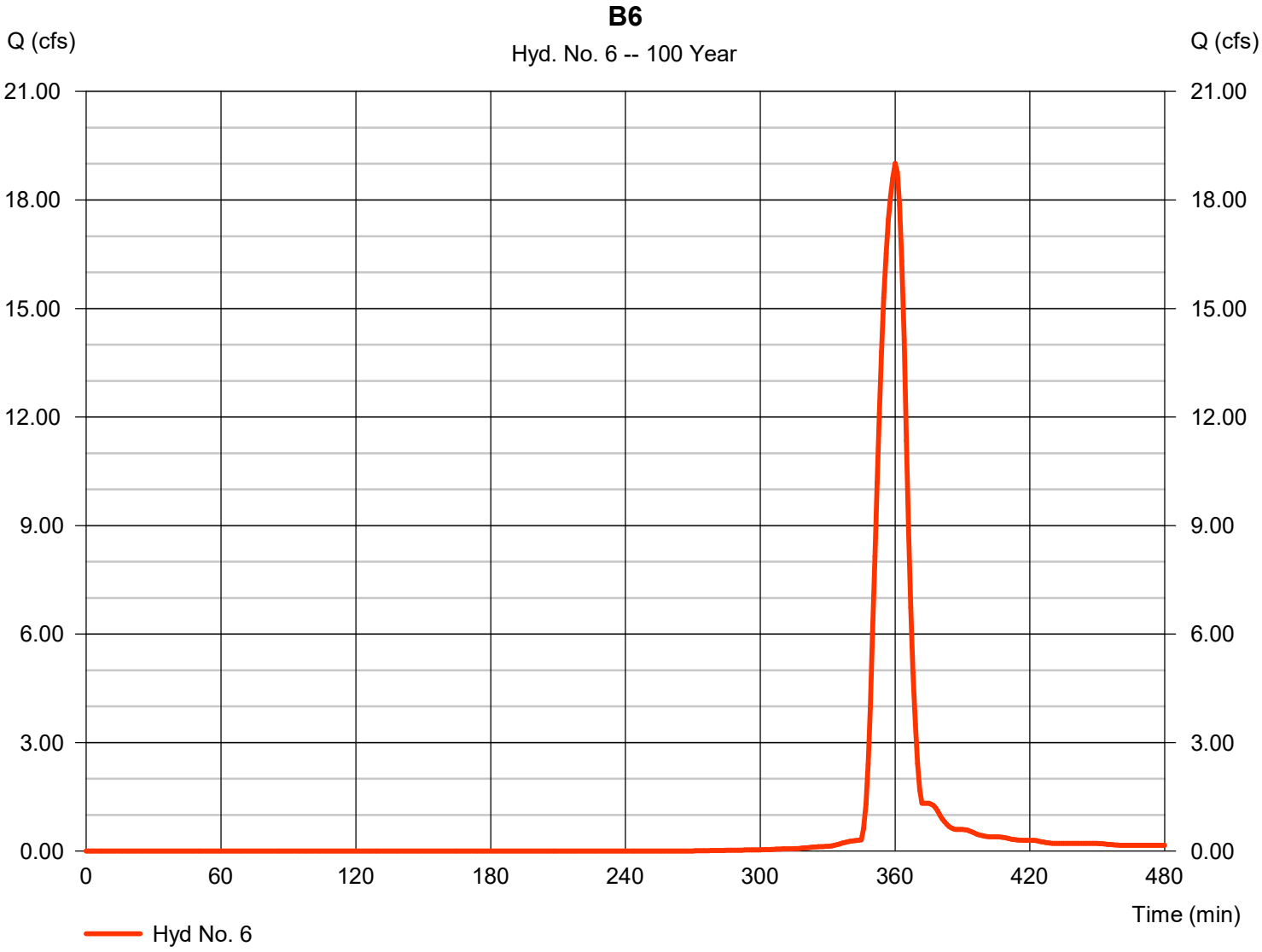


Hydrograph Report

Hyd. No. 6

B6

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.01 cfs
Storm frequency	=	100 yrs	Time to peak	=	360 min
Time interval	=	1 min	Hyd. volume	=	22,038 cuft
Drainage area	=	2.280 ac	Curve number	=	91
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.70 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484

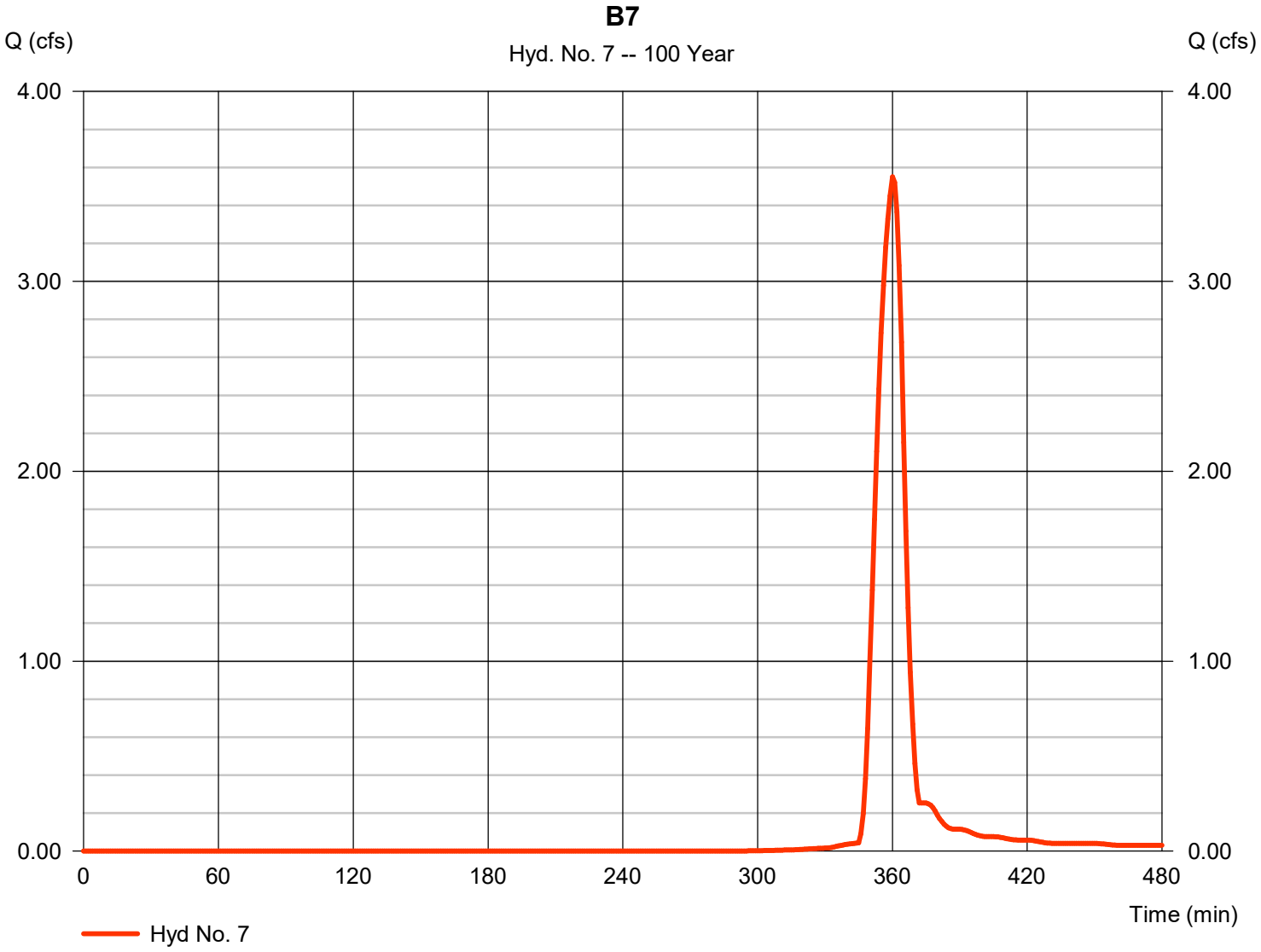


Hydrograph Report

Hyd. No. 7

B7

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.550 cfs
Storm frequency	=	100 yrs	Time to peak	=	360 min
Time interval	=	1 min	Hyd. volume	=	4,050 cuft
Drainage area	=	0.450 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.70 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484

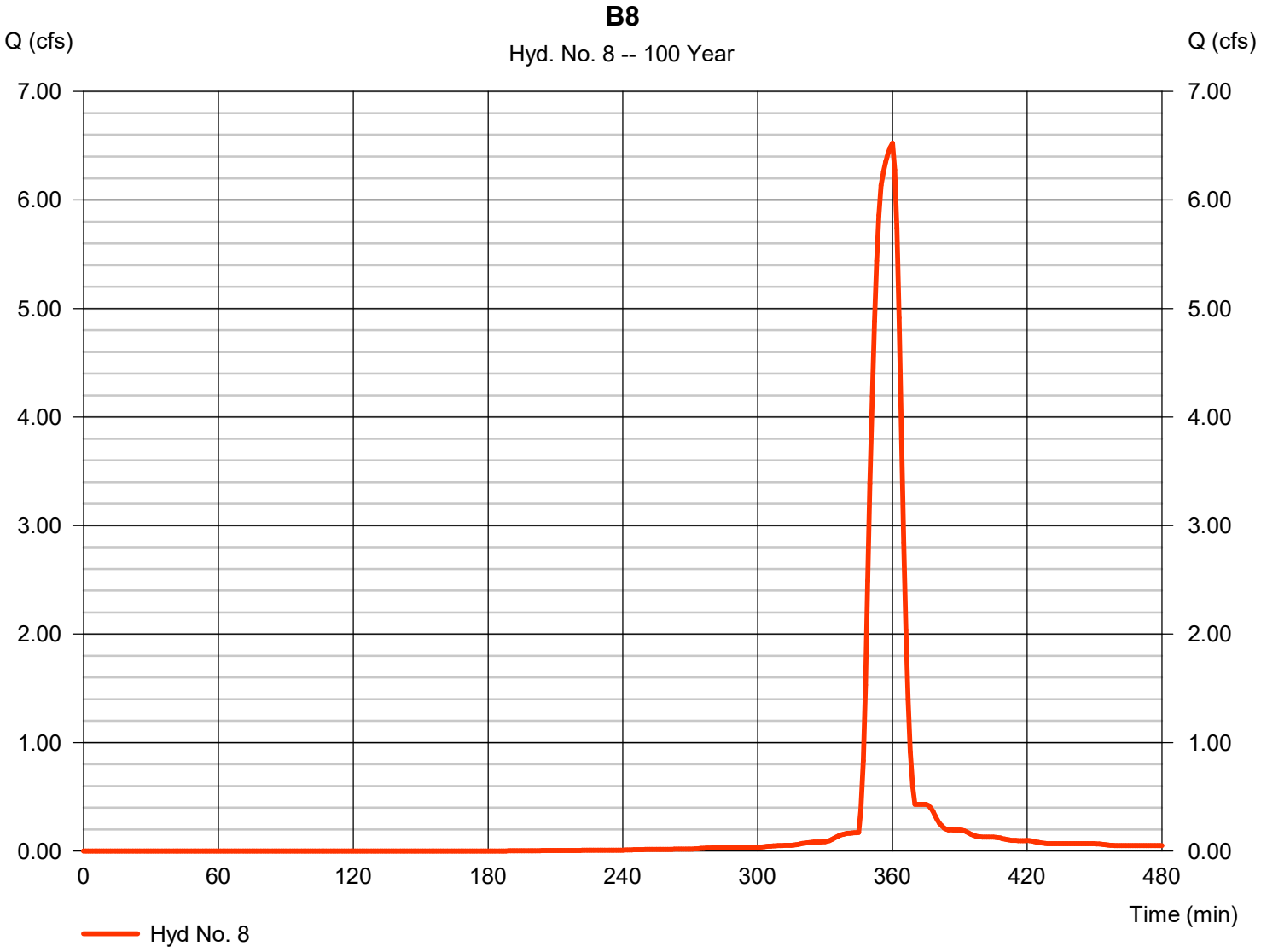


Hydrograph Report

Hyd. No. 8

B8

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.524 cfs
Storm frequency	=	100 yrs	Time to peak	=	360 min
Time interval	=	1 min	Hyd. volume	=	7,864 cuft
Drainage area	=	0.670 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\4 Final Drainage Repor	Shape factor	=	484

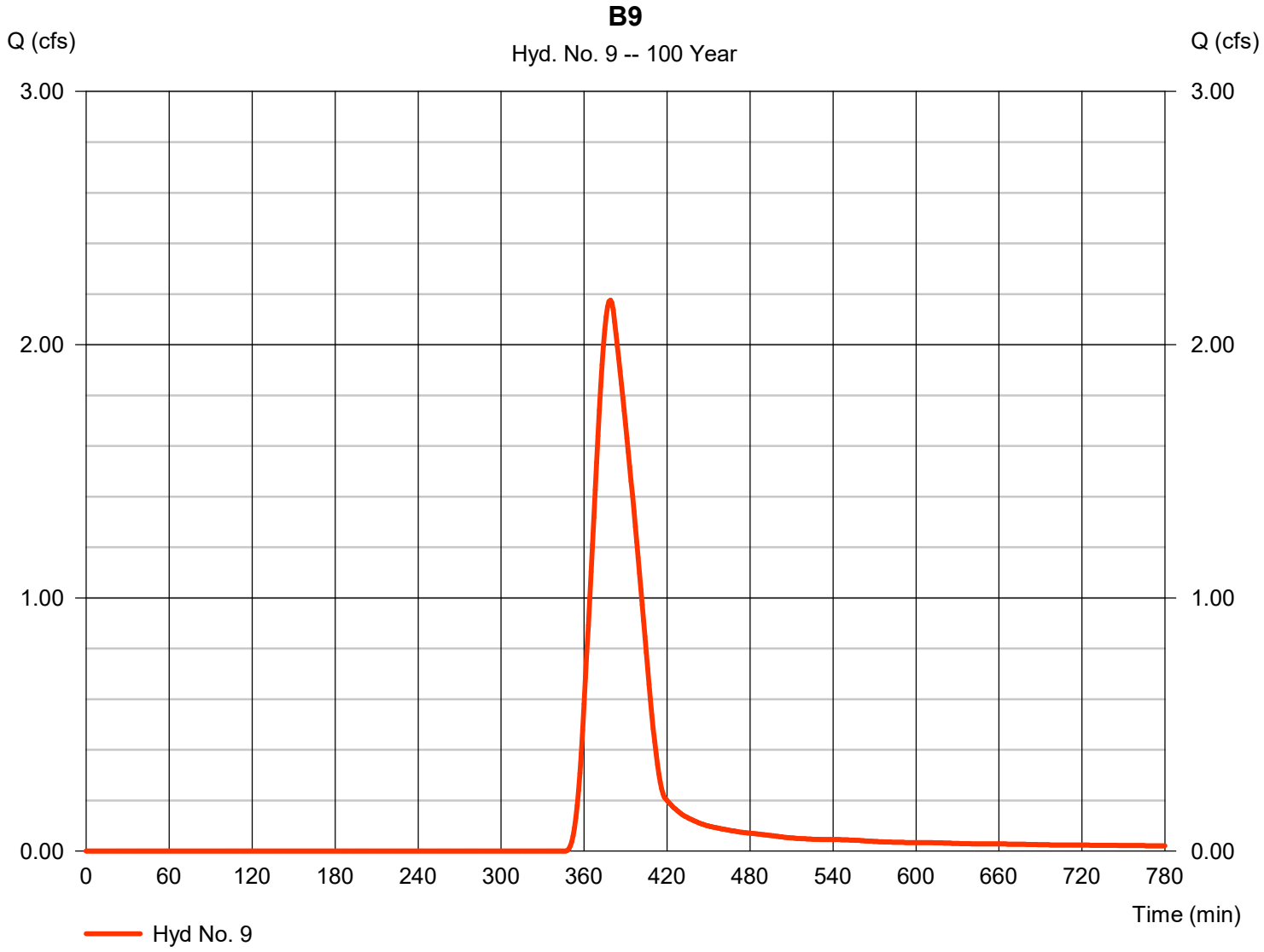


Hydrograph Report

Hyd. No. 9

B9

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.176 cfs
Storm frequency	=	100 yrs	Time to peak	=	379 min
Time interval	=	1 min	Hyd. volume	=	6,330 cuft
Drainage area	=	1.200 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	36.10 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\4 Final Drainage Repor	Shape factor	=	484

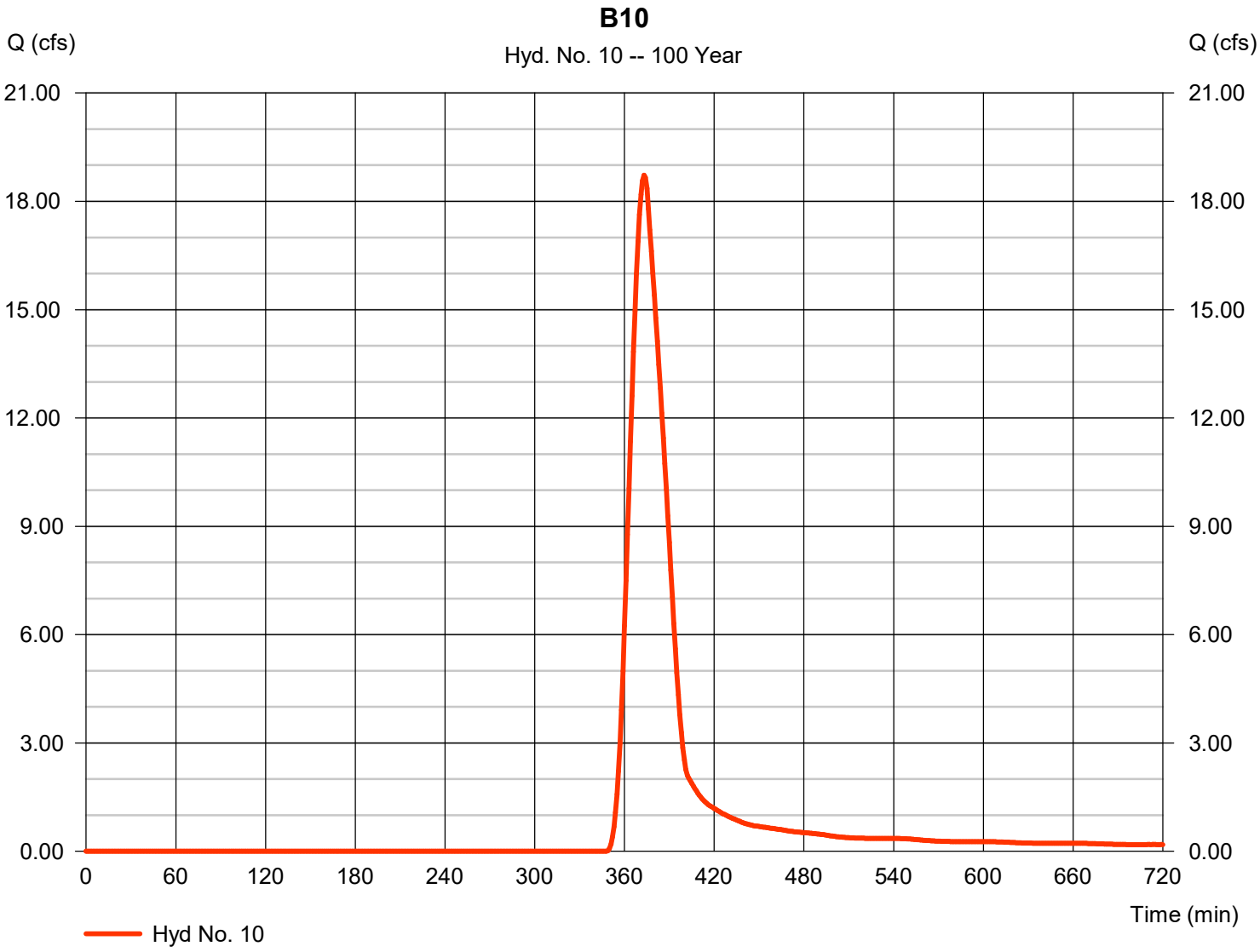


Hydrograph Report

Hyd. No. 10

B10

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.72 cfs
Storm frequency	=	100 yrs	Time to peak	=	373 min
Time interval	=	1 min	Hyd. volume	=	44,166 cuft
Drainage area	=	11.230 ac	Curve number	=	69
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	26.40 min
Total precip.	=	3.70 in	Distribution	=	Custom
Storm duration	=	P:\9-ASA DAC Emergency Mgmt Facility (9331490)\Design\Final Drainage Repor	Shape factor	=	484

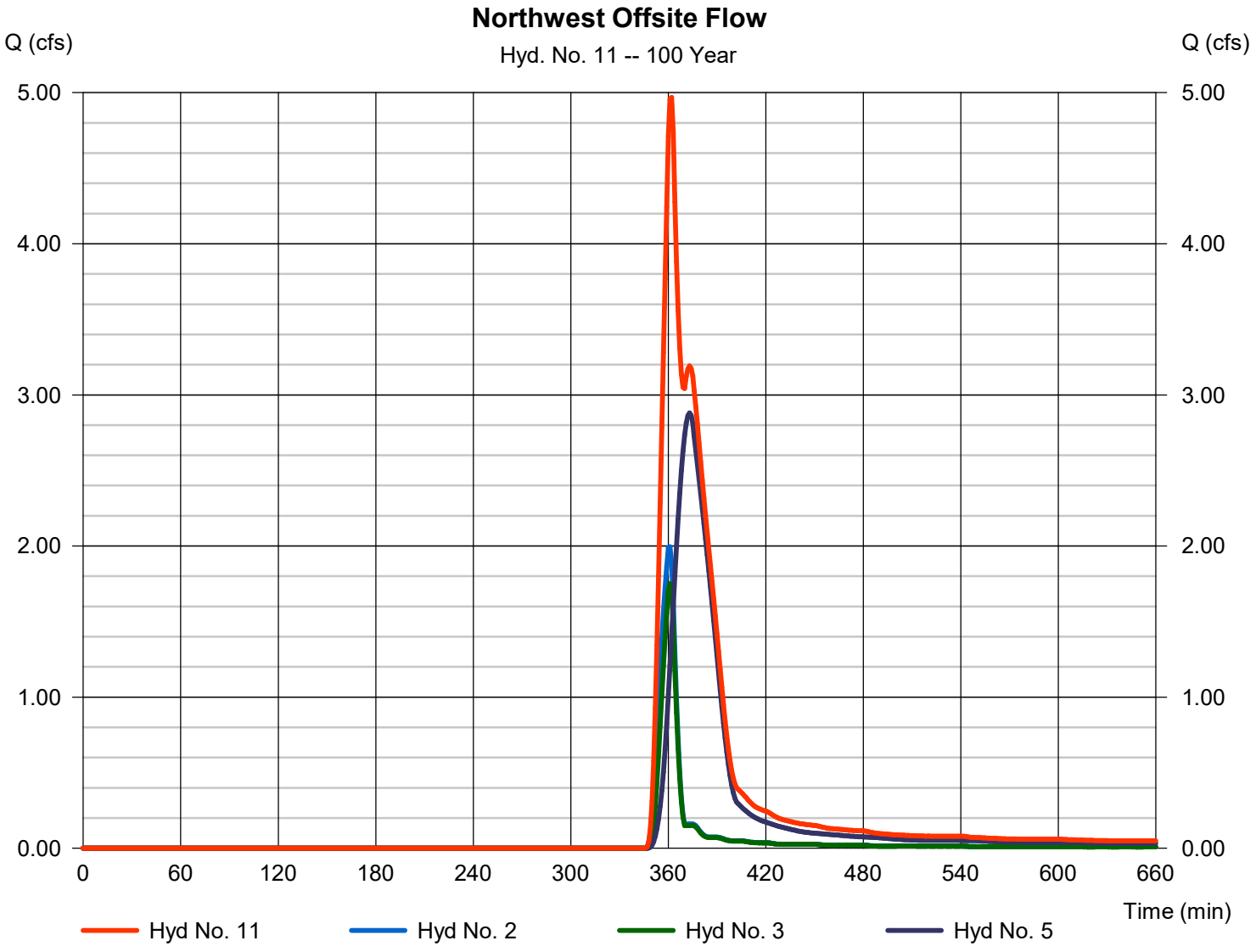


Hydrograph Report

Hyd. No. 11

Northwest Offsite Flow

Hydrograph type	= Combine	Peak discharge	= 4.968 cfs
Storm frequency	= 100 yrs	Time to peak	= 362 min
Time interval	= 1 min	Hyd. volume	= 10,454 cuft
Inflow hyds.	= 2, 3, 5	Contrib. drain. area	= 2.300 ac

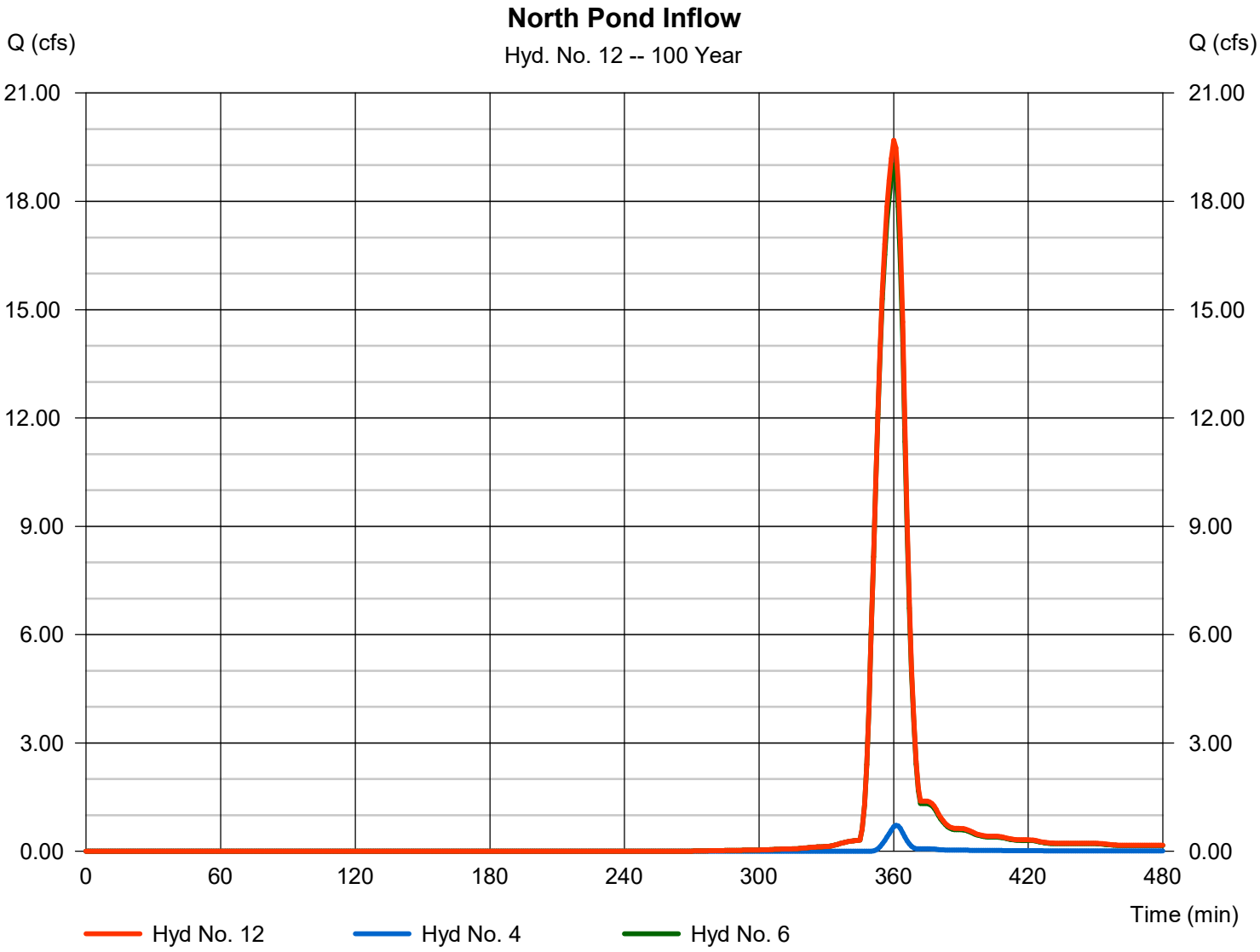


Hydrograph Report

Hyd. No. 12

North Pond Inflow

Hydrograph type	= Combine	Peak discharge	= 19.69 cfs
Storm frequency	= 100 yrs	Time to peak	= 360 min
Time interval	= 1 min	Hyd. volume	= 22,748 cuft
Inflow hyds.	= 4, 6	Contrib. drain. area	= 2.530 ac

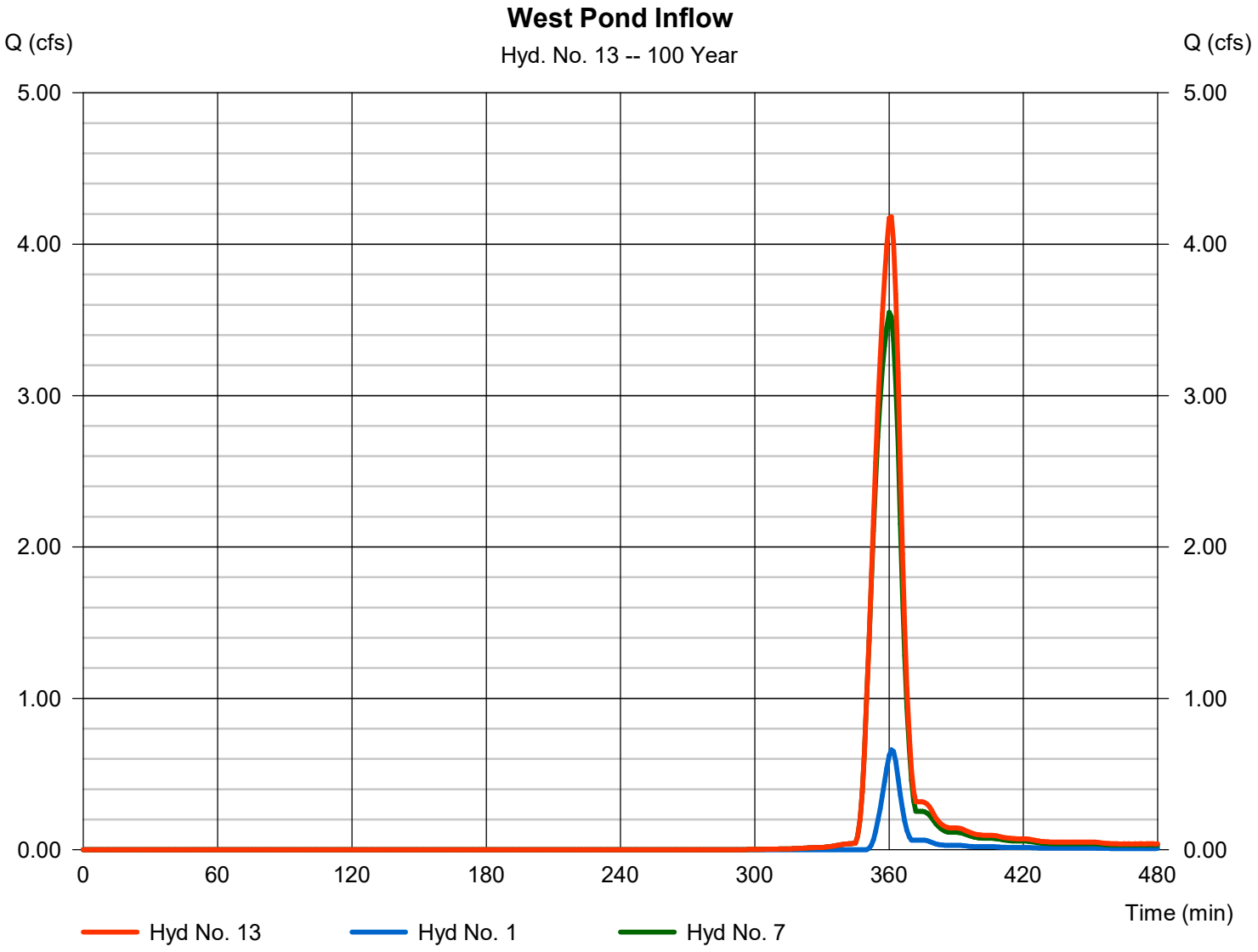


Hydrograph Report

Hyd. No. 13

West Pond Inflow

Hydrograph type	=	Combine	Peak discharge	=	4.181 cfs
Storm frequency	=	100 yrs	Time to peak	=	361 min
Time interval	=	1 min	Hyd. volume	=	4,703 cuft
Inflow hyds.	=	1, 7	Contrib. drain. area	=	0.680 ac



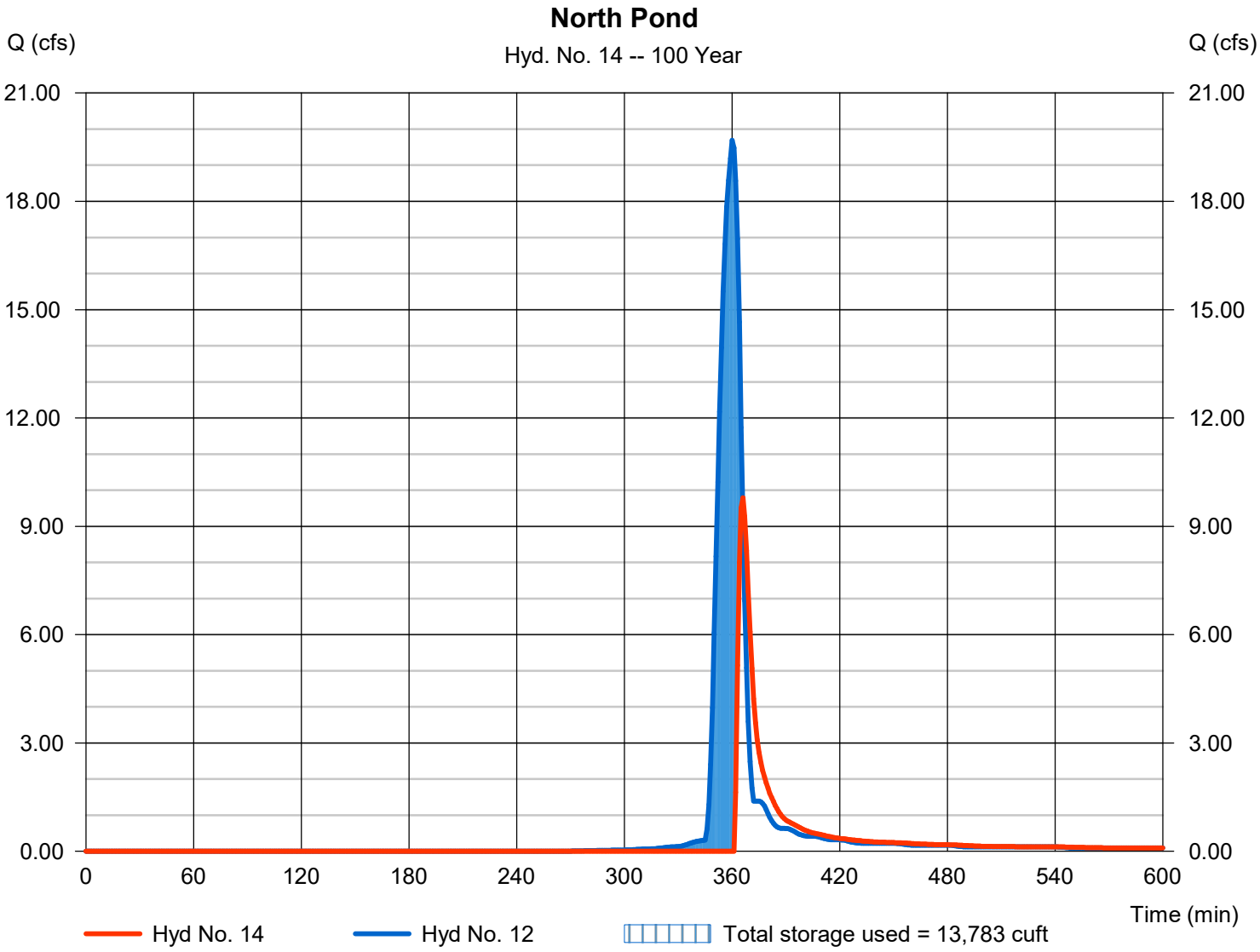
Hydrograph Report

Hyd. No. 14

North Pond

Hydrograph type	=	Reservoir	Peak discharge	=	9.789 cfs
Storm frequency	=	100 yrs	Time to peak	=	366 min
Time interval	=	1 min	Hyd. volume	=	11,447 cuft
Inflow hyd. No.	=	12 - North Pond Inflow	Max. Elevation	=	104.00 ft
Reservoir name	=	North Pond 1	Max. Storage	=	13,783 cuft

Storage Indication method used.

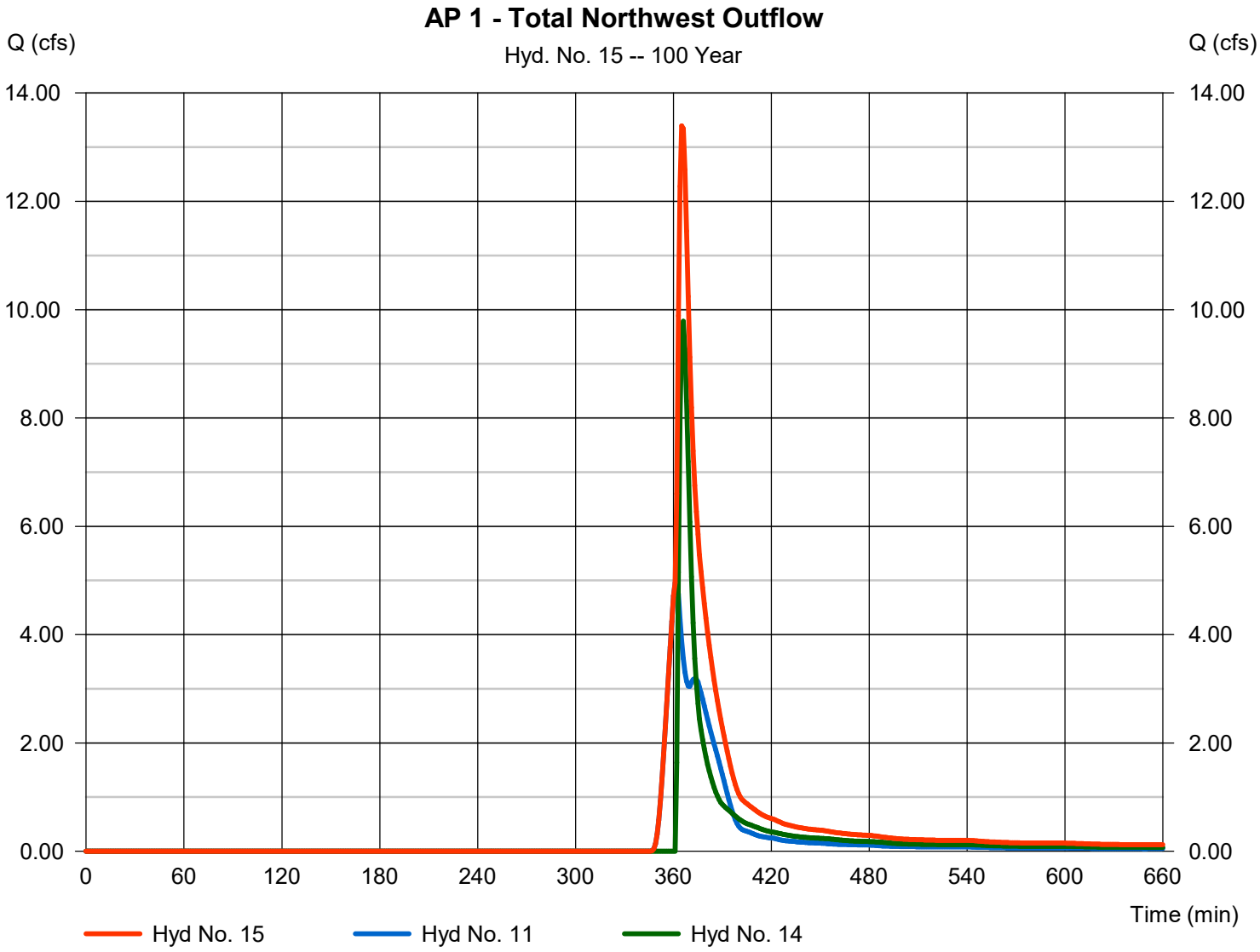


Hydrograph Report

Hyd. No. 15

AP 1 - Total Northwest Outflow

Hydrograph type	= Combine	Peak discharge	= 13.39 cfs
Storm frequency	= 100 yrs	Time to peak	= 365 min
Time interval	= 1 min	Hyd. volume	= 21,901 cuft
Inflow hyds.	= 11, 14	Contrib. drain. area	= 0.000 ac

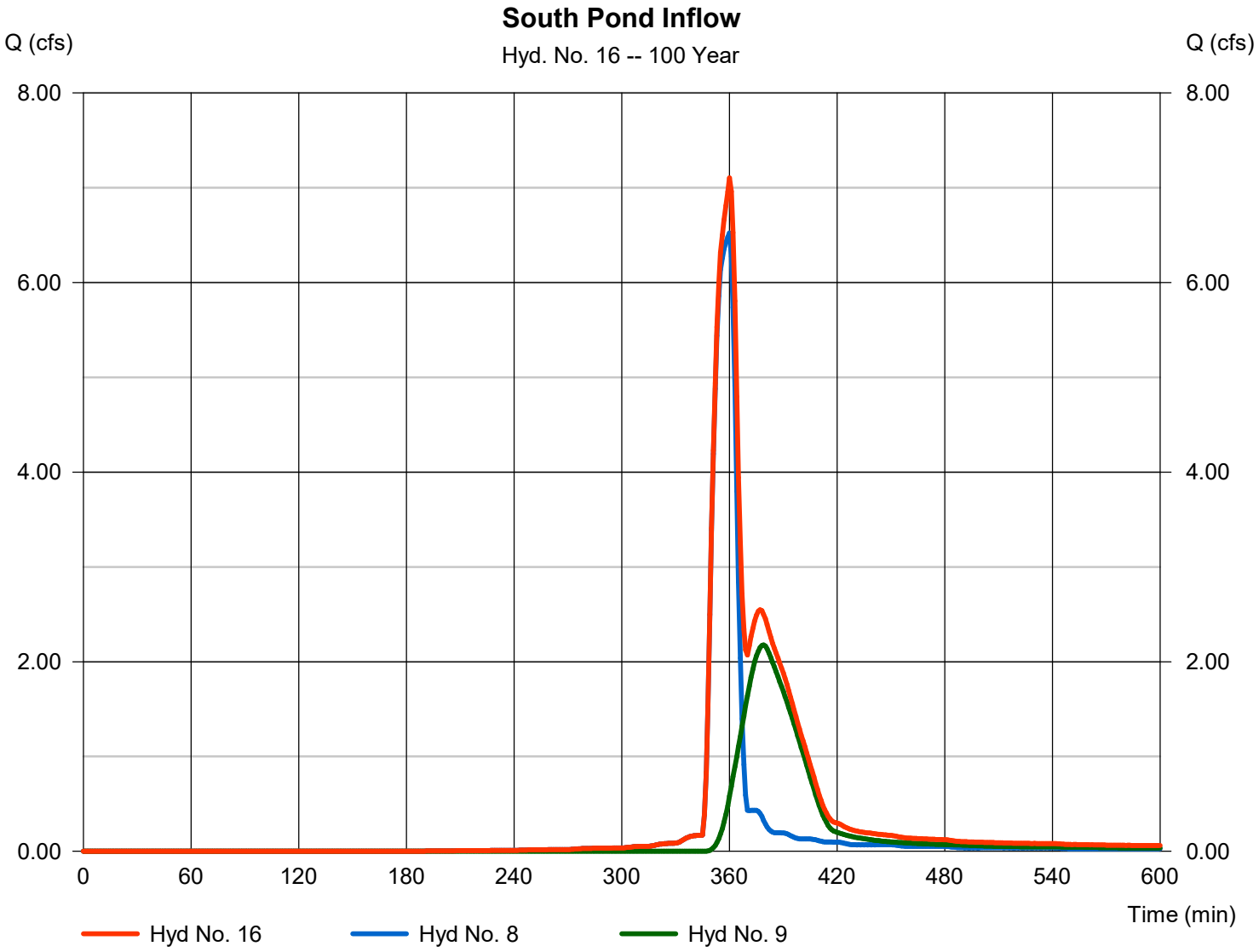


Hydrograph Report

Hyd. No. 16

South Pond Inflow

Hydrograph type	= Combine	Peak discharge	= 7.104 cfs
Storm frequency	= 100 yrs	Time to peak	= 360 min
Time interval	= 1 min	Hyd. volume	= 14,194 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 1.870 ac



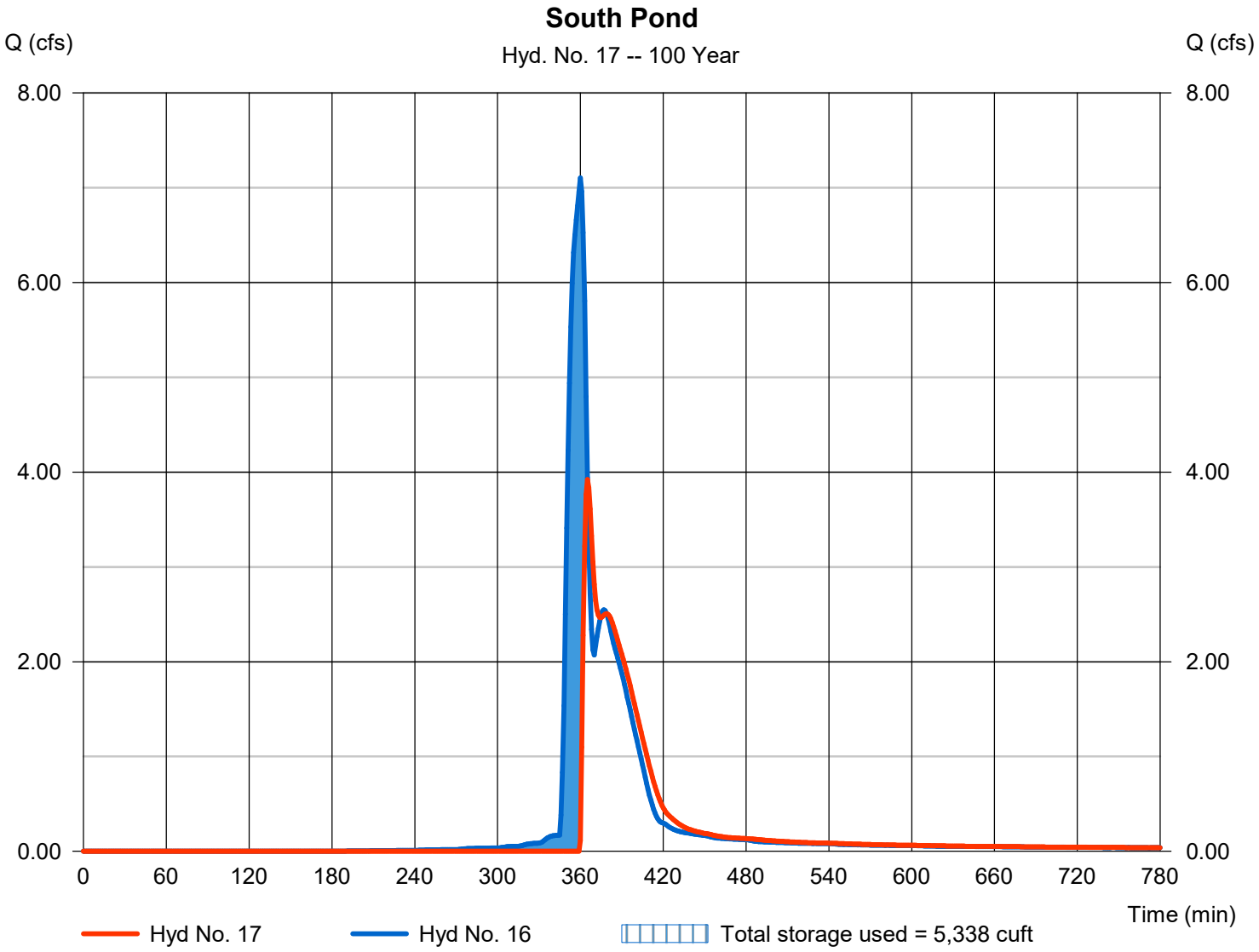
Hydrograph Report

Hyd. No. 17

South Pond

Hydrograph type	=	Reservoir	Peak discharge	=	3.923 cfs
Storm frequency	=	100 yrs	Time to peak	=	365 min
Time interval	=	1 min	Hyd. volume	=	9,987 cuft
Inflow hyd. No.	=	16 - South Pond Inflow	Max. Elevation	=	103.95 ft
Reservoir name	=	South Pond	Max. Storage	=	5,338 cuft

Storage Indication method used.

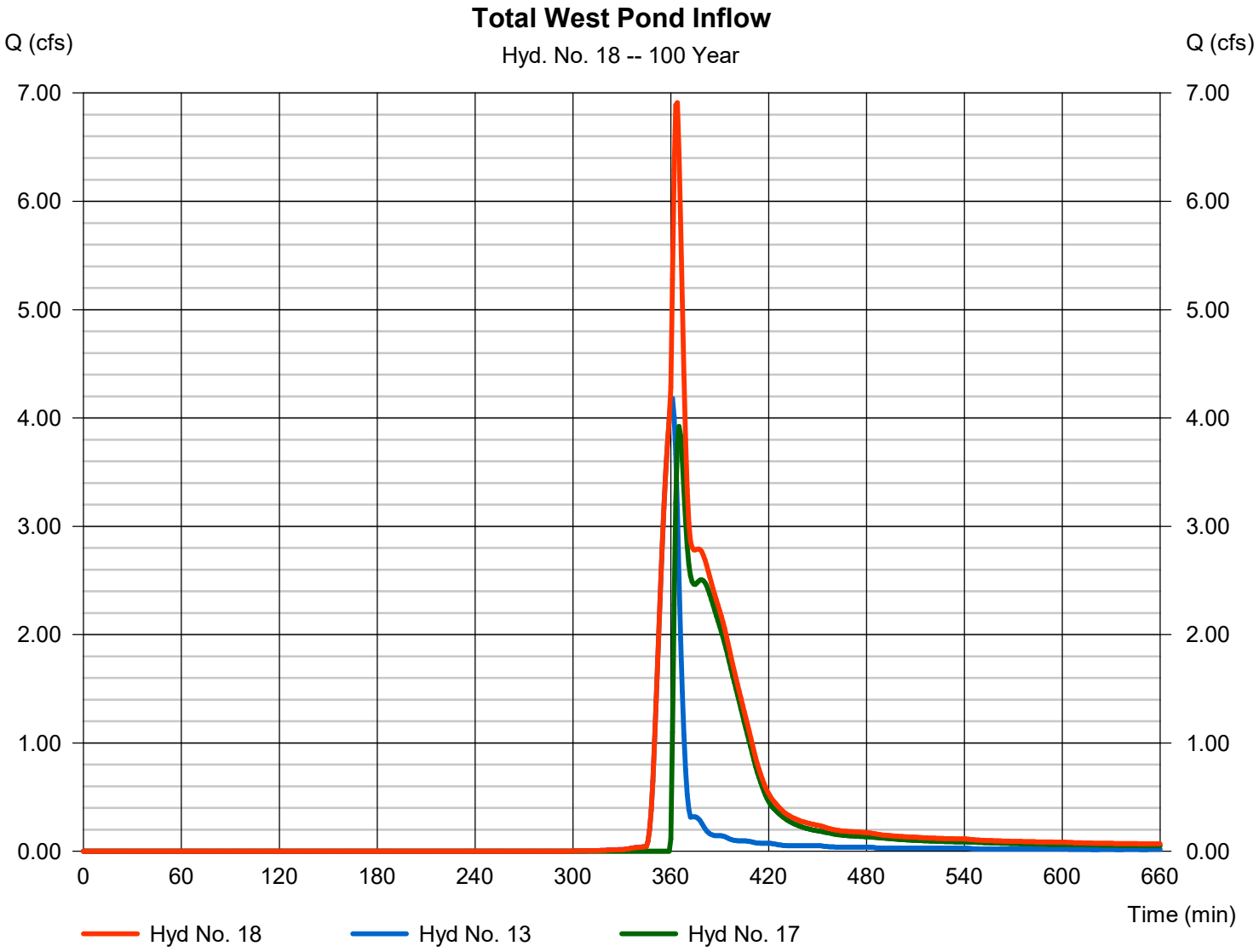


Hydrograph Report

Hyd. No. 18

Total West Pond Inflow

Hydrograph type	=	Combine	Peak discharge	=	6.911 cfs
Storm frequency	=	100 yrs	Time to peak	=	364 min
Time interval	=	1 min	Hyd. volume	=	14,690 cuft
Inflow hyds.	=	13, 17	Contrib. drain. area	=	0.000 ac



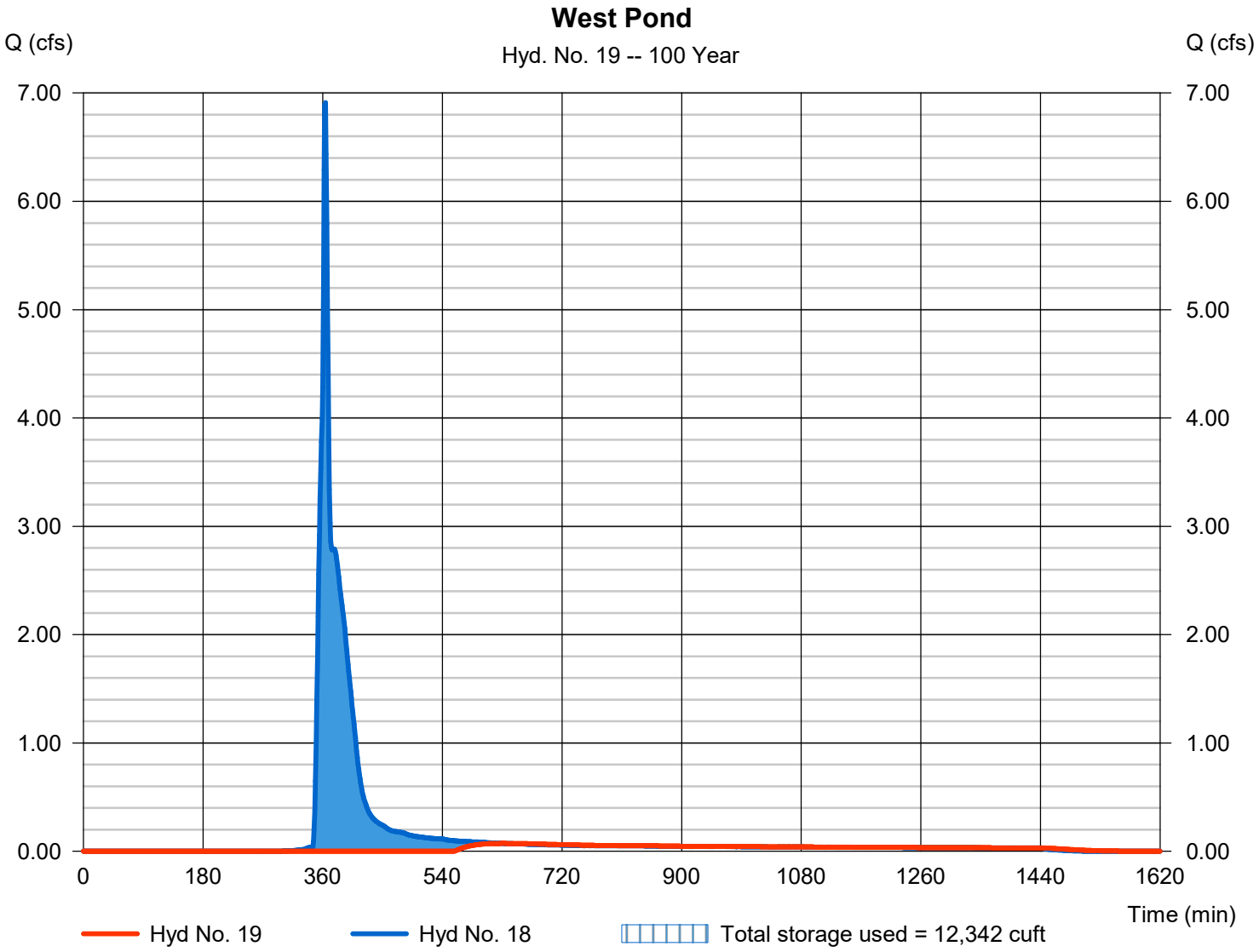
Hydrograph Report

Hyd. No. 19

West Pond

Hydrograph type	=	Reservoir	Peak discharge	=	0.072 cfs
Storm frequency	=	100 yrs	Time to peak	=	631 min
Time interval	=	1 min	Hyd. volume	=	2,477 cuft
Inflow hyd. No.	=	18 - Total West Pond Inflow	Max. Elevation	=	103.52 ft
Reservoir name	=	West Pond	Max. Storage	=	12,342 cuft

Storage Indication method used.

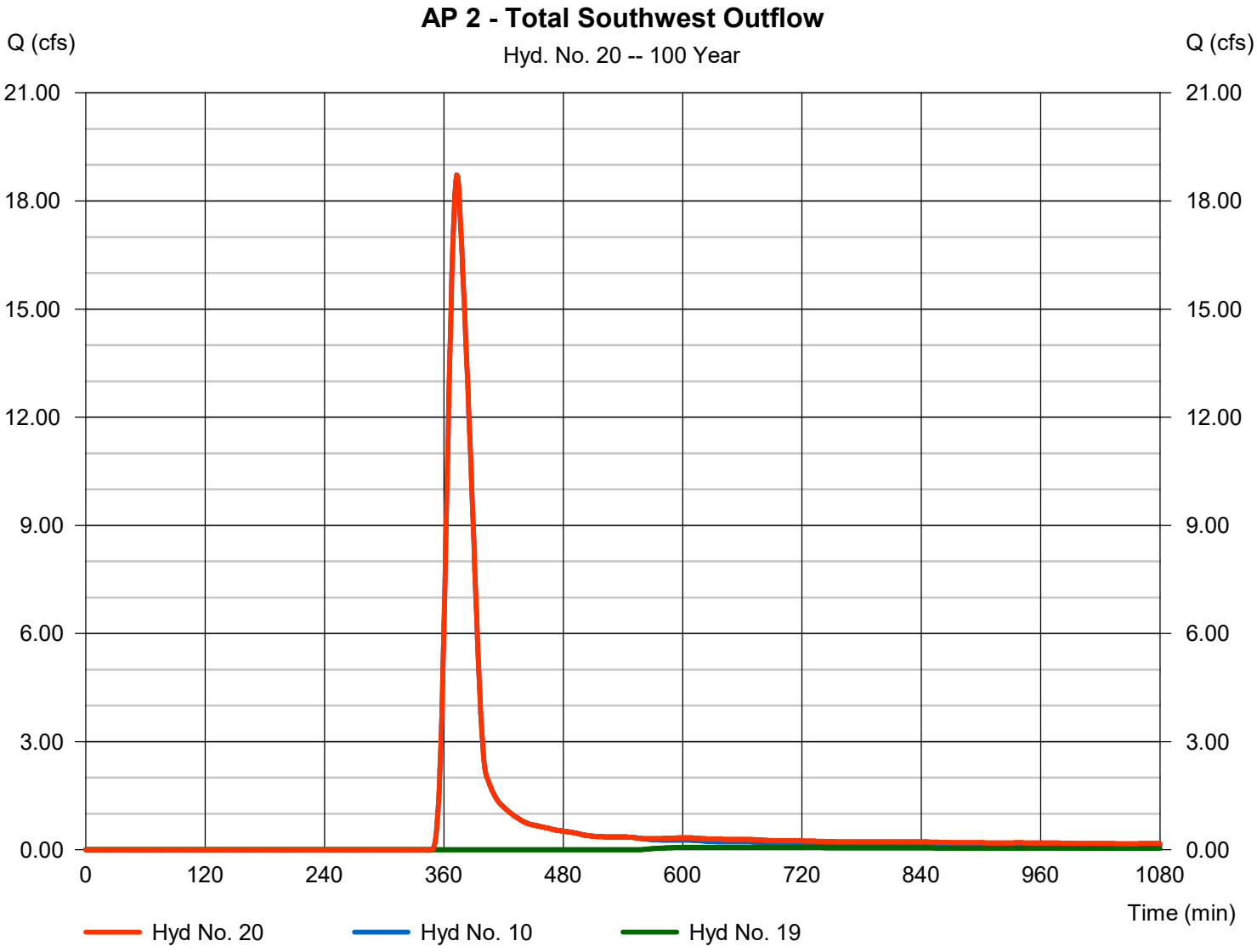


Hydrograph Report

Hyd. No. 20

AP 2 - Total Southwest Outflow

Hydrograph type	=	Combine	Peak discharge	=	18.72 cfs
Storm frequency	=	100 yrs	Time to peak	=	373 min
Time interval	=	1 min	Hyd. volume	=	46,642 cuft
Inflow hyds.	=	10, 19	Contrib. drain. area	=	11.230 ac

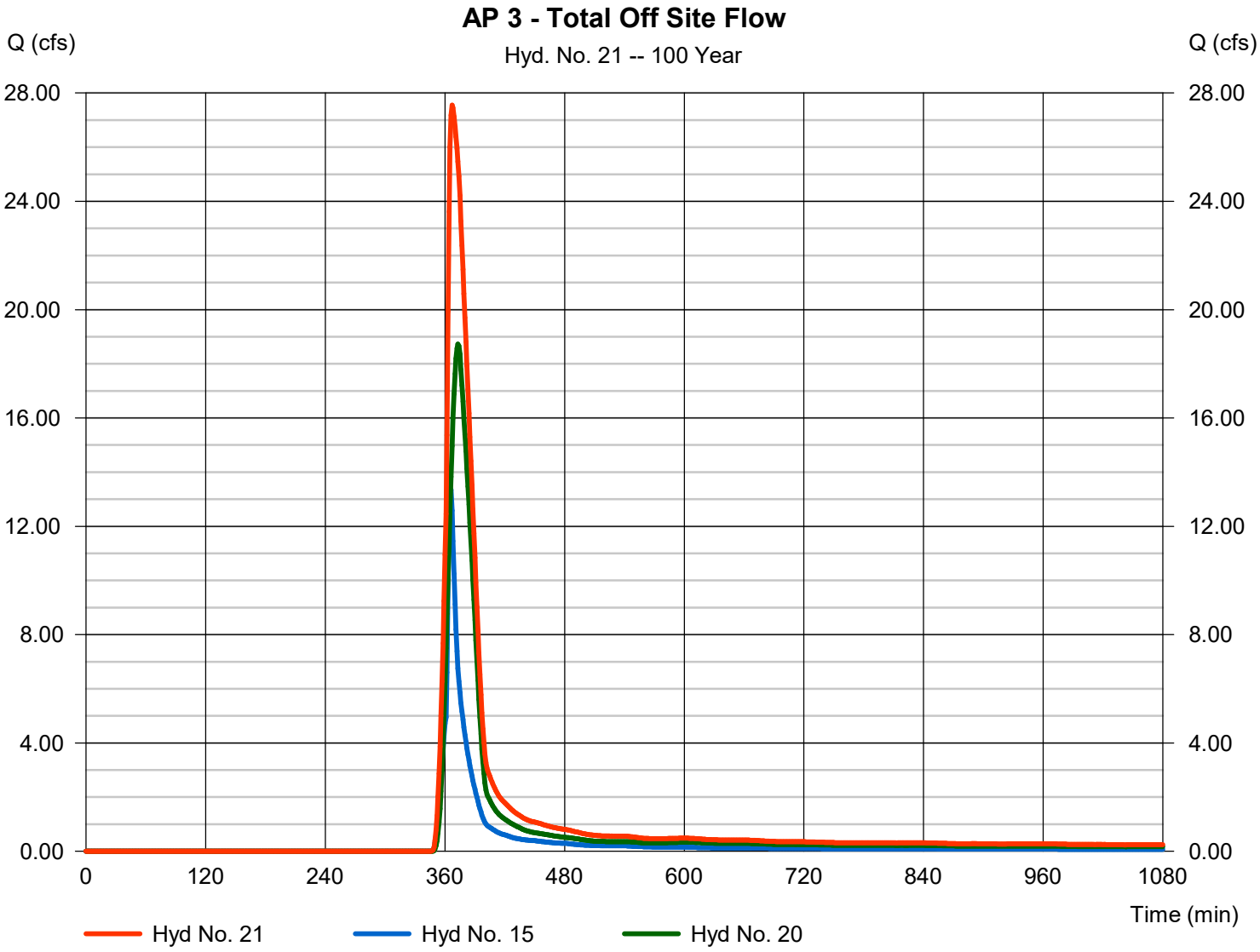


Hydrograph Report

Hyd. No. 21

AP 3 - Total Off Site Flow

Hydrograph type	=	Combine	Peak discharge	=	27.55 cfs
Storm frequency	=	100 yrs	Time to peak	=	367 min
Time interval	=	1 min	Hyd. volume	=	68,543 cuft
Inflow hyds.	=	15, 20	Contrib. drain. area	=	0.000 ac



APPENDIX D.R.4

FLOWMASTER CULVERT PIPE DESIGN DATA

NYLOPLAST INLET DESIGN CURVES

FLOWMASTER CULVERT PIPE DESIGN DATA

Worksheet for Storm Drain 1

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data	
Roughness Coefficient	0.012
Channel Slope	3.000 %
Normal Depth	24.0 in
Diameter	24.0 in
Discharge	42.45 cfs

Results	
Discharge	42.45 cfs
Normal Depth	24.0 in
Flow Area	3.1 ft²
Wetted Perimeter	6.3 ft
Hydraulic Radius	6.0 in
Top Width	0.00 ft
Critical Depth	23.5 in
Percent Full	100.0 %
Critical Slope	2.692 %
Velocity	13.51 ft/s
Velocity Head	2.84 ft
Specific Energy	4.84 ft
Froude Number	(N/A)
Maximum Discharge	45.66 cfs
Discharge Full	42.45 cfs
Slope Full	3.000 %
Flow Type	Undefined

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	24.0 in
Critical Depth	23.5 in
Channel Slope	3.000 %
Critical Slope	2.692 %

Worksheet for Storm Drain 2

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data	
Roughness Coefficient	0.012
Channel Slope	2.500 %
Normal Depth	24.0 in
Diameter	24.0 in
Discharge	38.75 cfs

Results	
Discharge	38.75 cfs
Normal Depth	24.0 in
Flow Area	3.1 ft²
Wetted Perimeter	6.3 ft
Hydraulic Radius	6.0 in
Top Width	0.00 ft
Critical Depth	23.3 in
Percent Full	100.0 %
Critical Slope	2.210 %
Velocity	12.33 ft/s
Velocity Head	2.36 ft
Specific Energy	4.36 ft
Froude Number	(N/A)
Maximum Discharge	41.68 cfs
Discharge Full	38.75 cfs
Slope Full	2.500 %
Flow Type	Undefined

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	24.0 in
Critical Depth	23.3 in
Channel Slope	2.500 %
Critical Slope	2.210 %

Worksheet for Storm Drain 3

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data	
Roughness Coefficient	0.012
Channel Slope	1.500 %
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	13.94 cfs

Results	
Discharge	13.94 cfs
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	16.6 in
Percent Full	100.0 %
Critical Slope	1.302 %
Velocity	7.89 ft/s
Velocity Head	0.97 ft
Specific Energy	2.47 ft
Froude Number	(N/A)
Maximum Discharge	14.99 cfs
Discharge Full	13.94 cfs
Slope Full	1.500 %
Flow Type	Undefined

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	16.6 in
Channel Slope	1.500 %
Critical Slope	1.302 %

Worksheet for Storm Drain 4

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data	
Roughness Coefficient	0.012
Channel Slope	1.000 %
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	11.38 cfs

Results	
Discharge	11.38 cfs
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	15.5 in
Percent Full	100.0 %
Critical Slope	0.928 %
Velocity	6.44 ft/s
Velocity Head	0.64 ft
Specific Energy	2.14 ft
Froude Number	(N/A)
Maximum Discharge	12.24 cfs
Discharge Full	11.38 cfs
Slope Full	1.000 %
Flow Type	Undefined

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	15.5 in
Channel Slope	1.000 %
Critical Slope	0.928 %

Worksheet for Storm Drain 5

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data	
Roughness Coefficient	0.012
Channel Slope	2.500 %
Normal Depth	24.0 in
Diameter	24.0 in
Discharge	38.75 cfs

Results	
Discharge	38.75 cfs
Normal Depth	24.0 in
Flow Area	3.1 ft²
Wetted Perimeter	6.3 ft
Hydraulic Radius	6.0 in
Top Width	0.00 ft
Critical Depth	23.3 in
Percent Full	100.0 %
Critical Slope	2.210 %
Velocity	12.33 ft/s
Velocity Head	2.36 ft
Specific Energy	4.36 ft
Froude Number	(N/A)
Maximum Discharge	41.68 cfs
Discharge Full	38.75 cfs
Slope Full	2.500 %
Flow Type	Undefined

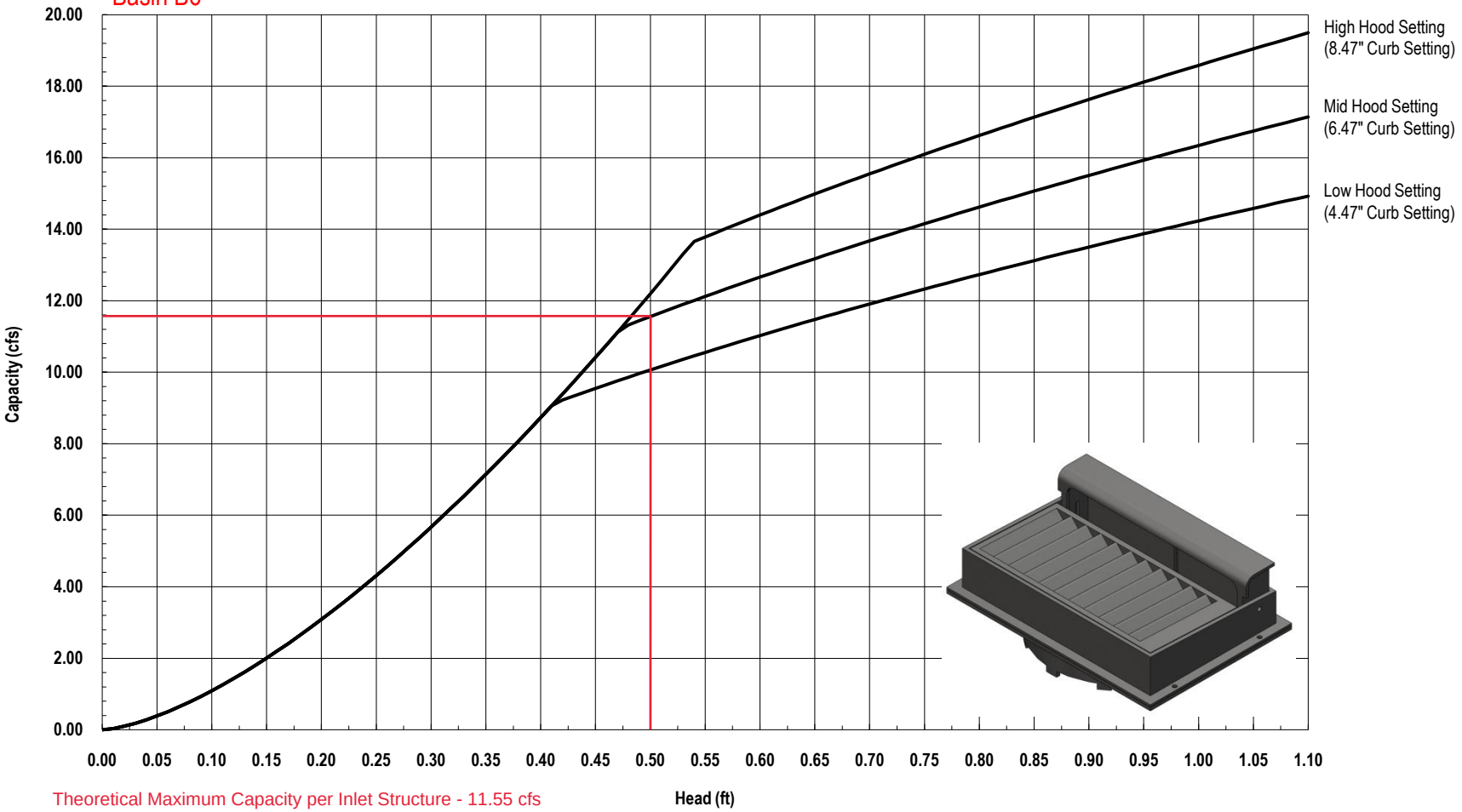
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	24.0 in
Critical Depth	23.3 in
Channel Slope	2.500 %
Critical Slope	2.210 %

NYLOPLAST INLET DESIGN CURVES

Nyloplast 2' x 3' Curb Inlet High Flow Grate Inlet Capacity Chart

Basin B6



Theoretical Maximum Capacity per Inlet Structure - 11.55 cfs

Maximum Capacity of Four (4) Inlets - 46.2 cfs

Basin B6 Design Peak Flow - 19.01 cfs

Required Flow Assuming 35% Inlet Reduction Factor - 29.25 cfs

Excess Capacity within Basin B6 - 16.95 cfs

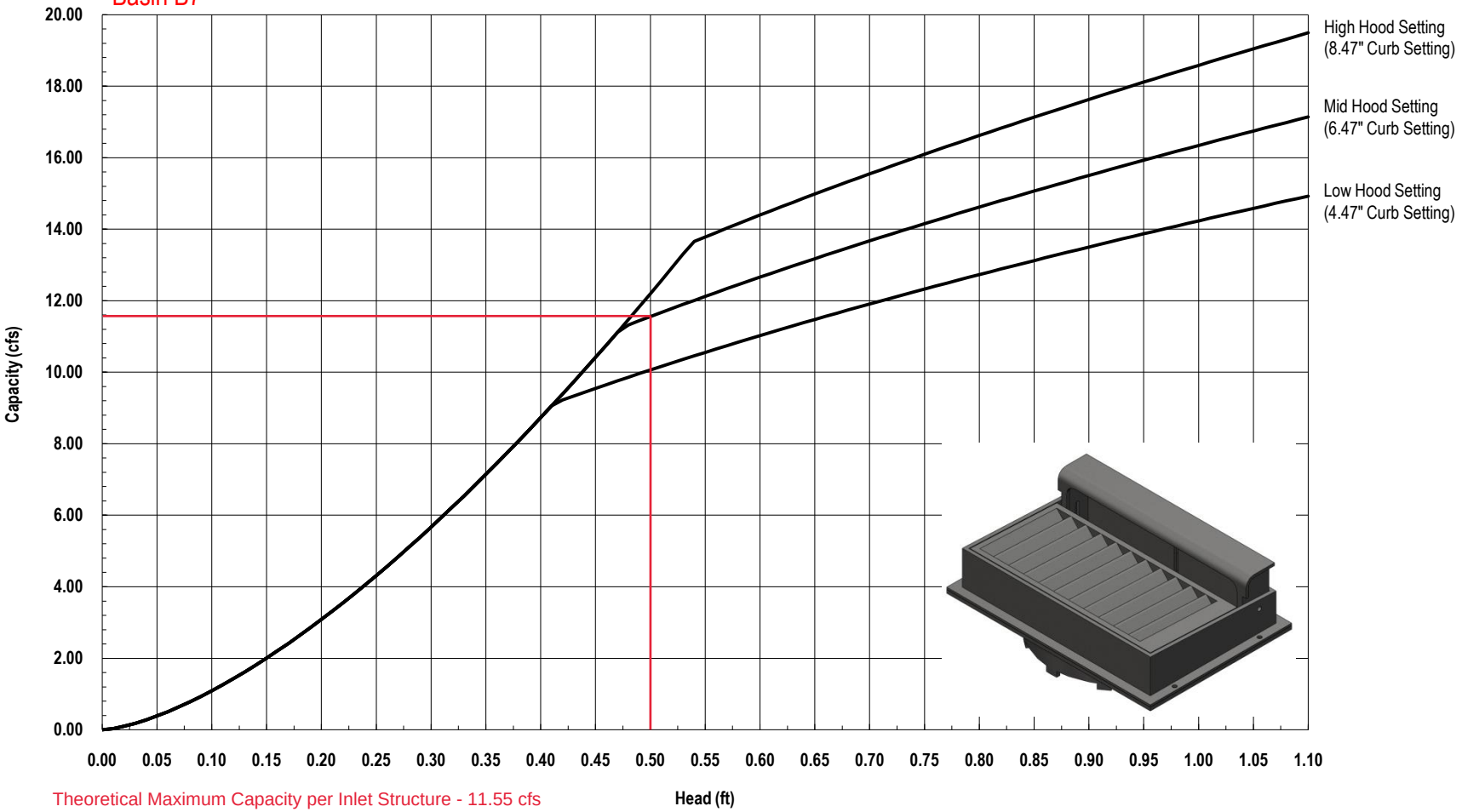
Nyloplast®

3130 Verona Avenue • Buford, GA 30518

(866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490

Nyloplast 2' x 3' Curb Inlet High Flow Grate Inlet Capacity Chart

Basin B7



Theoretical Maximum Capacity per Inlet Structure - 11.55 cfs

Basin B7 Design Peak Flow - 3.55 cfs

Required Flow Assuming 35% Inlet Reduction Factor - 5.46 cfs

Excess Capacity within Basin B6 - 6.09 cfs

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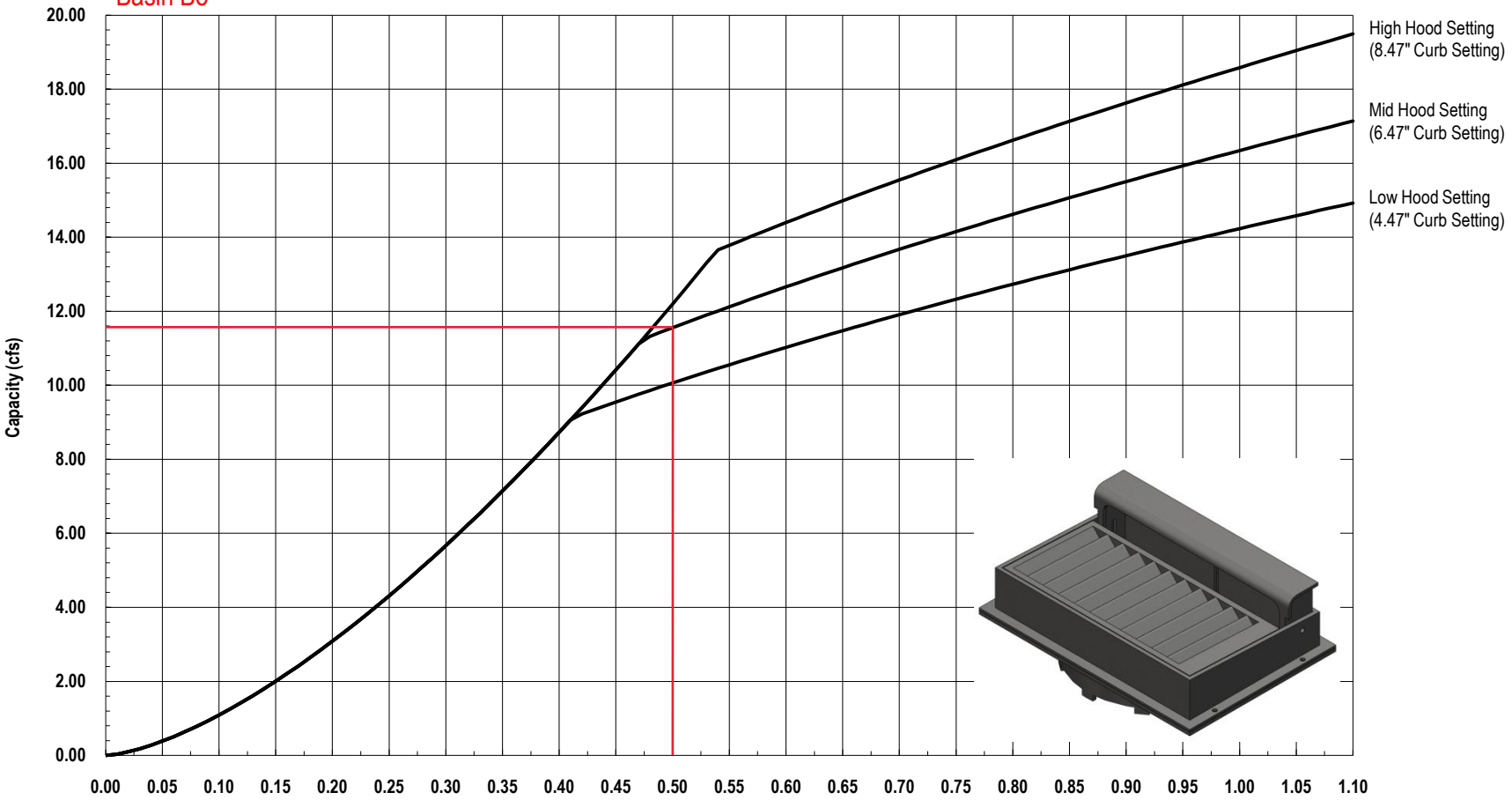
Nyloplast 2' x 3' Curb Inlet High Flow Grate Inlet Capacity Chart

Basin B8



Theoretical Maximum Capacity per Inlet Structure - 11.55 cfs

Basin B7 Design Peak Flow - 6.52 cfs

Required Flow Assuming 35% Inlet Reduction Factor - 10.03 cfs

Excess Capacity within Basin B6 - 1.52 cfs

Nyloplast®

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SECTION 004113 - BID FORM

PROJECT NAME: Office of Emergency Management (EOM)
at Las Cruces, New Mexico

BID NUMBER:

Herein after called Bidder, a (corporation, partnership, individual).

State of incorporation_____

TO: David Ornelas e-mail: davido@donaanacounty.org
Doña Ana County, New Mexico

The Bidder, in response to the Advertisement for Bids, and having examined the Site and Bidding Documents prepared by ASA Architects, and the Addenda acknowledged below, and being familiar with all conditions surrounding the construction of the proposed project including availability of materials, equipment, and labor, hereby proposes to perform all work for the construction of the above referenced project for the prices stated below.

In submitting this Bid, the Bidder represents that Bidder has financial ability and experience to complete the Work and agrees to the following:

1. To hold the Bid open for 60 days.

2. To accept the provisions of the Instructions to Bidders.

3. To enter in to and execute a Contract, if awarded, based on this Bid, and to furnish Performance and Labor and Materials Payment Bonds.

4. To accomplish work in accordance with the Contract Documents.

5. To complete the work within 240 calendar days from the Notice to Proceed.

6. To pay as liquidated damages, the sum of $1,000.00 for each consecutive calendar day past the time allowed for construction of work that is not completed.

The Bidder acknowledges receipt of the following Addenda: Located at the end of this project manual and any additional addendum to be listed below:

Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____

The prices set forth in this Bid Form include all work necessary to complete the construction, including overhead, profit, items of incidental expenses, permits, taxes except New Mexico Gross Receipts Tax and local option tax, and any other expenses applicable to complete the construction. It is understood that New Mexico Gross Receipts Tax and local option tax will be paid by Owner and are to be included as separate line item on Applications for Payment.

The Bidder agrees to construct this project for the following lump sum prices:

BID LOT 1 (BASE BID): Construction of equipment Room 100, 101 and including demolition, architectural, structural MPE and new door access and the installation Plymovent System including all supporting structure and duct work associated hardware for a complete system. Includes connection and installation of sewer line to new septic tank, and any trenching and replacement of concrete or asphalt.

_____

_____ Dollars $ _____.

BID LOT 2: Septic Tank System as noted on AS-101 note 20.

_____

_____ Dollars $ _____.

BID LOT 3: Construction of ADA / HC Site Parking

_____

_____ Dollars $ _____.

BID LOT 4: Demolition and Renovation of existing building. Rooms 102,103,104,105,106,107,108 and the addition of room 117. Door replacement shall include any required demolition, infill framing and new exterior finish system. MPE includes new or reworked services to, into and in the building outlined as Bid Lot 4 on contract documents. Fire Protection to services to, into and in the building outlined for Bid Lot 5.

_____

_____ Dollars $ _____.

BID LOT 5: Addition of new building. Rooms 109, 110, 111. 112, 114, 115, 116. Door replacement shall include any required demolition, infill framing and new exterior finish system. MPE includes new or reworked services to, into and in the building outlined as Bid Lot 4 on contract documents. MPE includes new or reworked services to, into and in the building outlined as Bid Lot 5 on contract documents. Fire Protection to services to, into and in the building outlined for Bid Lot 5.

_____

_____ Dollars $ _____.

The required Bid Security, Campaign Contribution Disclosure Form, Application for Preference, Listing of Subcontractors, Qualification Statement, and Corporate Resolution (if applicable) are enclosed with this Bid Form.

SUBMITTED BY: _____

PRINTED NAME: _____

SIGNATURE: _____

TITLE: _____

ADDRESS OF FIRM: _____

_____

TELEPHONE NUMBER: _____

NEW MEXICO CONTRACTOR'S LICENSE NUMBER: _____

NEW MEXICO IN-STATE BIDDER'S PREFERENCE NUMBER: _____

LICENSE CLASSIFICATION: _____

LICENSE EXPIRATION DATE: _____

NMDWS PUBLIC WORKS MINIMUM WAGE ACT REGISTRATION NUMBER: _____

NEW MEXICO RESIDENT CERTIFICATE INCLUDED: _____YES _____NO

NEW MEXICO RESIDENT VETERAN CONTRACTOR DECLARATION FORM INCLUDED: _____YES _____NO

CORPORATE SEAL

BID SUBMITTAL CHECK LIST

No.	DESCRIPTION	COMMENT
1	Bid Form	Ensure the bid form is filled out completely and accurately, signed by the representative stated on the form, and that all addenda are acknowledged.
2	Bid Bond	The bid bond must be for 5% of the total bid amount specified on the bid form including all alternates and is issued by a surety that is authorized to do business in New Mexico.
3	Campaign Contribution Disclosure Form	Provide completed form.
4	NM Resident or NM Veteran Preference Certificate	Provide a copy of the certificate issued by the New Mexico Tax and Revenue Department to qualify for a price preference pursuant to Section 13.4.2, NMSA 1978 as amended.
5	Listing of Subcontractors	List all subcontractors performing work or labor or rendering service in an amount in excess of $5,000 or ½ of 1 percent of the Architect's Estimate of the Base Bid, whichever is greater.
6	Qualifications Statement	Provide completed form.
7	Proof of Insurance	Provide either an insurance certificate for the project with all supporting endorsements or a letter from an authorized carrier certifying that the required proof of coverage with supporting endorsements will be provided in a timely manner prior to contract execution.

* Submit bid documents in the numbered sequence above.

END OF BID FORM

SECTION 004313 – BID BOND

PART 1 – GENERAL

1.01 SUMMARY

A. Acceptable form for bid bond is AIA Document A310 “Bid Bond”, current edition.

B. A copy of this document may be reviewed at the Office of the Architect; 201 North Alameda, Las Cruces, NM 88005.

C. Attach a completed, embossed and sealed original to the Bid Form

END OF SECTION

SECTION 004343 - WAGE DETERMINATION SCHEDULE

PART 1 - GENERAL

1.01 SUMMARY

A. The prevailing wage decision applicable for this project follows this page.

B. This wage decision must be included in subcontracts between contractor and subcontractors.

END OF SECTION

[WAGE DECISION FOLLOWS]

SECTION 004346 - CAMPAIGN CONTRIBUTION DISCLOSURE FORM

Pursuant to NMSA 1978, § 13-1-191.1 (2006), any person seeking to enter into a contract with any state agency or local public body for professional services, a design and build project delivery system, or the design and installation of measures the primary purpose of which is to conserve natural resources must file this form with that state agency or local public body. This form must be filed even if the contract qualifies as a small purchase or a sole source contract. The prospective contractor must disclose whether they, a family member or a representative of the prospective contractor has made a campaign contribution to an applicable public official of the state or a local public body during the two years prior to the date on which the contractor submits a proposal or, in the case of a sole source or small purchase contract, the two years prior to the date the contractor signs the contract, if the aggregate total of contributions given by the prospective contractor, a family member or a representative of the prospective contractor to the public official exceeds two hundred and fifty dollars ($250) over the two year period.

Furthermore, the state agency or local public body shall void an executed contract or cancel a solicitation or proposed award for a proposed contract if: 1) a prospective contractor, a family member of the prospective contractor, or a representative of the prospective contractor gives a campaign contribution or other thing of value to an applicable public official or the applicable public official's employees during the pendency of the procurement process or 2) a prospective contractor fails to submit a fully completed disclosure statement pursuant to the law.

THIS FORM MUST BE FILED BY ANY PROSPECTIVE CONTRACTOR WHETHER OR NOT THEY, THEIR FAMILY MEMBER, OR THEIR REPRESENTATIVE HAS MADE ANY CONTRIBUTIONS SUBJECT TO DISCLOSURE:

The following definitions apply:

"Applicable Public Official" means a person elected to an office or a person appointed to complete a term of an elected office, who has the authority to award or influence the award of the contract for which the prospective contractor is submitting a competitive sealed proposal or who has the authority to negotiate a sole source or small purchase contract that may be awarded without submission of a sealed competitive proposal.

"Campaign Contributions" means a gift, subscription, loan, advance or deposit of money or other thing of value, including the estimated value of an in-kind contribution, that is made to or received by an applicable public official or any person authorized to raise, collect or expend contributions on that on that official's behalf for the purpose of electing the official to either statewide or local office. "Campaign Contributions" includes the payment of a debt incurred in an election campaign, but does not include the value of services provided without compensation or unreimbursed travel or other personal expenses of individuals who volunteer a portion or all of their time on behalf of a candidate or political committee, nor does it include the administrative or solicitation expenses of a political committee that are paid by an organization that sponsors the committee.

"Family Member" means spouse, father, mother, child, father-in-law, mother-in-law, daughter-in-law or son-in-law.

"Pendency of the Procurement Process" means the time period commencing with the public notice of the request for proposals and ending with the award of the contract or the cancellation of the request for proposals.

"Person" means any corporation, partnership, individual, joint venture, association or any other private legal entity.

"Prospective contractor" means a person who is subject to the competitive sealed proposal process set forth in the Procurement Code or is not required to submit a competitive sealed proposal because that person qualifies for a sole source or a small purchase contract.
"Representative of a prospective contractor" means an officer or director of a corporation a member or manager of a limited liability corporation, a partner of a partnership or a trustee of a trust of the prospective contractor.

DISCLOSURE OF CONTRIBUTIONS:

Contribution Made By: _____

Relation to Prospective Contractor: _____

Name of Applicable Public Official: _____

Date Contribution(s) Made: _____

Amount(s) of Contribution(s): _____

Nature of Contribution(s): _____

Purpose of Contribution(s): _____
(Attach extra pages if necessary)

_____
Signature Date

_____
Title (position)

--OR--

NO CONTRIBUTIONS IN THE AGGREGATE TOTAL OVER TWO HUNDRED FIFTY DOLLARS ($250) WERE MADE to an applicable public official by me, a family member or representative.

_____
Signature Date

_____
Title (position)

SECTION 004396 - NEW MEXICO RETAINAGE ACT PROVISIONS

PART 1 – GENERAL

1.01 SUMMARY

A. The New Mexico Retainage Act; N.M.S.A. 57-28-1-57-28-12 (2001) is applicable to this Project.

B. For this Project the Owner will not hold retainage.

END OF SECTION

SECTION 004397 – APPLICATION FOR PREFERENCE

PART 1 – GENERAL

1.01 SUMMARY

A. Bidders seeking preference must submit the following, as applicable, with the Bid:

1. To obtain resident contractor preference, submit a copy of the bidder's Resident Contractor Certificate issued by the State of New Mexico Taxation and Revenue Department.

2. To obtain resident veteran contractor preference, submit a copy of the bidder's Resident Veteran Business Certificate and completed Resident Veteran Contractor / Business Revenue Declaration Form.

END OF SECTION

SECTION 004399 - BIDDER'S LISTING OF SUBCONTRACTORS

THIS FORM SHALL BE COMPLETED BY BIDDER AND SUBMITTED WITH DOCUMENT 004113- BID FORM

1. Subcontractor Listing shall be included with Bid as a condition of the Bid and be fully complete with regards to all Subcontractors providing services valued at $5,000.00 or more, or one-half of one percent of the architect's or engineer's estimate of the total project cost, not including alternates, whichever is greater pursuant to Section 13-4-34, NMSA 1978.

    a. Listing Threshold for this Project: **$5,000.00**

    b. Subcontractor Listing shall be expanded after Bid by apparent low bidder if Awarded, and before Contract, to include major Suppliers.

    c. Subcontractor Listing shall also be expanded after Bid by apparent low bidder if Awarded, and before Contract, to include the Department of Workforce Solutions Minimum Wage Act Registration Number. See the Department of Workforce Solutions web site at www.dws.state.nm.us under “Public Works” for registration form, listings and information.

2. Listing of Subcontractors:

    a. Firm’s listed agree that any and all claims which the firm may have or may incur to it for overcharges resulting from antitrust violations as to goods, services, and materials purchased in connection with this project are hereby assigned to the Owner, but only to the extent that such overcharges are passed on to the Owner. It is agreed that the firm retains all rights to any such antitrust claims to the extent of any overcharges not passed on to the Owner, including the right to any treble damages attributable thereto.

SUBCONTRACTOR LISTING
PROJECT NAME: Remodel and Addition to Radium Springs Fire Station
PROJECT NUMBER: 17107L

TYPE OF WORK	FIRM NAME	LOCATION	Minimum Wage Act Registration # (if over $60,000)

END OF SECTION

SECTION 004513 - QUALIFICATIONS STATEMENT

This form shall be completed by Bidder and **submitted with Document 004113 Bid Form** to demonstrate the Contractor has experience and qualifications to carry out terms of Contract and successfully complete Work. Provide additional sheets as required.

1. NAME OF FIRM: _____

2. MAIN OFFICE ADDRESS: _____

   _____

   _____

3. TELEPHONE NUMBER: _____

4. NEW MEXICO CONTRACTOR'S LICENSE NUMBER: _____

5. LICENSE CLASSIFICATION: _____

6. LICENSE EXPIRATION DATE: _____

7. NMDWS PUBLIC WORKS MINIMUM WAGE ACT REGISTRATION NUMBER: _____

8. DATE FIRM ORGANIZED: _____

9. YEARS ENGAGED IN CONTRACTING UNDER PRESENT NAME: _____

10. GENERAL CHARACTER OF WORK PERFORMED BY FIRM:

    _____

    _____

    _____

11. SIMILAR PROJECTS COMPLETED BY FIRM IN PAST 5 YEARS
    (List client, location, construction amount, and date completed):

    _____

    _____

    _____

    _____

    _____

12. PREVIOUS CLIENTS DURING PAST 5 YEARS
    (Provide name of contact and telephone number):

    _____

    _____

    _____

    _____

    _____

13. CURRENT PROJECTS UNDER CONTRACT
(List construction amount and estimated completion date.):

_____

_____

_____

_____

_____

14. NAME OF SUPERINTENDENT TO OVERSEE CONSTRUCTION AT SITE (Attach resume of proposed superintendent. Indicate education, training, previous construction experience of individual and list of projects for which individual has served as construction superintendent. Include number of years that individual has been employed by Contractor and positions and responsibilities.):

_____

END OF STATEMENT

SECTION 005213- AGREEMENT FORM

PART 1 – GENERAL

1.01 SUMMARY

A. Contract form to be used for this Project is AIA Document A101-2007 “Standard Form of Agreement between Owner and Contractor where the Basis of Payment is a Stipulated Sum”, 2007 Edition.

B. A copy of this document may be reviewed at the Office of the Architect; 201 North Alameda, Las Cruces, New Mexico 88005.

END OF SECTION

SECTION 006113 – PERFORMANCE AND LABOR AND MATERIAL PAYMENT BOND

PART 1 – GENERAL

1.01 SUMMARY

A. Performance and Labor and Material Payment Bond form to be used for this project is AIA Document A312, Performance Bond / Payment Bond.

B. A copy of this document may be reviewed at the Office of the Architect; 201 North Alameda, Las Cruces, New Mexico 88005.

END OF SECTION

SECTION 007213 - GENERAL CONDITIONS OF THE CONTRACT

PART 1 – GENERAL

1.01 SUMMARY

A. Form of General Conditions to be used for this Project is AIA Document A201, General Conditions of the Contract for Construction, 2007 or latest Edition.

B. A copy of this document may be reviewed at the Office of the Architect; 201 North Alameda, Las Cruces, New Mexico 88005.

END OF SECTION

SECTION 007300 - SUPPLEMENTARY CONDITIONS

The following modifies AIA Document A201 – 2007, General Conditions of the Contract for Construction, 1997 Edition. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 1 GENERAL PROVISIONS

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

ADD the following paragraphs:

1.2.4 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

.1 The Agreement.

.2 Addenda, with those of later date having precedence over those of earlier date.

.3 The Supplementary Conditions.

.4 The General Conditions of the Contract for Construction.

.5 Specifications and Drawings.

1.2.5 In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by Addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation, at no additional cost to the Owner.

1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

ADD the following paragraph:

1.5.3 The Owner will furnish free of charge One (01) set of Contract Drawings and One (01) copy of the Project Manual. Contractor shall pay reproduction cost for any additional copies of Drawings and Project Manual.

ARTICLE 3 CONTRACTOR

3.5 WARRANTY

ADD to paragraph 3.5.1, the following:

3.5.1 Contractor shall submit warranties in writing.

3.6 TAXES

ADD the following paragraph:

3.6.1 The bid amount shall exclude the applicable state gross receipts tax or applicable local option tax. The Owner shall be required to pay the applicable tax including any increase in the applicable tax becoming effective after the date the contract is entered into. The applicable gross receipts tax or local options tax shall be shown as a separate amount on each billing or request for payment made under the contract, as outlined in the State Procurement Code Chapter 348, Section 5, Section 13-1-108 NMSA-108 as Amended. The Contractor shall in turn pay the applicable gross receipts tax or local option tax.

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

ADD the following paragraph:

3.10.1.1 Completed Progress Schedule shall be submitted to the Architect no later than ten (10) calendar

days after the date of the Agreement and shall be updated during construction as required to keep it current. Nothing in this requirement shall be deemed to be a usurpation of the Contractor's authority and responsibility to plan and schedule the Work as he sees fit, subject to all other requirements of the Contractors Documents.

3.18 INDEMNIFICATION

DELETE paragraph 3.18.1 in its entirety and substitute the following:

3.18.1 Contractor shall hold harmless, indemnify and defend the Architect and the Owner and its "public employees" as defined in the New Mexico Tort Claims Act, Sections 41-4-1 to 41-4-29, NMSA 1978, against and from any and all claims, losses, demands, judgments, damages, liabilities, lawsuits, expenses, fees of attorney(s), costs and/or actions of any kind and nature whether from death(s), bodily and/or personal injury to person(s), damage(s) to property(ies) and/or any other nature whatsoever arising from or out of, connected with, resulting from or related to, directly, indirectly or allegedly, the Contractor's negligent and/or intentional act(s) and/or omission(s) in the Contractor's performance under this agreement. Contractor's operations and/or activities in connection herewith and/or Contractor's use and/or occupancy of the premises and/or improvements, including any and all negligent and/or intentional act(s) and/or omission(s) of the Contractor's officer(s), director(s), employees(s), servant(s), agent(s), representative(s), customer(s), invitee(s) patron(s), contractor(s), subcontractor(s), successor(s), assign(s), and/or supplier(s), as well as all other persons doing business with the Contractor. The Contractor's agreement to hold harmless, indemnify and defend shall not be affected or terminated by the cancellation or expiration of the term or any renewal or any other termination of this Agreement. Contractor shall at all times during the term of the Agreement have and keep in force contractual liability insurance in the amounts as set forth in the New Mexico Tort Claims Act, supra. The contracting for any insurance by Contractor does not in any way limit, modify or negate the Contractor's agreement to hold harmless, indemnify and defend the Architect and the Owner and its "public employees" as defined in the New Mexico Tort Claims Act, supra.

DELETE paragraph 3.18.2 in its entirety and substitute the following:

3.18.2 Nothing in this Contract Document is intended to or shall be deemed to constitute a partnership or joint venture between the parties. The Contractor and its officer(s), director(s), employee(s), servant(s), agent(s) and representative(s) are and shall remain independent contractors under this Agreement and shall at no time be deemed the officer(s), agent(s), servant(s), employee(s) and/or representative(s) of the Owner or Architect so as to bind the Owner or Architect in any respect. The Contractor shall be responsible to all persons for the negligent and/or intentional act(s) and/or omission(s) of the Contractor, its officer(s), director(s), employee(s), servant(s), agent(s) and/or representative(s) and the Owner and Architect shall in no way be responsible.

ADD the following paragraphs:

3.18.3 The Owner and its "public employees" as defined in the New Mexico Tort Claims Act, supra, do not waive sovereign immunity, do not waive any defense(s) and/or do not waive any limitation(s) of liability pursuant to law. No provision in this Agreement modifies and/or waives any of the provisions of the New Mexico Tort Claims Act, supra, and the amendments thereto.

3.18.4 It is specifically agreed between the parties executing this Agreement that it is not intended by any of the provisions of any part of the Agreement to create a public or any member thereof a third party beneficiary or to authorize anyone not a party to the Agreement to maintain a suit(s) or wrongful death(s), bodily and/or personal injury(ies) to person(s), damage(s) to property(ies) and/or any other claim(s) and/or cause(s) of action whatsoever pursuant to the provisions of this Agreement.

3.18.5 Contractor shall hold harmless and indemnify the Owner and its "public employees" from any and all liability, claims, lawsuits damages, or costs arising out of or allegedly arising out of the performance of this contract; except for any such liability arising out of:

.1 The preparation of maps, drawings, opinions, reports, surveys, change orders, designs or specifications prepared by the Owner or its "public employees", or

.2 The giving or the failure to give direction by the Owner or any of its "public employees", where the giving or failure to give such direction is the immediate proximate cause of the injury or damage complained of, or

.3 Any injury or damage which is solely the result of a negligent act or omission of the Owner or any of its "public employees".

Whenever the Owner receives a claim, notice of claim, summons or demand which is or could be subject to the foregoing indemnification, such claim, notice summons, or demand shall be immediately forwarded to the Contractor to be forwarded to the Contractor's insurance carrier for response and defense as required.

ARTICLE 4 ARCHITECT

4.2 ADMINISTRATION OF THE CONTRACT

DELETE from paragraph 4.2.10, the second sentence in its entirety.

ADD to paragraph 4.2.13, the following:

4.2.13 The term "aesthetic effect" as used herein refers to color, texture, profile and juxtaposition of masses. The Architect shall be the sole interpreter of the design intent with respect to such matters, but the Architect's authority with respect thereto shall not contravene any other rights of either the Owner or the Contractor ascribed to them by other provisions of the Contract.

ARTICLE 8 TIME

8.1 DEFINITIONS

ADD the following paragraph:

8.1.5 The contract time shall be substantially completed within the number of consecutive calendar days indicated in the Agreement, "Notice to Proceed", or other written order.

8.3 DELAYS AND EXTENSIONS OF TIME

ADD the following paragraph:

8.3.4 The Contractor shall not be entitled to claim any damages for delay from any cause whatsoever in the progress of the work or any portion thereof

ARTICLE 9 PAYMENTS AND COMPLETION

9.2 SCHEDULE OF VALUES

ADD the following paragraph:

9.2.1 The Schedule of Values shall be submitted prior to the start of construction and shall be approved by the Architect prior to the first submitted Pay Application. The Schedule of Values shall be itemized, in detail by division, as a basis for approving work completed. Refer to Section 012000 "Price and Payment Procedures" for additional information.

9.3 APPLICATIONS FOR PAYMENT

ADD to paragraph 9.3.1, the following:

9.3.1: Applications for Payment shall be based on the previously approved Schedule of Values of labor and materials incorporated in the Work, and of all stable materials suitably stored at the site, up to and including the last day of the preceding month, less the aggregate total of all previous payments; provided the aggregate total of all monthly payments shall not exceed the Contract Price. Application shall be made on AIA Document G-702 & G-702A.

ADD the following paragraphs:

9.3.1.3 Contractor shall base his pay request on materials stored and work completed under this Contract. Prior to the 25th day of each month, the Contractor shall submit to the Architect an

application for payment supported by a current schedule of values and such other data substantiating Contractor's right to payment. The Owner shall make progress payments for properly allocable materials and equipment stored at the project site, or at some other location agreed upon in writing, and for schedule of value items. The Owner shall not withhold retainage.

9.3.1.4 All applicable taxes, whether now enacted into law or hereafter made applicable, shall appear as a separate line item on Contractor's pay requests.

9.3.1.5 In the event the Contractor submits a pay request that is improperly completed, the Architect shall, within seven days after receipt, give notice of the incomplete request to the sender. Upon receipt of this notice, the Contractor shall be responsible for any timely completion and re-submission of the pay request to the Architect.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

ADD the following paragraphs:

9.5.4 The Owner may withhold or, on account of subsequently discovered evidence, nullify the whole or part of any Certificate for Payment to such extent as may be necessary to protect himself from loss on account of unsatisfactory or unacceptable completion of any Schedule of Value line item, including Project Closeout Requirements. Such action shall be based on, but not limited to, the following:

.1 Defective work not remedied.

.2 Claims filed or reasonable evidence indicating probable filing of claims by other parties against the Contractor.

.3 Failure of the Contractor to make payments properly to subcontractors and/or for material and/or labor.

.4 Damage to another contractor.

.5 A reasonable doubt that the Contract can be completed for the unpaid balance.

.6 When the issues listed above are resolved or the Contractor provides a Surety Bond satisfactory to the Architect and Owner which will protect the Owner in the amount withheld, payment shall be made for amounts withheld.

9.6 PROGRESS PAYMENTS

Add to paragraph 9.6.1, the following:

9.6.1 Commencing on the date of receipt by the Owner, full payment shall be issued on an undisputed pay request within twenty-one (21) days after receipt via first class mail or by hand delivery. Failure by the Owner to pay an undisputed pay request within the twenty-one (21) day allotment will obligate and bind the Owner to pay the Contractor an interest penalty calculated at 1-1/2% per month beginning on the 22nd day and through the date that payment is issued.

ADD the following paragraph:

9.6.8 Payment due to the Contractor in cash or bonds may not be assigned or pledged by the Contractor.

9.8 SUBSTANTIAL COMPLETION

ADD to paragraph 9.8.1, the following:

9.8.1 The project shall be deemed to be substantially complete when the Owner has received from the Architect the Architect's Certificate of Substantial Completion and when the Owner has received from the Contractor all "Close-Out" Documents required for the project (i.e. O&M Manuals, Record Drawings, etc.).

9.11 LIQUIDATED DAMAGES

ADD the following paragraph:

9.11.1 The Owner will suffer financial loss if the project is not substantially completed on the date set forth in the Contract Documents. The Contractor (and his surety) shall be liable for and shall pay to the Owner Two Hundred and Fifty Dollars ($250.00) for each consecutive calendar day of delay past the contract time until the work is Substantially Completed.

ARTICLE 11 INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

ADD to paragraph 11.1.1, the following:

11.1.1.9 The Liability insurance required by paragraph 11.1.1 shall be on a Commercial General Basis, including the following:

General Liability: Premises, operations, explosions, collapse hazard, underground hazard, contractual insurance, products with completed operations, broad form property damage, independent contractor's and personal injury. The limits shall be no less than $1,000,000 combined single limits for bodily injury and property damage.

Automobile Liability: Owned, hired and non-owned vehicles. The limits of liability shall be no less than $1,000,000 combined single limit bodily injury and property damage.

Worker's Compensation: Required along with state statutory employer's liability limits.

Notification: The certificate must state that coverage afforded under the policies will not be canceled or allowed to expire until at least 30 days prior written notice has been given to the City.

Coverage must remain in force for the duration of the project.

ADD to paragraph 11.1.3, the following:

11.1.3.1 Contractor shall furnish one copy of the Certificates herein required for each copy of the Agreement, specifically setting forth evidence of all coverage required by paragraphs 11.1.1 and 11.1.2. The form of the Certificate shall be AIA Document G-1705 or other approved form. Contractor shall furnish the Owner copies of any endorsements that are subsequently issued amending coverage or limits.

ADD the following paragraphs:

11.1.5 Commercial general liability and automobile liability insurance shall include as additional named insured: The Owner, the Architect, the Architect's consultants and engineers, and each of their officers, employees and agents, and any other persons with an insurable interest designated by the Owner as an additional named insured.

11.1.6 Should any of the above described policies be canceled before the expiration date thereof, the issuing company will mail thirty (30) day written notice to the certificate holder named. Failure to mail such notice shall impose no obligation or liability of any kind upon the company, its agents or representatives.

11.3 PROPERTY INSURANCE

ADD to paragraph 11.3.1, the following:

11.3.1 The Owner will assume liability for the perils of fire, lightning, extended coverage as called for, and in addition will provide coverage for vandalism and malicious mischief (Builder's Risk Insurance). The Owner's insurance is subject to a deductible which the Contractor shall be liable for on any claim he makes.

11.4 PERFORMANCE BOND AND PAYMENT BOND

ADD to paragraph 11.4.1, the following:

11.4.1.1 Execution of approved Performance Bond and approved Payment Bond, each in an amount of not less than one hundred percent (100%) of the contract price, conditioned upon the faithful performance of the Contract and upon payment of all persons supplying labor or furnishing materials, will be required of the successful bidder. Performance Bond and Payment Bond shall be executed by a surety company authorized to do business in the State of New Mexico. Surety shall be approved in Federal Circular 570 as published by the United States Treasury Department or the State Board of Finance. Performance Bond and Payment Bond shall be executed on the latest edition of AIA Form A-311.

ADD the following paragraphs:

11.4.3 Attorneys-In-Fact who sign Bid Bonds or Contract Bonds must file with each bond, a certified and effectively dated copy of their Power of Attorney.

11.5.4 Premium for bonds shall be paid for by the Contractor or his subcontractors.

ARTICLE 15 CLAIMS AND DISPUTES

15.4 ARBITRATION

ADD to paragraph 15.4.2, the following:

15.4.2 The parties to this Agreement hereby agree that the Arbitrator shall not have the right to award punitive damages or other exemplary relief to anyone under any circumstances whatsoever. The parties acknowledge that the New Mexico Uniform Arbitration Act gives them the right to remove the Arbitrator's power to award punitive damages and other exemplary relief from arbitration agreements, and they hereby exercise their right to delete such authority.

END OF SECTION

SECTION 011100 – SUMMARY OF WORK

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes the following:

1. General description of work.
2. Contractor's duties.
3. Work by others.
4. Work sequence.
5. Contractor use of site.
6. Identification of Entities
7. Definitions.
8. Abbreviations.

1.02 RELATED SECTIONS

A. Section 007213 - General Conditions of the Contract.

1. Article 2: Basic responsibilities and rights of Owner.
2. Article 3: Basic responsibilities of Contractor.
3. Article 6: Owner's right to award separate contracts.

1.03 GENERAL DESCRIPTION OF WORK

A. The Project is new construction of the new Chaves County Public Health Building on South Garden Avenue in Roswell, New Mexico.

1. The Scope of Work is approximately 3,399 square feet of building construction and interior build out for a new dentist office and approximately 1,099 square feet of shell building construction for a future tenant.
2. The Work generally includes, but is not limited to the following:
   a. Sitework, including clearing, grading, drainage, erosion control, utilities, and paving.
   b. Landscaping and landscape irrigation.
   c. Structural foundations, concrete slab, steel columns, and steel joists.
   d. Architectural including metal framing, cabinets, countertops, exterior wall finishes, roofing, doors, frames, hardware, glazing, interior wall finishes, floor finishes, ceilings and other architectural components and systems as indicated on the drawings and in the specification.
   e. Mechanical, plumbing and electrical systems, equipment and components.

1.04 CONTRACTOR'S DUTIES

A. Except as noted, provide and pay for all labor, materials, and equipment.

B. Pay applicable and required taxes.

1. Taxes shall be included as separate amounts on Applications for Payment.

C. Secure and pay for permits, fees, and licenses necessary for execution of the Work.

D. Give required notices.

E. Comply with codes, ordinances, regulations, and other legal requirements of public authorities, which bear on performance of Work.

F. Request required inspections from public authorities, correct any noted deficiencies, and obtain certifications of satisfactory inspection.

1. Deliver certificates to the Architect in accordance with Section 017800 “Closeout Submittals”.

1.05 WORK BY OTHERS

A. The Owner intends to award separate contracts for the purchase and installation of:

1. Items indicated or designated as “Not In Contract” (NIC) on Drawings.

2. Furniture and Furnishings other than those indicated on drawings or specified herein.

3. IT Equipment, including the following:

a. Cabling.
b. Data jacks and face plates.
c. IT racks and shelving.
d. Patch panels and power strips.
e. Final connections and terminations required at the outlet and back at IT room.
f. Refer to electrical drawings for conduit and rough-in by General Contractor.

4. Phone System, including the following:
a. Phone jacks and face plates.
b. Phone equipment and wiring required.
c. Final connections and terminations required at the outlet and back at the IT room.
d. Refer to electrical drawings for rough-in and specific hard lines by General Contractor.

5. Security, including the following:
a. Security equipment including cameras, sensors, monitors, etc.
b. Low voltage power supply and wiring.

6. Cable TV is not anticipated for provision or installation for this project.

B. Owner’s responsibilities:

1. Delivery of Owner supplied products.

2. Schedule of work by others.

C. Contractor's responsibilities:

1. Inform Owner of required delivery dates for Owner supplied products and installation dates for work by others.

2. Coordinate work with other installers or contractors.

1.06 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner and Architect.

B. Construct work to accommodate Owner’s occupancy requirements.

1.07 CONTRACTOR USE OF SITE

A. Construction shall be limited to the project site..

B. Do not allow construction debris and waste to enter adjacent properties.

C. The Owner reserves the right to place and install equipment and furnishings in completed areas of the building prior to Substantial Completion, provided Owner's installation does not interfere with construction.

1. Placing of equipment and furnishings does not constitute acceptance of Work.

1.08 IDENTIFICATION OF ENTITIES

A. Where the term "Architect" is used in the Contract Documents it is defined as the authorized representative designated by the Owner and acting within the scope of the particular duties entrusted to such representative.

1. Architect:
ASA Architects
201 North Alameda
Las Cruces, NM 88005
P 575.526.3111

a. Project Architect: Robert S. Price

B. Where the term "Owner" is used in the Contract Documents, it is defined as follows:

1. Owner:
Chaves County New Mexico
St. Mary's Place
Roswell, New Mexico 88203
P: 575-624-6600
Project Representative:
Mac Rogers
Public Services Director

1.09 DEFINITIONS

A. Refer to Document 007213 "General Conditions of the Contract for Construction", Article 1.1 for definitions of terms used within Contract Documents.

B. Additional terms used within the Specifications but not defined by Document 007213 "General Conditions" shall have the following definitions:

1. Products: Materials, manufactured items, components, fixtures, machinery, equipment, or systems forming the Work but not including machinery, equipment, and other aids used for preparing, fabricating, conveying, and installing the Work.

2. Supply: Furnish, deliver, and unload at the project site (Same meaning as furnish).

3. Furnish: Supply, deliver, and unload at the project site (Same meaning as supply).

4. Install: Operations at the project site to incorporate products into the work such as unpacking, assembling, anchoring, erecting, applying, placing, curing, finishing, and preparing for use.

5. Provide: To supply or furnish a product and to also install it.

6. Execution: Operations at the project site including preparatory actions, installing, and post installation adjusting, testing, cleaning, and demonstrating.

1.10 ABBREVIATIONS

A. Abbreviations used within the Specifications are defined as follows. For abbreviations not listed, contact Architect for definitions.

ADA	Americans with Disabilities Act
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
CF	Cubic feet

CFM	Cubic feet per minute
F	Fahrenheit
IBC	International Building Code
LB	Pound
LF	Linear feet
PSF	Pounds per square foot
PSI	Pounds per square inch
SF	Square feet
SY	Square yards
UL	Underwriters Laboratory

END OF SECTION

SECTION 012000 - PRICE AND PAYMENT PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes administrative and procedural requirements for formatting and processing applications for payment.

1.02 RELATED SECTIONS

A. Agreement Between Owner and Contractor.

B. Section 007213 - General Conditions of the Contract.

1. Article 9: General procedures for Schedule of Values, Applications for Payment, Certificates for Payment, and Progress Payments.

C. Section 013100 – Project Management and Coordination.

D. Section 013300 – Submittal Procedures.

E. Section 017700 – Closeout Procedures.

1.03 SCHEDULE OF VALUES

A. Procedures:

1. Prepare a Preliminary Schedule of Values allocating the various portions of the work using AIA Document G703.

2. Submit for review by the Architect three (3) copies of Preliminary Schedule of Values within ten (10) calendar days after date of Agreement between Owner and Contractor.

3. Revise Schedule of Values to incorporate Architect's comments and if applicable, approved Change Orders and Construction Change Directives.

4. Submit three (3) copies of the Final Schedule of Values at least seven (7) days before submittal of the initial Application for Payment.

B. Format:

1. Schedule of Values shall be a complete schedule and breakdown of costs for the entire project prepared using AIA Document G703.

2. Round values to the nearest whole dollar with the sum of all values equal to the total Contract Sum.

C. Content: Use Project Manual Table of Contents as basis for line items.

1. Cross reference line items with the number and title of corresponding specification sections.

2. Provide sufficient detail to allow computation of values for progress payments during construction.

3. Include within each line item a directly proportional amount of Contractor's overhead and profit.

4. Provide separate line items for materials and for installation when materials will be stored on site prior to installation such that costs of suitably stored materials may be included separately on an Application for Payment.

5. The schedule format shall contain columns for each portion of the work as follows:

a. Column 1 – Scheduled Value
b. Column 2 – Work Completed From Previous Application
c. Column 3 – Work Completed This Period
d. Column 4 – Materials Presently Stored

e. Column 5 – Total Completed and Stored to Date
f. Column 6 – Percentage Completed
g. Column 7 – Balance to Finish

4. Provide separate line items for:

   a. Each allowance included in the Contract Sum.

   b. Each Contract modification.

   c. For bonds.

   d. For Insurance.

5. The Schedule of Values shall provide a separate line item titled Close-Out. To provide a value consistent with and appropriate to the provisions of the specification, the value of the Close-Out line items shall not be less than the following:

   a. Punch List Items, Record Drawings (As-Builts), O & M Manuals, and Close-Out Documents: 5 percent of the cost of construction.

1.04 APPLICATIONS FOR PAYMENT

A. Format: AIA Form G702 “Application and Certificate for Payment” and AIA G703 “Continuation Sheet”.

B. Payment period: Monthly unless otherwise stipulated in the Agreement Between the Owner and the Contractor.

C. Preparation:

1. Use Schedule of Values for listing items in Applications for Payment.

2. Complete each entry on the Application for Payment form.

   a. Incomplete forms will be returned without action.

3. List each authorized Change Order and Change Order Directive as a separate line item and in the same format as other line items.

4. Provide subtotals and total.

5. Indicate actual and percent of amount used and amount remaining.

6. Applications shall be signed and dated by an authorized officer of the Contractor. Signature shall be notarized.

D. Include appropriate invoices for materials stored on site.

E. At the request of the Architect, provide substantiating data justifying dollar amounts in question.

F. Submittal: Submit 3 executed copies of each Application for Payment.

G. Prior to acceptance of each Application for Payment, the Architect will review Project Record Drawings specified in Section 017800 “Closeout Submittals” to ensure that recorded data is current.

1.05 INITIAL APPLICATION FOR PAYMENT

A. Submit the initial application for payment only after the following have been submitted and accepted by the Architect and the Owner.

1. Certificates of insurance.

2. Schedule of Values.

3. Copy of building permit.

4. Construction schedule.

5. List of subcontractors, principle suppliers and fabricators.

6. Submittal schedule.

1.06 SUBSEQUENT APPLICATIONS FOR PAYMENT

A. Submit the following with subsequent applications for payment:

1. Updated construction schedule.

2. Construction photographs.

3. Updated submittal schedule.

1.07 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION

A. Submit after issuance of Certificate of Substantial Completion and in accordance with Section 017700 “Closeout Procedures”.

1.08 FINAL APPLICATION FOR PAYMENT

A. Submit after completion of final cleaning, final inspection, final submittals, and other final completion procedures specified in Section 017700 “Closeout Procedures”.

END OF SECTION

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SECTION 012100 – ALLOWANCES

PART 1 – GENERAL

1.01 SUMMARY

A. All requirements of General and Supplementary Conditions, applicable sections of the Project Manual, and applicable portions of Drawings shall govern scope, quality, and execution of Allowances.

B. This section includes procedures and descriptions for Allowances which are to be included in the Base Bid Amount.

1.02 RELATED SECTIONS

A. Section 007200 – General Conditions of the Contract.

B. Individual Specification Sections as applicable to each Allowance for products, assemblies, installations, and services.

1.03 PROCEDURES

A. The Contractor shall not exceed any Allowance without first obtaining written approval from the Architect.

B. Verify, by invoices or other data as requested by the Architect, all expenditures of monies for products, assemblies, installations, and services purchased under each allowance.

C. Should the actual cost of any product, assembly, installation, or service covered under any Allowance be more or less than the specified amount of the Allowance, the contract sum will be adjusted by a Change Order equal to the amount of the difference.

D. It shall be the General Contractor's responsibility to request applicable selections from the Architect far enough in advance of scheduled dates for Work to allow all required time for product review, selection, securing necessary approvals, possible revisions, and for placing orders and securing delivery so as not to delay any portion of the project.

E. In cases where no technical specification exists for products, assemblies, installations, or services furnished by Allowance submit the following in accordance with Section 013300 "Submittal Procedures":

1. Manufacturer's product data, installation instructions, and care and maintenance procedures.

2. Applicable shop drawings.

3. Manufacturer's selection charts for colors, textures, and patterns to be selected by the Architect.

4. Other information as requested by the Architect.

F. In cases where no technical specification exists for products, assemblies, installations, or services furnished by Allowance provide the manufacturer's standard warranty for materials and installation but for no less than a period of one year after Substantial Completion.

PART 2 – PRODUCTS

2.01 ALLOWANCES

A. Include the following in the amount of each Allowance:

1. Total cost of the product, assembly, or service.

2. Delivery, unloading, and handling at the project site including uncrating and storage.

3. Labor, installation, and finishing.

4. Other expenses required to complete the installation.

B. Included in the Base Bid but not included in the amount of each allowance shall be the cost for the following:

1. All applicable taxes except New Mexico Gross Receipts tax and local option tax.

2. Bond, Overhead and Profit.

2.02 SELECTION

A. The Architect will assist in the selection of products and assemblies under each Allowance by performing the following duties:

1. Review proposed manufacturers, products, assemblies, installations, and services.

2. Make selections, receive approvals, and provide approval to proceed to the Contractor.

B. The Contractor shall assist in the selection of products and assemblies under each Allowance by performing the following duties:

1. Obtain written proposals as requested by the Architect.

2. Make recommendations of products, assemblies, installations, and services for consideration by the Architect.

3. Provide written notification to the Architect of any adverse effect anticipated by the selection of a product, assembly, installation, or service related to the construction schedule or contract sum.

4. Upon the Architect's approval to proceed, enter into a purchase agreement with the appropriate subcontractor or supplier.

5. Designate in the Construction Schedule, dates for delivery, installation, and completion of Allowance related work.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Comply with the manufacturer's written installation instructions and the Architect's Directives for the installation of Allowance purchased products and assemblies.

3.01 SCHEDULE OF ALLOWANCES

A. Allowances for products, assemblies, installations, and services shall be in the amounts stated under the respective Allowance Description and included in the Base Bid Amount.

B. ALLOWANCES:

1. Provide an allowance of $TBD (One Hundred Thousand Dollars) for _____

2. Provide an allowance of $5,000 (Five Thousand Dollars) for selection, provision and installation of electronic card readers for entry doors. Conduit, rough-in, and other hardware shall be included in the Contractor's price as specified elsewhere.

END OF SECTION

SECTION 012300 – ALTERNATES

PART 1 – GENERAL

1.01 SUMMARY

A. All requirements of General and Supplementery Conditions, applicable sections of the Project Manual, and applicable portions of Drawings shall govern scope, quality, and execution of Alternates.

B. This section includes procedures and descriptions for Alternates which increase or decrease the scope of work for the project.

1.02 PROCEDURES

A. An Alternate is a proposed amount that may be added or deducted from the project if the Owner decides to accept a change in the products, materials, systems, installation methods, or amount of construction to be completed.

B. Alternates are identified by number and the descriptions include basic changes for incorporation into the Work.

C. Owner shall have the right to accept one or more Alternates.

D. Particular Alternates, as selected by the Owner, shall be made a part of the Work by specific provisions in the Agreement between the Owner and the Contractor.

E. Amounts for Alternates included in the Guaranteed Maximum Price shall:

1. Consider all work that must be accomplished for complete incorporation of Alternates including modifications to Base Bid items.

2. Include in lump sum prices for Alternates all costs of labor, materials, equipment, permits, fees, insurance, bonds, overhead, and profit.

    a. Include miscellaneous devices, accessories, and similar items incidental for a complete installation.

3. Where work is shown in Additive Alternates that represent an “Up-Grade” to the Base Bid, include additional costs for the “Up-Grade” only, excluding costs already included in the Base Bid.

4. Immediately after Award of Contract, advise all necessary personnel and suppliers as to which alternates have been selected by the Owner.

    a. Use all means necessary to alert personnel and suppliers as to all changes in the work caused by the Owner’s selection or rejection of Alternates.

5. Coordinate related work and modify surrounding work as required to properly integrate work of each Alternate

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

3.01 SCHEDULE OF ALTERNATES

A. Work not identified in the following Alternate Descriptions shall be included in the Base Bid.

B. Additive Alternates:

1. TBD

C. Deductive Alternates:

1. No Deductive Alternates.

END OF SECTION

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes administrative and procedural requirements for handling and processing contract modifications.

1.02 RELATED SECTIONS

A. Section 007213 – General Conditions of the Contract.

1. Article 7: Procedures for change orders and construction change directives.

B. Section 012000 – Price and Payment Procedures.

C. Section 016200 – Product Options (Substitution approval after award of contract).

1.03 MINOR CHANGES IN THE WORK

A. The Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time utilizing the Architect's Supplemental Instruction Form.

1.04 PROPOSAL REQUESTS

A. Architect and Owner Initiated Requests for Proposals: The Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or Contract Time.

1. If necessary, the description will include supplemental or revised drawings and specifications.

2. Within 3 days of receipt of a request for proposal, submit to the Architect an estimate of cost necessary to execute the change.

3. Proposal requests issued by the Architect are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.

B. Contractor Initiated Proposals: When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.

1. Include a statement outlining the reasons for the change and the effect of the change on the Work.

2. Provide a complete description of the proposed change.

3. Indicate the effect of the proposed change on the Contract Sum and Contract Time.

4. Comply with requirements in Section 016200 "Product Options" if the proposed change requires substitution of one product or system for a specified product or system.

C. Proposal Request Form: Use AIA Document G709 for Change Order Proposal Requests.

D. Documentation: Maintain adequate records and provide full information required for evaluation of proposed changes and to substantiate costs including the following:

1. Product, labor, and equipment quantities, unit costs, and total amounts.

a. When requested, furnish data to substantiate quantities.

2. Delivery charges and equipment rental.

3. Amounts for taxes, insurance, and bonds.

4. Overhead and profit amounts.

5. Documented credits for deletions.

6. Justification for changes in Contract Time.

1.05 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: The Architect may issue a Construction Change Directive on AIA Form G714 signed by the Owner and instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. The Directive will contain a complete description of the Work.

2. The Directive will designate the method to be followed to determine changes in the Contract Sum and/or Contract Time.

B. Time and Material: The Contractor shall maintain detailed records on a time and material basis of work required by the Construction Change Directive.

C. Documentation: After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract including the following:

1. Names of personnel performing Work.

2. Dates and times Work was performed and by whom.

3. Time records and wage rates paid.

4. Invoices for products, equipment, and subcontracts.

1.06 CHANGE ORDER PROCEDURES

A. Changes in the Work shall be determined and Change Orders executed in accordance with Section 007213 “General Conditions of the Contract”.

B. The Contractor shall issue a Change Order for signatures of Owner and Architect on AIA Document G701 for the following:

1. Allowances: Differences in costs between products purchased and cash allowances stated in Section 012100 “Allowances”.

2. Unit Prices: Computed from unit prices stated in Contract Documents or subsequently agreed upon and actual measured quantities installed.

3. Stipulated Sum: Based on Architect’s Request for Proposal and Contractor’s price quotation or Contractor’s Request for Change Order; both only as approved by the Owner and the Architect.

4. Time and Material: Architect will determine allowable change in Contract Sum and Time.

1.07 AUTHORIZED CHANGE ORDERS

A. After receiving authorization from the Architect by means of a Change Order signed by both the Owner and the Architect, the Contractor shall:

1. Proceed with the change in the work.

2. Revise the Schedule of Values and Application for Payment forms to record each Change Order as a separate line item and adjust the Contract Sum and Time.

3. Revise the Progress Schedule to reflect changes in Contact Time and to adjust times for other work items affected by changes.

4. Record changes in Project Record Documents.

END OF SECTION

SECTION 013000 - ADMINISTRATIVE REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes administrative and procedural requirements for the following:

1. Preconstruction meeting.

2. Progress meetings.

3. Progress photographs.

1.02 PRECONSTRUCTION MEETING

A. The Architect will schedule and administer a Pre-Construction Meeting to be held after execution of the Owner / Contractor Agreement and issuance of Notice to Proceed.

1. The Pre-Construction Meeting will be held at the site or other agreeable location.

B. Attendance is required for the following parties:

1. Owner.

2. Architect.

3. Architect's Consultants.

4. Contractor including project manager and job superintendent.

5. Major subcontractors and suppliers.

C. Agenda:

1. Permits.
2. Submission of executed bonds and insurance certificates.
3. Notice to Proceed
4. Distribution of contract documents.
5. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
6. Designation of responsible personnel representing Owner, Contractor, and Architect.
7. Channels of communication.
8. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, change orders, and contract closeout procedures.
9. Scheduling, work sequence, project meetings, and delivery priorities.
10. Use of premises by Owner and Contractor, including work hours and right of way restrictions.
11. Owner's requirements and occupancy prior to completion.
12. Presentation and discussion of Site Mobilization Plan.
13. Site storage, construction facilities, and controls
14. Temporary utilities.
15. Survey and building layout.
16. Security and housekeeping procedures.
17. Employment practices and wage rates.
18. Procedures for testing.
19. Procedures for maintaining record documents.
20. Requirements for start-up of equipment.
21. Inspection and acceptance of equipment put into service during construction period.

D. The Architect will record minutes and distribute copies to all participants.

1.03 PROGRESS MEETINGS

A. The Contractor will schedule and administer meetings throughout the progress of the Work.

1. Meetings will be held at monthly intervals maximum.

2. Meetings will be held at the site or other agreeable location.

B. Attendance is required for the following parties:

1. Owner.

2. Architect.

3. Contractor including project manager and job superintendent.

4. Major subcontractors and suppliers.

5. Architect's Consultants when necessary.

6. Owner's independent contractors when necessary.

C. Agenda:

1. Review minutes of previous meetings.
2. Review schedule and work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Maintenance of quality and work standards.
11. Effect of proposed changes on progress schedule and coordination.
12. Review Project Record Documents.
13. Other business relating to Work.

D. The Contractor will record minutes and distribute copies within three days after meeting to all participants and those affected by decisions made.

1.04 PROGRESS PHOTOGRAPHS

A. Submit photographs with each application for payment, taken not more than 7 days prior to submission of application for payment.

B. Photography Type: Digital, 24 bit color, 1024 x 768 resolution minimum, in JPG format.

1. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

2. Provide electronic files on CD and 2 sets of 3x5 or 4x6 color prints.

3. Provide files unaltered by photo editing software.

4. File Naming: Include project identification, date and time of view, and view identification.

C. Provide photographs of site and construction throughout progress of Work produced by an experienced photographer acceptable to the Architect.

D. Periodic Views:

1. Provide non-aerial photographs from required views at specified times, until Date of Substantial Completion.

2. Consult with Architect for required views and specified times.

E. In addition to periodic, recurring views, take photographs of each of the following events:

1. Completion of site clearing.
2. Excavations in progress.
3. Foundations in progress and upon completion.
4. Structural framing in progress and upon completion.
5. Enclosure of building upon completion.

END OF SECTION

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SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 – GENERAL

1. 01 SUMMARY

A. This section includes the following:

1. Project management and coordination.

2. Field engineering.

1.02 RELATED SECTIONS

A. Section 014000 - Quality Requirements.

B. Section 015000 - Temporary Facilities and Controls.

1.03 SUBMITTALS

A. Provide in accordance with Section 013300 “Submittal Procedures”.

1. Coordination drawings:

a. Provide where coordination is critical for installation of components fabricated off site and where space is limited and maximum utilization of space is required.

b. Show relationship and integration of components and construction entities, required installation sequence, dimensions, and tolerances.

B. Staff assignment list:

1. List of Contractor's principal staff assignments for Project. Indicate names, duties and responsibilities, addresses, and telephone numbers.

2. Distribute and post in field office and elsewhere on site as appropriate to provide coordination information.

1.04 PROJECT MANAGEMENT AND COORDINATION

A. The General Contractor shall employ a Superintendent and necessary assistants who shall be in attendance at the project site during performance of the Work.

B. The Superintendent’s resume shall be submitted to the Owner prior to commencement of construction and must demonstrate to the Owner reasonable satisfaction that the Superintendent has performed the same duties on previous construction projects similar to this project.

C. The Superintendent shall be a competent and responsible employee who is regularly employed by the Contractor and is designated by the Contractor as its representative to be in full time attendance at the Project site throughout the construction of the Work.

1. The Superintendent shall attend each job meeting.

D. The Contractor must supply to the Owner & Architect the mobile telephone number of the Project Superintendent and the Project Manager who may be contacted during non-work-hours for emergencies on the project.

E. The Superintendent shall represent the Contractor, and communications given to the Superintendent shall be as binding as if given to the Contractor.

1. Important communications shall be confirmed in writing.

2. Other communications shall be similarly confirmed on written request in each case.

F. The Superintendent shall be responsible for coordinating all the Work of the Contractor and the Subcontractors.

G. Coordinate scheduling, submittals, and work of various specification sections to ensure efficient and orderly sequence of installation of interdependent construction elements.

1. Ensure that work of one specification section is not installed in such a manner as to limit, preclude, or restrict work of another section.

H. Coordinate completion and clean-up of work of separate specification sections in preparation for final inspection specified in Section 017700 “Closeout Procedures”.

I. After acceptance of Work, coordinate access to facility for required maintenance, monitoring, adjusting, and correcting deficiencies in manner to minimize disruption of Owner's activities.

1.05 FIELD ENGINEERING

A. Existing control datum for field engineering is indicated on Drawings.

B. Locate or establish survey control and reference points prior to starting site construction.

1. Protect points during construction and record locations with horizontal and vertical data on Project Record Documents in accordance with Section 017800 “Closeout Submittals”.

C. Prior to start of construction, verify location of control points and layout information on Drawings relative to property, setback, and easement lines.

D. Provide competent field engineering services and establish elevations, lines, and levels utilizing recognized engineering survey practices.

1. Periodically verify layouts.

E. Promptly replace dislocated control and reference points based on original survey control.

PART 2 – PRODUCTS

2.01 EQUIPMENT

A. Verify utility requirements and characteristics of equipment are compatible with facility utilities.

B. Coordinate work of various specification sections having interdependent requirements for installing, connecting to, and placing in service such equipment.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Space requirements:

1. Coordinate space requirements and installation of mechanical, electrical, and other work shown diagrammatically on Drawings.

a. Follow routing shown for pipes, ducts, and wireways as closely as practicable.

b. Utilize spaces efficiently to maximize accessibility for other installations, maintenance, and repairs.

2. Where space is limited, coordinate installation of components to ensure maximum access for maintenance.

a. Ensure space provided around equipment and fixtures complies with applicable codes.

B. Concealment: In finished areas, conceal pipes, ducts, and wireways within construction except as otherwise indicated.

1. Where practical, conceal supports, fasteners, and other attachment devices.

C. Arrangement:

1. Unless otherwise indicated, installations shall be aligned vertically and horizontally.

a. Place piping, conduit, wireways, and other linear items parallel with lines of building.

2. Coordinate mounting heights and spacing of components so that finished work is neat and orderly with organized appearance.

3. Repetitive items such as hangers and fasteners shall be equally spaced unless indicated otherwise.

D. Finished surfaces: Coordinate locations of fixtures, boxes, and other recessed or surface mounted items with finish elements and grades to ensure proper installation and neat appearance.

3.02 CUTTING AND PATCHING

A. Openings made in installed exterior surfaces shall be closed to protect construction from weather and extremes of temperature and humidity.

B. Cutting and patching of installed construction shall be accomplished in accordance with Section 017300 “Execution Requirements”.

C. Remove, cut, and patch previously installed construction in a manner to minimize damage and to provide a means of restoring finishes to original or better condition.

D. Where refinishing is required, provide a neat transition to adjacent surfaces.

E. Patched work shall match existing adjacent work in texture and appearance.

END OF SECTION

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SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes administrative and procedural requirements for processing the following submittals:

1. Shop drawings.
2. Product data.
3. Samples.
4. Manufacturer's instructions.
5. Design data and calculations.
6. Manufacturer's certificates.
7. Reports for testing, inspecting, and demonstrating.

1.02 RELATED SECTIONS

A. Section 007213 – General Conditions of the Contract**.**

B. Section 012000 - Price and Payment Procedures.

C. Section 013000 - Administrative Requirements (Progress schedule, coordination drawings, and construction photographs).

D. Section 014000 - Quality Requirements (Manufacturers' field services and reports).

E. Section 016000 - Product Requirements (Substitution requests).

F. Section 017800 - Closeout Submittals.

G. Refer to individual specification sections for submittal requirements related to specific products.

1.03 SUBMITTAL SCHEDULE

A. Procedure:

1. Submit for review by Architect three (3) copies of Submittal Schedule within twenty (20) days of date of Agreement Between Owner and Contractor.
2. Revise to address review comments and resubmit.
3. Update Submittal Schedule to reflect change orders, progress schedule revisions, and status of individual submittals.
    a. Submit three (3) copies with each Application for Payment.

B. Format: Tabular arrangement indicating the following:

1. Submittal number and title.
2. Related specification section number and title.
3. Proposed submittal date, actual submittal date, and date reviewed submittal is required.

1.04 SUBMITTAL PROCEDURES

A. Schedule submittals to expedite Work and to allow a reasonable amount of time for review.

B. Preparation:

1. Provide separate submittal for each specification section requiring submittals.

   a. Include all material requested for that section.

   b. Provide folders or binders for material.

2. Coordinate submission of related items and group submittals of related products (or a system) in a single transmission.

3. Identify variations from requirements of Contract Documents and indicate product and system limitations which may adversely affect Work.

4. Mark or show dimensions and values in same units as specified.

5. Provide 4 inch x 6 inch minimum space for Architect and Contractor review stamps.

C. Contractor review: **Submittals not reviewed and stamped by the Contractor will be returned without review by the Architect or his consultants. Any delay caused by returning non-reviewed submittals shall be the responsibility of the Contractor.**

1. Review submittals prior to transmittal and verify compatibility with field conditions and dimensions, product selections and designations, and conformance of submittal with requirements of the Contract Documents.

   a. Return non-conforming submittals to preparer for revision rather than submitting to the Architect.

2. Coordinate submittals to avoid conflicts between various items of work.

3. Apply Contractor's stamp with signature certifying that review, verification of products required, field dimensions, adjacent construction, and coordination of information is in accordance with the requirements of the Contract Documents.

4. Failure of Contractor to review submittals prior to transmittal to Architect shall be cause for rejection.

D. Transmittal:

1. Transmit each submittal with a separate Submittal Transmittal Form.

2. Sequentially number transmittal forms.

   a. Resubmittals shall have original number with an alphabetic or numeric suffix.

3. Identify project, contractor, subcontractor, supplier, pertinent drawing sheet and detail numbers, and associated specification section numbers.

4. Sign Submittal Transmittal Form and deliver submittals to Architect.

E. Review: Architect will review and return submittals with comments.

F. Do not fabricate products or begin work until return of submittals with Architect’s acceptance.

G. On return promptly distribute reviewed submittals to concerned parties.

1. Instruct parties to promptly report any inability to comply with provisions.

H. Resubmission:

1. Revise and resubmit submittals as required within fifteen (15) days of return from Architect.

2. Make re-submittals under procedures specified for initial submittals.

3. Identify all changes made since previous submittal.

I. Submittals or samples requiring selection of colors shall be submitted together and reviewed at one time by the Architect.

1. Partial submittals will not be reviewed independently unless allowed by the Architect.

1.05 SHOP DRAWINGS

A. Submission: Submit the number of copies which the Contractor requires plus two (2) originals to be retained by the Architect.

1. Fold drawings to fit submittal folders.

B. Form:

1. Size: 8-1/2 inches x 11 inches minimum and 36 inches x 48 inches maximum except for full size details and templates.

2. Present in a clear and thorough manner, title each drawing with the project name, and identify each element of drawing with reference number.

3. Plans, elevations, sections, and details shall be to scale with scale indicated.

4. Indicate field verified dimensions and show relationship of products to adjacent work.

a. Note coordination requirements.

5. Schematics and wiring and other diagrams shall be logically arranged and presented in a clear understandable manner with all items labeled.

1.06 PRODUCT DATA

A. Submission: Submit the number of copies which the Contractor requires plus two (2) originals to be retained by the Architect.

B. Form:

1. Provide all critical information such as reference standards, performance characteristics, capacities, power requirements, wiring and piping diagrams, controls, component parts, finishes, dimensions, and required clearances.

2. Mark each copy of manufacturer's standard printed data to identify products, models, options, and other data pertinent to project.

a. Submit only data which is pertinent.

3. Modify manufacturer's standard schematic drawings and diagrams and supplement standard data to provide specific information applicable to project.

a. Delete information not applicable.

4. Colors and patterns: Unless color and pattern is specified for product, submit accurate color and pattern charts or samples illustrating manufacturer's full range for selection by Architect.

1.07 SAMPLES

A. Submission:

1. Submit the number of samples which Contractor requires plus One (1) sample which will be retained by Architect.

2. Label each sample with identification related to Submittal Transmittal Form.

3. Submit samples at least Thirty (30) days prior to date Contractor needs approval for ordering or incorporation into Work.

B. Type: Submit samples to illustrate functional and aesthetic characteristics of the products, with all integral parts and attachment devices.

1. Include full range of manufacturer's standard finishes, indicating colors, textures, and patterns for Architect selection.

C. Reviewed product samples may be used in work with approval of the Architect.

1.08 MANUFACTURER'S INSTRUCTIONS

A. Submission: Submit the number of copies which Contractor requires plus two (2) to be retained by the Architect.

B. Form:

1. Manufacturers' printed instructions for activities such as delivery, storage, assembly, installation, wiring, start-up, adjusting, finishing, and maintaining.

2. Indicate pertinent portions and identify any conflicts between manufacturer’s instructions and Contract Documents.

1.09 DESIGN DATA AND CALCULATIONS

A. Submission: Submit the number of copies which Contractor requires plus two (2) to be retained by the Architect.

B. Form:

1. Provide basic calculations, analysis, and data to support design decisions and demonstrate compliance with specified requirements.

a. State assumptions and define parameters.

b. Give general formulas and references.

c. Provide sketches as required to illustrate design method and application.

2. Arrange calculations and data in a logical manner with suitable text to explain procedure.

3. Indicate name, title, and telephone number of individual performing design and include professional seal of designer where applicable or required.

1.10 MANUFACTURERS’ CERTIFICATES

A. Submission: Submit the number of copies which Contractor requires plus two (2) to be retained by the Architect.

B. Form:

1. Certificates shall indicate that products conform to or exceed specified requirements.

a. Submit supporting reference data, affidavits, and certifications as required.

2. Certificates may be based on recent or previous test results if acceptable to the Architect.

1.11 REPORTS

A. Submission:

1. Submit the number of copies which Contractor requires plus two (2) to be retained by the Architect.

2. Submit reports within fifteen (15) days after completion of activity.

B. Form:

1. Present complete information in a clear concise manner.

2. Computer printed on 8-1/2 inch x 11 inch white paper.

3. Bind with titled cover in folder, plastic binder, or three ring binder as appropriate for quantity of material.

C. Reports shall include:

1. Time, location, conditions, and duration of activity.

2. Names of persons performing and witnessing activity.

3. Equipment used.

4. Description of activity, data recorded, and results.

5. Deficiencies found, corrective measures, and results of retesting.

6. Other pertinent data.

END OF SECTION

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SECTION 014000 - QUALITY REQUIREMENTS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. This section includes the following:

1. Installation quality control.
2. Reference standards.
3. Field samples.
4. Inspection and testing laboratory services.
5. Manufacturer's field services and reports.

1.02 RELATED SECTIONS

A. Section 007213 - General Conditions of the Contract.

1. Article 3.3: Contractor's supervision and construction procedures.
2. Article 12: Contractor's responsibility for uncovering and correction of work.
3. Article 13.5: Requirements for tests and inspections.

B. Section 016000 - Product Requirements

1.03 INSTALLATION QUALITY CONTROL

A. Monitor and maintain quality control over manufacturers, suppliers, subcontractors, work force, site conditions, products, and services to ensure Work is of specified, consistent quality.

B. Workmanship:

1. Specified requirements represent a minimum acceptable quality for Work. Comply with industry standards except when more stringent specified requirements and tolerances indicate higher standards or more precise workmanship.
2. Perform work with suitable qualified personnel to produce work of specified quality.
3. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and distortion.

C. Manufacturer's instructions:

1. Comply fully with manufacturer's written instructions and perform steps in manufacturer's recommended sequence.
2. Should instructions conflict with Contract Documents, request clarification from the Architect before proceeding.

1.03 REFERENCE STANDARDS

A. When specifications require conformance to a reference standard, applicable standard shall be the edition current at the date of receiving bids.

B. Should specified reference standard conflict with Contract Documents, request clarification from the Architect.

C. Contractual relationship, duties, and responsibilities of the parties to the Contract, including those of The Architect, shall not be altered from that stated in the Contract Documents by mention or inference to the contrary in a specified reference standard.

1.04 FIELD SAMPLES

A. When required by an individual specification section, install field samples for review by the Architect.

B. Acceptable installed sample shall remain as part of Work and shall represent quality level for that item of work.

1. Unacceptable sample shall be removed and replaced, repaired, or refinished as directed by the Architect.

1.05 INSPECTION AND TESTING LABORATORY SERVICES

A. Contractor shall make arrangements, bear costs, and employ an independent firm acceptable to the Architect and the Owner to perform inspections and compliance testing for the following:

1. Materials, components, and systems where testing to determine compliance with Contract Documents is required.

B. Submit within fourteen (14) days of date of Agreement Between Owner and Contractor, testing laboratory qualifications for acceptance by the Architect.

C. Testing firm shall perform inspections, tests, and other services specified in individual specification sections and as required.

D. Testing firm shall submit directly to the Architect three (3) copies of reports indicating observations and results of inspections and tests with indication of compliance or non-compliance with Contract Documents.

1. Additional copies may be required to be distributed to Owner and/or other Engineering Consultants at the direction of the Architect.

E. Contractor's responsibilities:

1. Cooperate with testing firm and furnish materials and other products to be tested.

a. Provide assistance in accessing and obtaining samples.

b. Provide storage for samples and testing equipment.

2. Notify Architect two (2) days prior to operations requiring testing services.

3. Make arrangements with testing firm and pay for additional samples and tests required for Contractor's use.

F. Retesting: Retesting required due to non-conformance with specified requirements shall be performed by same testing firm and paid for by the Contractor.

1.06 MANUFACTURER'S FIELD SERVICES AND REPORTS

A. When required by an individual specification section, provide services of manufacturer's field representative to observe site conditions, installation, quality of workmanship, starting of equipment, testing and adjusting equipment, and as applicable, to instruct and supervise field operations.

B. Submit qualifications of manufacturer's field representative to Architect for approval fifteen (15) days in advance of required observation.

C. Manufacturer's field representatives shall report observations, site decisions, and instructions given to installers that are supplemental or contrary to manufacturer's written instructions.

D. Submit report of field representative within thirty (30) days of observation and in accordance with Section 013300 “Submittal Procedures”.

END OF SECTION

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. This section includes the following temporary facilities and controls:

1. Site mobilization.
2. Temporary Services: Electrical, lighting, heating and ventilating, water, and communications.
3. Construction Facilities: Access, field facilities, sanitary facilities, and fire protection.
4. Fencing, barriers, and protection.
5. Protection of installed work.
6. Removal of utilities, facilities, and controls.

1.02 RELATED WORK

1. Section 007213 - General Conditions of the Contract.
   a. Article 3.15: Contractor's responsibility for cleaning.
   b. Article 10: Safety precautions and programs.

1.03 REFERENCES

A. NFPA 10 - Standard for Portable Fire Extinguishers.

B. NFPA 241 - Safeguarding Building Construction, Alterations, and Demolition Operations.

1.04 SITE MOBILIZATION

A. Locations for temporary facilities shall be determined at the Pre-Construction Conference including the following:

1. Field office.
2. Storage areas, sheds, and fencing.
3. Project identification sign.
4. Access routes.
5. Temporary utility routes and connections.
6. Sanitary facilities.
7. Trash and rubbish receptacles.
8. Parking arrangements.

1.05 TEMPORARY ELECTRICITY

A. Contractor may connect to existing power source at site and pay cost of electricity used.

B. Contractor shall furnish and maintain all temporary poles and overhead construction, feeders, transformers, meters, disconnects, drops, over-current protection, and other wiring and fittings for temporary electrical service as required by the project.

C. Provide power outlets for construction operations with branch wiring, distribution boxes, and flexible power cords as required.

D. Permanent convenience receptacles may be utilized during construction.

E. All temporary power service, materials and utilization shall conform to all applicable codes.

1. Upon completion, remove temporary facilities.

1.06 TEMPORARY LIGHTING

A. Provide lighting for construction operations. Lighting levels shall be appropriate for type and difficulty of work. Use these minimums as guidelines:

1. 20 footcandles: Egress and circulation lighting.

2. 50 footcandles: Rough assembly and fabrication, ordinary finishing, and ordinary inspection.

3. 100 footcandles: Detailed assembly, fine finishing, and difficult assembly.

4. 200 footcandles: Intricate assembly, very fine finishing, and very difficult inspection.

B. After dark, provide security lighting for interior and exterior work and storage areas.

C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

D. Maintain lighting and provide routine repairs.

E. Permanent building lighting may be utilized during construction.

1.07 TEMPORARY HEATING AND VENTILATING

A. Ventilate enclosed areas to prevent accumulation of dust, fumes, vapors, and gases.

B. Provide temporary fan units as may be required to maintain clean air for construction operations.

C. Provide and pay for supplemental heating and cooling devices and energy needed to maintain required and specified conditions.

D. Permanent building heating and ventilating equipment may be utilized during construction only if approved in advance with the Owner and Architect.

1.08 TEMPORARY WATER SERVICE

A. Contractor may connect to existing water source at site and pay cost of water used.

B. Contractor shall furnish and maintain all temporary mains, laterals, branch lines, meters, and other service piping and fittings to supply temporary water as required by the project.

C. Assume responsibility for temporary connections and water lines.

1. Upon completion, remove temporary facilities.

1.09 TEMPORARY COMMUNICATIONS

A. Cell phone service will be acceptable.

1.10 ACCESS

A. Acceptable access routes and site entrances shall be determined at the Pre-Construction Conference.

1. Prepare construction entrance to accommodate traffic.

2. Protect existing curbs and walks traversed by construction vehicles from damage.

B. Identify access to Contractor's work and office area with appropriate signs so that delivery personnel and others may contact Contractor.

C. Prevent unauthorized personnel from proceeding outside of Contractor's work and office area.

1.11 FIELD FACILITIES

A. Provide and maintain storage sheds and other facilities as required.

B. Arrange for parking for work force.

1.12 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required sanitary facilities for work force.

B. New toilet facilities shall not be used by work force.

1.13 TEMPORARY FIRE PROTECTION

A. Install and maintain temporary fire protection components.

1. Establish and follow procedures to protect against fire losses.

2. Comply with NFPA 241.

B. Fire extinguishers: Provide hand carried, portable, UL rated fire extinguishers of type and size recommended by NFPA 10 for building exposure conditions.

1. Place in accessible, convenient locations in clear view with a minimum of one extinguisher per floor.

C. Access: Maintain unobstructed access to fire hydrants, water supply, fire extinguishers, stairways, and access routes for fighting fires.

D. Heating devices: Exercise care and monitor use of temporary heaters to minimize fire risk.

E. Store combustible materials in fire-safe containers.

F. Volatile products: Do not store paints, varnishes, paint removers, solvents, adhesives, cleaning rags, and other volatile products in building.

1. Take precautionary measures to prevent fire hazards and spontaneous combustion.

G. Cutting and welding: Approve in advance, use of open flame cutting, welding, and soldering equipment.

1. Ensure that safe conditions exist before granting approval.

1.14 FENCING

A. Provide temporary fencing around materials storage area.

1. 6 foot high commercial grade chain link fence.

2. Equip with vehicular and pedestrian gates with locks.

1.15 BARRIERS AND PROTECTION

A. Security: Provide to protect Work and existing facilities from unauthorized entry, vandalism, and theft.

B. Barriers: Provide to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from construction operations.

C. Enclosures: Provide temporary, insulated, weather tight closures of exterior openings to provide acceptable working conditions, protect Work, and prevent unauthorized entry.

1. Fit with self-closing, lockable doors.

D. Protect existing trees and plants designated to remain.

1. Replace damaged plant material.

1.16 PROTECTION OF INSTALLED WORK

A. Protect installed Work. Control activity in immediate work area.

B. Provide temporary and removable protection for installed products.

C. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, and movement of heavy objects with durable sheet materials.

D. Prohibit traffic and storage on roof surfaces and landscaped areas.

1.17 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above grade and buried utilities, equipment, facilities, and excess materials prior to final inspection.

B. Clean and repair damage caused by installation of temporary facilities.

END OF SECTION

SECTION 015800 - PROJECT IDENTIFICATION

PART 1 – GENERAL

1.01 WORK INCLUDED

A. This section includes the following types of construction signage:

1. Project signage which identifies the project and team members.

2. Community Development Block Grant (CDBG) project identification sign

3. Temporary Signs

1.02 RELATED SECTIONS

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A. Section 061000 – Rough Carpentry.

1.03 SUBMITTALS

A. Submit a photographic image of each project sign, including all graphics, for the Architect's approval.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lumber and Plywood:

1. Project signs shall be constructed of ¾ inch exterior marine plywood bolted to 4 inch x 4 inch treated wood posts.

2. For other signs provide exterior marine plywood of sizes and thicknesses as appropriate for the conditions.

3. Preservative chemicals for treated lumber and posts shall contain no arsenic, chromium, or urea formaldehyde.

B. Painting:

1. For painted sign panels and graphics provide exterior grade alkyd gloss enamel over exterior primer.

2.02 FABRICATION

A. Prepare project signage which identifies the project and team members as indicated on drawings.

B. Prepare CDBG project identification sign as indicated w/ item 10 of the additional conditions, apart to the Community Development Block Grant program documents.

C. Signs shall be prepared by an experienced signage provider using either painted exhibit lettering or die-cut adhesive applied letters and graphics.

D. Design, style, and size of lettering, color, and text shall be as indicated on drawings or as directed by the Architect.

E. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors as required.

PART 3 – EXECUTION

3.01 ERECTION

A. Erect project signage within 30 days after date affixed to Owner / Contractor Agreement.

1. Furnish project signs and erect on site at locations designated by the Architect.

2. Erect supports and framing on secure foundation, rigidly braced and framed to resist applicable wind loads.

3. Install sign surface plumb and level, with butt joints and anchor securely to supports.

B. Allow no other sign to be displayed without approval of the Architect.

END OF SECTION

SECTION 016000 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes the following:

1. General product requirements.
2. Re-use of existing products.
3. New products.
4. Product Options.
5. Maintenance materials.
6. Transportation and handling.
7. Storage and protection.

1.02 RELATED SECTIONS

A. Section 011100 – Summary of Work.

B. Section 014000 - Quality Requirements.

C. Section 016200 – Product Options.

1.03 REFERENCES

A. 16 CFR 260 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; current edition.

B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

PART 2 PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

A. Products of the same category shall be products of a single manufacturer.

1. Where available, products under a single specification section shall be of the same manufacturer.

2.02 RE-USE OF EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner.

1. Notify the Architect and Owner promptly upon discovery;
2. Protect, remove, handle, and store as directed by the Owner.

C. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

2.03 NEW PRODUCTS

A. Provide new products unless otherwise specifically required or permitted by the Contract Documents.

B. Do not use products having any of the following characteristics:

1. Asbestos Containing Building Material.

2. Lead Based Paint.

C. Provide interchangeable components of the same manufacture for components being replaced.

D. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.

E. Cord and Plug: Provide minimum 6 foot cord and plug including grounding connector for connection to electric wiring system.

1. Cord of longer length is specified in individual specification sections.

2.04 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

1. Submit in accordance with Section 016200 “Product Options”.

2.05 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site and store as directed by the Owner.

PART 3 – EXECUTION

3.01 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

C. Transport and handle products in accordance with manufacturer's instructions.

D. Deliver packaged products in unopened and undamaged cartons and wrappings.

E. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

F. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

G. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.02 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work areas in order to minimize waste due to excessive materials handling.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Cover products subject to deterioration with impervious sheet covering.

1. Provide ventilation to prevent condensation and degradation of products.

G. Store loose granular materials on solid flat surfaces in a well-drained area and prevent mixing with foreign matter.

H. Prevent contact with material that may cause corrosion, discoloration, or staining.

I. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

J. Arrange storage of products to permit access for inspection.

1. Periodically inspect to verify products are undamaged and are maintained in an acceptable condition.

END OF SECTION

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SECTION 0162 00 - PRODUCT OPTIONS

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes requirements for product options and substitution procedures.

1.02 RELATED SECTIONS

A. Section 012600 – Contract Modification Procedures.

1.03 PRODUCT OPTIONS

A. For products specified by reference standards or by description only, provide products meeting those standards or description as approved by the Architect.

B. For products specified by naming one or more manufacturers with the designation that no substitutions are allowed, provide only named products.

C. For products specified by naming one or more manufacturers, provide named products or approved substitute products.

1. Requests to use unspecified products shall be made in accordance with the “Substitution Request Procedures” as specified herein.

1.04 SUBSTITUTION REQUESTS

A. Where products are specified by naming specific products of one or more manufacturers, these products shall establish a minimum acceptable level of quality and performance.

B. Prior Approval: The Architect will consider requests made during bidding to use unspecified products only when indicated in individual specification sections.

1. When substitution requests are allowed during bidding by individual specification sections, requests shall be made in accordance with the “Substitution Request Procedures” as specified herein.

2. If product is acceptable, Architect will provide approval by addendum issued to known recipients of Bidding Documents.

C. After signing of Agreement between Owner and Contractor, Architect will consider written requests for substitutions.

1. Requests shall be made in accordance with “Substitution Request Procedures” as specified herein.

2. Architect will determine acceptability of proposed substitutions and notify Contractor of decision in writing.

a. If approved substitution request requires modification of Contract Amount or Contract Time, Architect will process change order incorporating substitution.

3. Substitutions will not be considered when indicated or implied on shop drawings and product data submittals.

D. Request for substitution and use of approved substitution shall constitute representation that Contractor.

1. Has investigated product and determined it meets or exceeds quality level of specified product.

2. Will provide same warranty for substitution as for specified product.

3. Will coordinate installation and make changes to other work required to accommodate accepted substitution and complete Work.

4. Waives claims for additional costs or time extensions related to substitutions which later become apparent.

1.05 SUBSTITUTION REQUEST PROCEDURES

A. Submit separate request for each substitution with Form 016213 “Substitution Request Form”.

1. Copy of form follows this Section.

B. Submit 3 copies of request for substitution and Include the following:

1. Complete data substantiating compliance of proposed substitution with Contract Documents.

2. For products:

a. Product identification, including manufacturer's name and address.

b. Manufacturer's literature containing product description, performance and test data, and reference standards.

c. Samples as required.

3. For construction methods:

a. Detailed description of proposed method.

b. Drawings illustrating methods.

4. Itemized comparison of proposed substitution with product specified.

5. Data relating to changes in construction schedule.

6. Give cost data comparing proposed substitution with specified product.

7. For substitution requests made after signing Agreement, include proposed changes to Contract Amount and Time if substitution is accepted.

END OF SECTION

[FORMS FOLLOW]

ASA ARCHITECTS

SUBSTITUTION REQUEST

Read **SECTION 016200 "PRODUCT OPTIONS"** prior to submission of this form.

The undersigned requests that the following product be accepted for use in the Project.

Product: _____

Model No: _____

Manufacturer: _____

Address: _____

The above product would be used in lieu of:

Product: _____

Specified in: Section: _____ Paragraph: _____

Reason for substitution request: _____

_____

Attached are the following items:

☐ Product description including specifications, performance and test data, and applicable reference standards

☐ Drawings

☐ Photographs

☐ Samples

☐ Tabulated comparison with specified product

☐ For items requiring color selections, full range of manufacturer's color samples

☐ Documentation of reason for request.

☐ Cost data for comparing proposed substitution with specified product

☐ Other:_____

The undersigned certifies that the following statements are correct. Explanations for all items which are **not** true are attached.

1. Proposed substitution has been thoroughly investigated and function, appearance, and quality meet or exceed that of specified product. ☐True ☐ False
2. Same warranty will be provided for substitution as for specified product. ☐True ☐ False
3. **No** aspect of Project will require re-design. ☐True ☐ False
4. Use of substitution will **not** adversely affect:
   a. Dimensions shown on Drawings. ☐True ☐ False

b. Construction schedule and date of completion. ☐True ☐ False

c. Work of other trades. ☐True ☐ False

5. Maintenance service and replacement parts for proposed substitution will be readily available in the New Mexico area. ☐True ☐ False

6. Proposed substitution does **not** contain asbestos in any form. ☐True ☐ False

7. All changes to Contract Sum related to use of proposed substitution are included in price listed below. Contractor waives claims for additional costs related to acceptance of substitution which may subsequently become apparent. ☐True ☐ False

8. Costs of modifying project design caused by use of proposed substitution which subsequently become apparent will be paid for by Contractor. ☐True ☐ False

If substitution requested after signing of Agreement between Owner and Contractor is accepted:

Contract Sum will be [decreased] [increased] by $ _____

Contract Time will be [decreased] [increased] by _____calendar days.

Submitted By:

Company: _____

Address: _____

Telephone Number: _____

Name: _____ Date: _____

Signature: _____

SECTION 017300 – EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. This section includes the following:

1. Basic requirements for examination, preparation, and installation.

2. Requirements and limitations for cutting and patching incidental to work and required to make several parts fit together.

3. Progress cleaning.

1.02 RELATED WORK

A. Section 007213 - General Conditions of the Contract:

1. Article 3.14: Contractor's responsibilities regarding cutting and patching operations.

2. Article 12: Uncovering and correction of work.

B. Section 015000 - Temporary Facilities and Controls.

C. Section 017700 - Closeout Procedures (Final Cleaning).

1.03 SUBMITTALS

A. Submit advance written request to Architect prior to cutting or other alteration which affects the following:

1. Structural integrity of an element.

2. Integrity of weather-exposed or moisture-resistant element.

3. Operation, efficiency, maintenance, or safety of an element.

4. Visual qualities of exposed elements.

5. Work of others under separate contract to Owner.

B. Cutting requests submitted to the Architect shall Include the following:

1. Project and Contractor identification.

2. Location and description of proposed work.

3. Necessity for cutting or alteration and alternatives to cutting and patching.

4. Effect on work of this Contract, existing construction, and work of others under separate contract to Owner.

5. Date work will be executed.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Patching and replacement materials: Those used for original installation.

B. Product substitutions: For any proposed change in patching materials, submit request for substitution in accordance with Section 016200 “Product Options”.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Prior to commencing installations:

1. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work.

2. Verify that existing substrate is capable of structural attachment of new work being applied or attached and that required blocking is in place.

3. Verify that existing substrate is compatible with, properly prepared, and otherwise ready to receive subsequent applications and finishes.

    a. Ensure that existing conditions conform to requirements of manufacturers of products to be applied.

4. Verify that utility services are available, of correct characteristics, and in correct location.

B. Prior to commencing cutting and patching, inspect existing elements subject to damage or movement during subsequent operations.

1. Document and report existing damage.

2. Beginning of cutting, patching, and new work implies acceptance of existing conditions.

3.02 PREPERATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks and openings in substrate prior to applying next material or substance.

C. Apply manufacturer required substrate primer, sealer, and conditioner prior to applying new material or substance to substrate.

3.03 INSTALLATION

A. Install, construct, erect, assemble, and apply products in accordance with manufacturer's recommendations, instructions, and specified requirements.

1. Where manufacturer's instructions conflict with specifications, notify Architect.

2. Do not proceed until clarification is received.

B. Install products secure, rigid, plumb, and level within specified or industry acceptable tolerances.

C. Remove excess materials such as adhesive, grout, mortar, and sealants, from finished surfaces in a manner which does not stain, corrode, disfigure, or otherwise damage finished surface.

D. Adjust working parts for smooth, proper operation.

E. Replace deformed, scratched, cracked, broken, or otherwise damaged products as result of installation.

F. After installation is complete, protect installed products and finished surfaces from subsequent construction operations in accordance with Section 015000 “Temporary Facilities and Controls”.

1. Replace or repair subsequently damaged products and surfaces.

G. Clean and maintain installed products in accordance with manufacturer's recommendations and specifications until Substantial Completion.

3.04 CUTTING AND PATCHING

A. Execute cutting, fitting, patching, excavation, and fill as required to:

1. Install new work into existing construction.

2. Fit products together and to integrate them with other work.

3. Uncover work to execute ill-timed work.

4. Remove and replace defective and non-conforming work.

5. Provide openings for penetrations of electrical work.

B. Provide temporary supports to ensure structural integrity and provide devices and methods to protect other portions of Project from damage.

C. Provide protection from elements for areas which may be exposed by cutting operations.

D. Execute work by methods to avoid damage to other work and which will provide appropriate surfaces to receive patching and finishing.

E. Perform cutting operations as follows:

1. Cut rigid materials using masonry saw or core drill.

a. Pneumatic tools are not allowed without prior approval.

2. Size openings to exactly fit penetrating item plus allowance for sealant.

a. Form edges of hole even and smooth.

3. Drill penetrations through concrete for conduit and piping.

4. Drill round holes and saw cut rectangular openings in concrete unit masonry units.

a. Where block is broken or chipped in process, remove complete face of exposed block and replace with partial block.

F. Perform patching operations as follows:

1. Restore work with new products meeting requirements of Contract Documents.

2. Fit work tight to pipes, sleeves, ducts, conduits, and other elements penetrating surfaces.

3. At penetrations of fire rated walls, partitions, ceilings, and floors, completely seal voids with fire-resistant material, in accordance with Section 078400 “Firestopping” to full thickness of penetrated element.

G. Perform finishing operations as follows:

1. Refinish surfaces to match adjacent finish.

a. For continuous surfaces, refinish to nearest intersection or natural break.

b. For an assembly, refinish entire unit.

3.05 ASPHALT PAVEMENT

A. Where existing or new pavement is damaged from construction operations, cut to install new underground utilities, and where existing items are removed from paved areas:

1. Cut pavement with saw or other means to provide neat, straight joints.

2. Where existing pavement is damaged by removals, remove additional pavement to allow clean cuts.

3. Backfill and sufficiently compact removal area prior to placement of pavement.

4. Place pavement to match existing materials and thicknesses.

5. Immediately after placement, protect new pavement from mechanical damage.

3.06 ROOF PENETRATIONS

A. Make every effort to have any required roof penetrations performed by the roofing subcontractor which performs the warrantied roofing installation.

3.07 PROGRESS CLEANING

A. Maintain site in a clean and orderly condition and maintain work areas free of waste materials, debris, and rubbish.

B. Remove waste materials, debris, and rubbish from site weekly and legally dispose of off-site.

C. Remove debris and rubbish from pipe chases, plenums, crawl spaces, above suspended ceilings, and other closed and remote spaces prior to enclosing space.

D. Prior to surface finishing, broom and vacuum clean interior areas to eliminate dust.

E. Washing of concrete trucks and dumping of excess cementitious material on site is not allowed.

1. All such materials and contaminated soil shall be removed.

F. Soils and other site material contaminated by paint residues, oils, fuels, and other construction products shall be removed and replaced with equivalent soil or material.

G. Existing lawns, landscaped areas, and areas for future landscaping affected by construction operations shall be raked to remove stones, mortars, aggregates, and other construction debris in excess of 3/4 inch diameter.

END OF SECTION

SECTION 017500 - STARTING AND ADJUSTING

PART 1 – GENERAL

1.01 WORK INCLUDED

A. This section includes general procedures for starting, monitoring, and adjusting equipment items and complete systems.

1.02 RELEATED WORK

A. Section 014000 – Quality Requirements.

B. Section 017800 - Closeout Submittals (Operation and maintenance manuals).

C. Section 017900 - Demonstration and Training.

1.03 QUALITY ASSURANCE

A. Personnel conducting system start-up shall be knowledgeable of installation, operation, and maintenance of specific project equipment and systems.

PART 2- PRODUCTS

Not Used.

PART 3 – EXECUTION

3.01 PREPARATION

A. Prior to startup, inspect equipment and systems to ensure that:

1. Installation is in accordance with manufacturer's instructions.

2. No defective items have been installed and there are no loose connections.

3. Power supplies are correct voltage, phasing, and frequency.

4. Grounding and transient protection systems are properly installed.

5. Items have been properly lubricated, belts tensioned, and control sequence and other conditions which may cause damage have been addressed.

B. Verify that system wiring has been tested.

C. Verify that provisions have been made for safety of personnel.

3.02 STARTING OF SYSTEMS

A. Execute starting under supervision of responsible personnel in accordance with manufacturer's instructions.

B. Manufacturer's Representative: When specified in individual sections and in accordance with Section 014000 “Quality Requirements”, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment and system installation prior to startup and to supervise placing equipment and system into operation.

C. Adjustment: Monitor systems, verify performance and correct deficiencies.

1. Replace defective components and equipment.

2. Adjust equipment and systems for smooth and proper installation.

D. Submit written report in accordance with Section 013300 “Submittal Procedures” that equipment and systems have been properly installed and are functioning correctly.

3.03 SCHEDULING

A. Coordinate schedule for starting of systems and equipment to ensure proper sequencing.

B. Notify Architect seven (7) days prior to startup of each system.

C. Schedule demonstration and training sessions after equipment and systems have been completely installed, startup completed, and adjustments made.

END OF SECTION

SECTION 017700 - **CLOSEOUT PROCEDURES**

PART 1 – GENERAL

1.01 WORK INCLUDED

A. This section includes the following:

1. Substantial completion procedures.
2. Final completion procedures.
3. Final cleaning.
4. Final inspection.
1. Correction period inspection.

1.02 RELATED WORK

A. Section 007213 - General Conditions of the Contract.

1. Article 9.8: Substantial Completion.
2. Article 9.9: Partial occupancy.
3. Article 1.10: Final completion and final payment.

B. Section 012000 - Price and Payment Procedures.

C. Section 017300 - Execution Requirements.

D. Section 017800 - Closeout Submittals.

1.03 SUBSTANTIAL COMPLETION PROCEDURES

A. Prior to or in conjunction with submission of Notice of Substantial Completion, submit the following items specified in Section 017800 “Closeout Procedures”.

1. Project record documents.
2. Operation and maintenance data and manuals.
3. Warranties.
4. Certificates of inspection.
5. Extra materials.
6. Keys.

B. Comply with Section 007213 “General Conditions of the Contract”, Article 9.8 for issuance of Certificate of Substantial Completion. When Work is sufficiently complete:

1. Inspect Work and prepare comprehensive list (Punchlist) of items to be completed or corrected.
2. Perform final cleaning of portions of Work for which approval of substantial completion is being requested.
3. Submit 3 copies of Notice of Substantial Completion and comprehensive list of items to be completed to Architect.

a. Indicate portions of Work suitable for Owner occupancy and for which approval of substantial completion is being requested.

4. Submit Application for Payment in accordance with Section 012000 “Price and Payment Procedures”.

C. After inspection by Architect and issuance of Certificate of Substantial Completion, Owner will occupy all of Project for installation of equipment and furnishings under provisions stated in Certificate of Substantial Completion.

1.04 FINAL COMPLETION PROCEDURES

A. Perform final cleaning as specified herein.

B. Prior to or in conjunction with submission of Notice of Final Completion, submit the following items:

1. Contractor's Affidavit of Payment of Debts and Claims, AIA G706.

2. Contractor's Affidavit of Release of Liens, AIA G706A.

3. Consent of Surety Company to Final Payment, AIA G707.

4. Final Application for Payment as specified in Section 012000 “Price and Payment Procedures”.

a. Identify total adjusted Contract Sum, previous payments, and sum due.

C. Submit Notice of Final Completion certifying that Contract Documents have been reviewed, work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect's inspection.

D. Remove temporary utilities, controls, and facilities in accordance with Section 015000 “Temporary Facilities and Controls”.

E. Request final inspection by Architect.

1.05 FINAL CLEANING

A. Execute final cleaning utilizing qualified personnel employed by a professional cleaning service.

B. Clean interior and exterior work areas surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; and vacuum carpeted and soft surfaces.

C. Sanitize any new equipment and fixtures.

D. Clean or replace filters of any new operating equipment.

E. Clear debris from roof, gutters and drainage systems, ceiling spaces, plenums, storage areas, and interior spaces which are work areas for the project.

F. Clean site, sweep paved areas, and rake landscaped areas and other ground surfaces which are work areas for the project.

G. Remove waste and surplus materials, rubbish, and construction facilities from the site and dispose of legally.

1.06 FINAL INSPECTION

A. Architect and Owner's representative will make inspection within 7 days of receipt of Certification of Final Completion.

B. If Work is incomplete or defective:

1. Architect will provide Contractor written list of deficiencies.

2. Contractor shall immediately correct deficiencies and submit certification that Work is complete.

3. Architect and Owner's representative will re-inspect Work.

1.07 CORRECTION PERIOD INSPECTION

A. 30 days prior to end of one year correction period, schedule and attend a one year correction period inspection.

1. Appropriate subcontractors shall attend.

B. Coordinate time of inspection with Architect.

C. Representatives of Owner, Architect, and appropriate consultants will attend.

D. Correct deficiencies noted.

END OF SECTION

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SECTION 017800 - CLOSEOUT SUBMITTALS

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes procedures for preparing and submitting closeout submittals including the following:

1. Project Record Documents.
2. Operation and maintenance data.
3. Warranties.
4. Certificates of inspection.
5. Insurance information.
6. Extra materials.

1.02 RELATED SECTIONS

A. Section 007213 - General Conditions of the Contract:

1. Contractor's warranty that Work is of good quality and free from defects and confirms to contract Documents.
2. Commencement of warranties and correction period.
3. One year correction period for Contractor to correct defective work.

B. Section 012000 - Price and Payment Procedures.

C. Section 013300 - Submittal Procedures.

D. Section 017500 – Starting and Adjusting.

1.03 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents. Record actual revisions to work:

1. Contract Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed submittals.

B. Store Record Documents separate from documents used for construction.

1. Label "Project Record Documents".

C. Record information concurrent with construction progress.

1. Use erasable colored pencil.
2. Date all entries.
3. Call attention to entry by circling area affected.

D. Specifications: Legibly mark and record in each section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.

2. Product substitutions or alternates utilized.

3. Changes made by Addenda and modifications.

E. Contract Drawings and shop drawings: Legibly mark each item to record actual construction including:

1. Actual items of equipment and system components installed.

2. Actual locations of components and routing of piping and raceways.

3. Measured horizontal and vertical locations of underground water, sewer, irrigation, electrical, and other utilities and appurtenances, referenced to permanent surface improvements.

4. Measured locations of piping, raceways, and other items concealed in construction, referenced to visible and accessible features.

5. Field changes of dimension and detail.

6. Details not on original Contract Drawings.

F. Utilizing a copy of the original contract documents, the Contractor shall neatly transfer all project record information and label each drawing “Project Record Documents”.

1. Submit documents to the Architect prior to or in conjunction with submission of Notice of Substantial Completion.

2. The responsibility for the accuracy of all changes from the original contract documents shall be the responsibility of the Contractor.

a. The Architect shall determine if the documents are acceptable.

1.04 OPERATION AND MAINTENANCE DATA

A. Provide operation and maintenance data for the following:

1. Electrical systems specified in Divisions 26, 27 & 28.

2. Other items and systems as designated by Architect or requested by Owner.

B. Submission:

1. Submit data to Architect in one or more binders.

2. Submit for review one (1) draft copy thirty (30) days prior to need date or as otherwise specified.

a. This copy will be returned after review with the Architect's comments.

b. Revise content as required.

3. Once approved, submit five (5) copies of final operation and maintenance manuals.

a. All manuals shall be submitted prior to or in conjunction with Notice of Substantial Completion.

C. Contents:

1. Appropriate design criteria.

2. Equipment and parts lists.

3. Operating instructions.

4. Maintenance instruction for equipment and finishes.

5. Shop drawings and product data.

6. Testing, balancing, and other field quality reports.

7. Copies of warranties.

8. Other material and information as indicated in individual specification sections and as necessary for operation and maintenance by Owner's personnel.

D. Form:

1. Manuals shall be 8-1/2 inch x 11 inch text pages bound in three ring expansion binders with a hard durable plastic cover.

   a. All documents shall be originals unless otherwise noted.

2. Prepare binder covers with printed subject title of manual, title of project, date, and volume number when multiple binders are required.

   a. Printing shall be on face and spine.

3. Internally subdivide the binder contents with divider sheets with typed tab titles under reinforced plastic tabs.

   a. Place dividers at beginning of each chapter, part, section, and appendix.

4. Provide a table of contents for each volume.

5. Provide directory listing as appropriate with names, addresses, and telephone numbers of Architect, Contractor, subcontractors, equipment suppliers, and nearest service representatives.

1.05 WARRANTIES

A. Execute and assemble warranties from subcontractors, suppliers, and manufacturers.

B. Provide duplicate notarized copies of special and extended warranties as required by individual specifications sections.

C. Provide Table of Contents and assemble in three ring binder with a hard durable plastic cover.

1. Internally subdivide the binder contents with permanent page dividers, with tab titling clearly typed under reinforced laminated plastic tabs.

D. Submit warranties to Architect prior to or in conjunction with submission of Notice of Substantial Completion.

E. For items of work delayed beyond date of Substantial Completion, provide updated warranty submittal within ten (10) days after acceptance, listing date of acceptance as start of warranty period.

1.06 CERTIFICATES OF INSPECTION

A. For inspections throughout the construction period required by regulatory agencies, obtain and maintain certificates issued to show compliance.

B. Prior to Substantial Completion, obtain from authorities having jurisdiction a Certificate of Occupancy.

C. Assemble certificates in three ring binder with table of contents and submit to the Architect prior to or in conjunction with submission of Notice of Substantial Completion.

1.07 INSURANCE INFORMATION

A. Submit prior to or in conjunction with submission of Notice of Substantial Completion information regarding insurance including change over requirements and insurance extensions.

PART 2 - PRODUCTS

2.01 EXTRA MATERIALS

A. Provide spare parts and maintenance materials in quantities specified in individual sections.

B. Extra materials shall be produced by the same manufacturer of and compatible with the installed products.

C. Prior to or in conjunction with submission of Notice of Substantial Completion deliver extra materials in unopened containers to Owner's representative at designated storage area at project site and place in location as directed.

1. Obtain receipt from Owner's representative.

D. During one year correction period:

1. Extra materials may be used by Contractor to replace expendable and normally worn parts.

2. Extra materials used by Contractor for replacement of defective products shall be replaced at no additional cost to the Owner.

END OF SECTION

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.

2. Training in operation and maintenance of systems, subsystems, and equipment.

3. Demonstration and training videotapes.

1.02 RELATED SECTIONS

A. Section 013100 - Project Management and Coordination

B. Divisions 02 through 50 Sections for specific requirements for demonstration and training for products in those Sections.

1.03 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Photographer Qualifications: A professional photographer who is experienced photographing construction projects.

D. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination". Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.

2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.

3. Review required content of instruction.

4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.04 SUBMITTALS

A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module.

1. Include learning objective and outline for each training module.

2. At completion of training, submit two complete training manuals for Owner's use.

B. Qualification Data: For instructor

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

E. Demonstration and Training Videotapes: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.

b. Name and address of photographer.

c. Name of Architect.

d. Name of Contractor.

e. Date videotape was recorded.

f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

1.05 COORDINATION

A. Coordinate instruction schedule with Owner's operations.

1. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals.

1. Do not submit instruction program until operation and maintenance data has been reviewed and approved by the Architect.

PART 2 - PRODUCTS

2.01 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

1. Motorized doors.

2. Fire-protection systems, including fire alarm and fire-extinguishing systems.

3. Plumbing and Mechanical systems specified in Divisions 22 & 23.

4. Electrical systems specified in Divisions 26, 27 & 28.

5. Other items and systems as designated by the Architect or requested by the Owner.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria - Include the following:

a. System, subsystem, and equipment descriptions.

b. Performance and design criteria if Contractor is delegated design responsibility.

c. Operating standards.

d. Regulatory requirements.

e. Equipment function.

f. Operating characteristics.

g. Limiting conditions.

h. Performance curves.

2. Documentation - Review the following items in detail:

a. Emergency manuals.

b. Operations manuals.

c. Maintenance manuals.

d. Project Record Documents.

e. Identification systems.

f. Warranties and bonds.

g. Maintenance service agreements and similar continuing commitments.

3. Emergencies - Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.

b. Instructions on stopping.

c. Shutdown instructions for each type of emergency.

d. Operating instructions for conditions outside of normal operating limits.

e. Sequences for electric or electronic systems.

f. Special operating instructions and procedures.

4. Operations - Include the following, as applicable:

a. Startup procedures.

b. Equipment or system break-in procedures.

c. Routine and normal operating instructions.

d. Regulation and control procedures.

e. Control sequences.

f. Safety procedures.

g. Instructions on stopping.

h. Normal shutdown instructions.

i. Operating procedures for emergencies.

j. Operating procedures for system, subsystem, or equipment failure.

k. Seasonal and weekend operating instructions.

l. Required sequences for electric or electronic systems.

m. Special operating instructions and procedures.

5. Adjustments - Include the following:

    a. Alignments.

    b. Checking adjustments.

    c. Noise and vibration adjustments.

    d. Economy and efficiency adjustments.

6. Troubleshooting - Include the following:

    a. Diagnostic instructions.

    b. Test and inspection procedures.

7. Maintenance - Include the following:

    a. Inspection procedures.

    b. Types of cleaning agents to be used and methods of cleaning.

    c. List of cleaning agents and methods of cleaning detrimental to product.

    d. Procedures for routine cleaning.

    e. Procedures for preventive maintenance.

    f. Procedures for routine maintenance.

    g. Instruction on use of special tools.

8. Repairs - Include the following:

    a. Diagnosis instructions.

    b. Repair instructions.

    c. Disassembly, component removal, repair, replacement, and reassembly instructions.

    d. Instructions for identifying parts and components.

    e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.01 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module.

    1. Assemble training modules into a combined training manual.

B. Set up instructional equipment at instruction location.

3.02 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

    1. Owner will furnish an instructor to describe Owner's operational philosophy.

2. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed upon times.

1. For equipment that requires seasonal operation, provide similar instruction at start of each season.

2. Schedule training with Owner with at least fourteen days' advance notice.

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written performance-based test.

E. Cleanup: Collect used and leftover educational materials and give to the Owner.

1. Remove instructional equipment.

2. Restore systems and equipment to condition existing before initial training use.

3.03 DEMONSTRATION AND TRAINING VIDEOTAPES

A. General: Engage a qualified commercial photographer to record demonstration and training videotapes.

1. Record each training module separately.

2. At beginning of each training module, record each chart containing learning objective and lesson outline.

3. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

B. Recording Format: Provide high-quality DVD (1920×1080, 1080P).

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training.

1. Display continuous running time.

END OF SECTION

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SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formwork for cast-in-place concrete.
2. Shoring, bracing, and anchorage.
3. Form accessories.
4. Form stripping.

1.2 PRODUCT DATA SUBMITTALS:

A. Void Forms: Manufacture's information including installation requirements.
B. Reinforcing Chairs: Manufacture's information including installation requirements.
C. Concrete Shores: Manufacture's data including load capacity and installation requirements.

1.3 QUALITY ASSURANCE

A. Perform Work according to ACI 347 and ACI 301.
B. For wood products furnished for Work of this Section, comply with AF&PA.
C. Sub Section

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials off ground in ventilated and protected manner to prevent deterioration from moisture.
B. Deliver materials to site with labels identifying product name and manufacturer.
C. Store concrete forms in accordance with manufacturer's requirements.
D. Store concrete forms in clean, dry area, under cover, and protected from heat and moisture.
E. Do not dent, scratch, or damage interior of forms. Do not drop forms.

PART 2 - PRODUCTS

2.1 WOOD FORM MATERIALS

A. Plywood Forms:
B. 1. Application: Exposed finish concrete.
C. 2. Description:

1. Comply with APA/EWA PS 1.
2. Panels: Full size, 4 by 8 feet.
3. Label each panel with grade trademark of APA/EWA.

D. Plywood for Surfaces to Receive Membrane Waterproofing:

1. Minimum Thickness: 5/8 inch.
2. Grade: APA/EWA "B-B Plyform Structural I Exterior."
3. Comply with APA/EWA PS 1.
4. Grade: APA/EWA "B-B Plyform Structural I Exterior."

E. Plywood with "Smooth Finish" Indicated on Drawings:

1. Minimum Thickness: 3/4 inch.
2. Grade: APA/EWA "HD Overlay Plyform Structural I Exterior."

2.2 PREFABRICATED FORMS

A. Preformed Steel Forms:

1. Description: Matched, tightly fitted, and stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
2. Minimum Thickness: 16 gage.

B. FRP Forms:

1. Matched, tightly fitted, and stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

C. Pan:

1. Material: Steel.
2. Configuration: Size and profile as required.

D. Tubular Column:

1. Description: Round spirally wound laminated fiber.
2. Surface Treatment: Release agent, non-reusable.
3. Sizes: As indicated on Drawings.

E. Steel Forms:

1. Description: Sheet steel, suitably reinforced.
2. Design: For particular use as indicated on Drawings.

2.3 VOID FORMS

A. Corrugated Paper Void Forms

1. Description: Corrugated paper forms designed to support concrete until it is self-supporting then create a void.
2. Moisture-resistant treated paper faces; biodegradable.
3. Structurally sufficient to support weight of wet concrete mix until initial set.
4. Size and Shape as shown on the drawings.

2.4 FORMWORK ACCESSORIES

A. Form Ties:
1. Type: Removable or Snap off cone type.
2. Material: Galvanized.
3. Free of defects capable of leaving holes no larger than one inches in concrete surface.

B. Spreaders:
1. Description: Standard, non-corrosive metal-form clamp assembly, of type acting as spreaders and leaving no metal within 1-1/2 inches of concrete face.
2. Wire ties, wood spreaders, or through bolts are not permitted.

C. Form Release Agent:
1. Description: Colorless mineral oil that will not stain concrete or absorb moisture [or impair natural bonding or color characteristics of coating intended for use on concrete].

D. Corners:
1. Type: Chamfer wood strip.
2. Size: 3/4 inches by ¾ inches.
3. Lengths: Maximum possible.

2.5 VAPOR BARRIER

A. Type: Polyethylene Sheets
1. Thickness as specified on the drawings.
2. ASTM 1745 with a water vaper permeance less than 0.030 Perms.

PART 3 - EXECUTION

3.1 EXAMINATIONS

A. Verify lines, levels, and centers before proceeding with formwork.
B. Verify that dimensions agree with Drawings.
C. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from Engineer before proceeding.

3.2 INSTALLATION

A. Earth Forms:
1. Trench earth forms at least two inches wider than footing widths indicated on Drawings.
2. Construct wood edge strips at top of each side of trench to secure reinforcing and to prevent trench from sloughing.

B. Formwork:
1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
2. Positioning:
a. Verify horizontal and vertical positions of forms.
b. Correct misaligned or misplaced forms before placing concrete.
3. Complete wedging and bracing before placing concrete.
4. Erect formwork, shoring, and bracing to achieve design requirements according to ACI 301 and ACI 347.
5. Stripping:
a. Arrange and assemble formwork to permit dismantling and stripping.
b. Permit removal of remaining principal shores.
6. Obtain approval of Architect/Engineer before framing openings in structural members not indicated on Drawings.
7. Install chamfer strips on external corners of beams, joists and columns.
8. Install void forms according to manufacturer instructions.
9. Do not patch formwork.
10. Leave forms in place for minimum number of days according to ACI 347.

C. Form Removal:

1. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads, and removal has been approved by Architect/Engineer.
2. Form Release Agent:
    a. Apply according to manufacturer instructions.
    b. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
    c. Do not apply form release agent if concrete surfaces are indicated to receive special finishes or applied coverings that may be affected by agent.
    d. Soak inside surfaces of untreated forms with clean water, and keep surfaces coated prior to placement of concrete.
3. Form Cleaning:
    a. Clean formed cavities of debris prior to placing concrete.
    b. Flush with water or use compressed air to remove remaining foreign matter.
    c. During cold weather, remove ice and snow from within forms without using de-icing salts, and use compressed air or other dry method to remove foreign matter.
4. Reuse and Coating of Forms:
    a. Thoroughly clean forms and reapply form coating before each reuse.
    b. For exposed Work, do not reuse forms with damaged faces or edges.
    c. Apply form coating to forms according to manufacturer instructions.
    d. Do not coat forms for concrete indicated to receive "scored finish."
    e. Apply form coatings before placing reinforcing steel.

D. Form Anchors and Hangers:
1. Do not use anchors and hangers leaving exposed metal at concrete surface.
2. Symmetrically arrange hangers supporting forms from structural-steel members to minimize twisting or rotation of member.
3. Penetration of structural-steel members is not permitted.

E. Inserts, Embedded Parts, and Openings:
1. Install formed openings for items to be embedded in or passing through concrete Work.
2. Locate and set in place items required to be cast directly into concrete.
3. Provide temporary ports or openings at bottom of formwork as required to facilitate cleaning and inspection.
4. Close temporary openings with tight-fitting panels, flush with inside face of forms, and neatly fitted such that joints will not be apparent in exposed concrete surfaces.

F. Form Ties:
1. Provide sufficient strength and quantity to prevent spreading of forms.
2. Leave inner rods in concrete when forms are stripped.
3. Space form ties equidistant, symmetrical, and aligned vertically and horizontally unless indicated otherwise on Drawings.

G. Embedded Items:
1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, waterstops, and other features.
2. Do not embed wood or uncoated aluminum in concrete.
3. Obtain installation and setting information for embedded items furnished under other Sections.
4. Securely anchor embedded items in correct location and alignment prior to placing concrete.

H. Openings for Items Passing through Concrete:
1. Frame openings in concrete where indicated on Drawings.
2. Establish exact locations, sizes, and other conditions required for openings and attachment of Work specified under other Sections.
3. Coordinate Work to avoid cutting and patching of concrete after placement.
4. Perform cutting and repairing of concrete required as result of failure to provide required openings.

3.3 TOLERANCES

A. Construct formwork to maintain tolerances according to ACI 301.

3.4 FIELD QUALITY CONTROL

A. Inspection:
1. Inspect erected formwork, shoring, and bracing to ensure that Work complies with formwork design and that supports, fastenings, wedges, ties, and items are secure.

2. Notify Engineer after placement of reinforcing steel in forms but prior to placing concrete.
3. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

SECTION 033500 – CONCRETE SEALERS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes non-slip aggregate, clear concrete sealer and hardener as specified herein.

1.02 RELATED SECTIONS

A. Section 033000 - Cast-in-Place Concrete.

1.03 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”.

1. Product Data: Submit product data, including chemical properties and percentage of solids, for each product.

2. Manufacturer’s Instructions: Submit application instructions, including surface preparation and application rates for each type of substrate, methods, and techniques.

1.04 QUALITY ASSURANCE

A. Applicator’s Qualifications: Company specializing in performing work of this Section with 3 years minimum experience.

B. Certifications:

1. Submit manufacturer’s certificate stating proper amount of materials was ordered and shipped to Project.

2. Submit sealer manufacturer’s certificate indicating review of Project conditions and intent to issue extended warranty.

a. Submittal of certificate is required prior to application of materials.

C. Low Emitting Materials: The volatile organic compound (VOC) content of clear wood finishes, floor coatings, stains, sealers, and shellacs shall not exceed the limits defined in Rule #1113, “Architectural Coatings” of SCAQMD.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000 “Product Requirements”.

B. Store products above 50 degrees F, but no greater than 85 degrees F, unless otherwise recommended by manufacturer.

1.06 PROJECT CONDITIONS

A. Do not apply materials when ambient or substrate surface temperatures are below 40 degrees F or higher than 100 degrees F.

B. Do not apply during inclement weather or when forecasted conditions will not permit compliance with manufacturer’s printed instructions.

C. Provide mechanical ventilation during and after application to dissipate fumes if natural ventilation is insufficient.

1.07 SCHEDULING

A. Schedule application of products at proper time intervals after concrete finishing and curing operations.

B. Maintain proper moisture content of concrete before, during, and after application of specified products.

1.08 WARRANTY

A. Comply with provisions of Section 017800 “Closeout Submittals”.

B. Warrant applied sealer system to be free of defects related to material deficiency and workmanship for 5 years.

C. Warranty period begins at date of Substantial Completion.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Provide materials, equipment, and personnel required to achieve specified finish.

2.02 NON-SLIP AGGREGATE

A. Dry Shake-On Non-Slip Aggregate:

1. Fused aluminum oxide grit or crushed emery or silica quartz, or blend thereof.

2. Factory-graded, rustproof and non-glazing.

B. Acceptable products are as follows:

1. Non-Slip - Euclid Chemical Company; Cleveland, OH.

2. Grip-It or Grip-It AO - L&M Construction Chemicals, Inc.; Omaha, NE.

3. Frictex NS - Sonneborn Building Products; USA

4. Other products as submitted and approved in accordance with Section 016200 “Product Options”.

2.03 CLEAR CONCRETE SEALER

A. Water Based Acrylic Sealing Compounds:

1. ASTM C1315, Type I, Class A, VOC compliant, free of natural or petroleum waxes.

a. Dries clear with satin sheen.

2. Compatible with substrate, chemical hardener, and subsequent toppings and coatings.

B. Acceptable products for liquid membrane-forming sealer are as follows:

1. Super Diamond Clear VOX - Euclid Chemical Company; Cleveland, OH.

2. Lumiseal WB Plus - L&M Construction Chemicals, Inc.; Omaha, NE.

3. VOCOMP-30 - W. R. Meadows, Inc.; Elgin, IL.

4. Other products as submitted and approved in accordance with Section 016200 “Product Options”.

2.04 HARDENER

A. Chemical hardeners shall be compatible with concrete substrate and concrete sealer.

B. Acceptable products are as follows:

1. Ashford Formula – Curecrete Chemical Company; Springville, UT

2. Lithium Hardener – Prosoco, Inc.; Lawrence, KS

3. Other products as submitted and approved in accordance with Section 016200 “Product Options”.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify that damage and defects in concrete surface have been repaired as specified in Section 033000 and accepted by Architect.

C. Verify that form ties have been broken off below concrete surface and plastic cones, fins and burrs have been removed.

D. Verify that form tie holes have been patched, unless specifically indicated to be left unfilled.

E. Verify that surfaces are clean, dry, dust free, and free of efflorescence, oil or other matter detrimental to sealer application.

F. Verify that joint sealant work in adjoining surfaces is complete prior to applications of sealers.

1. Delay application until sealants have cured.

G. Ensure concrete has cured for time period required by manufacturer of product to be applied before application of products.

3.02 PREPARATION

A. Provide protection as necessary to protect adjacent materials and surfaces from dirt, dust, spillage, overspray, and physical damage.

B. Prevent migration of airborne materials by use of tarpaulins, wind breaks, and similar containment devices.

C. Maintain control of concrete chips, dust and debris.

D. Collect water to prevent damage to adjacent surfaces.

E. Remove loose particles, foreign matter, and oil by method which will not affect sealer application.

F. Prepare surfaces in accordance with manufacturer’s directions.

3.03 APPLICATION

A. General: Provide finishes to match approved samples.

B. Non-slip Aggregate:

1. After float finishing, and before starting trowel finish, uniformly spread 25 pounds of dampened non-slip aggregate per 100 square foot of surface.

a. Tamp aggregate flush with surface but do not force below surface.

2. After curing, lightly work surface with steel wire brush, or an abrasive stone, and water to expose non-slip aggregate.

C. Clear Concrete Sealer:

1. Apply sealer using a low-pressure airless sprayer in a single coat at 400 to 600 ft/gal coverage unless a greater amount is recommended by the manufacturer to obtain penetration and full coverage.

2. Do not allow flooding or puddling of material on surface.

3. Do not dilute or alter material as packaged.

D. Hardener: Apply approved materials in accordance with manufacturer's written installation instructions.

3.04 ADJUSTING AND CLEANING

A. Repair or replace adjacent Work which has been damaged by applications and installations of Work of this section.

B. Clean-up and remove debris daily.

C. Clean spillage, overspray, or drift from adjacent surfaces.

1. Remove immediately in accordance with the manufacturer's instructions.

3.05 PROTECTION

A. Protect finished work in accordance with Section 017300 "Execution Requirements".

B. Protect finished concrete surfaces from damage by construction equipment, operations and from adverse weather conditions.

3.06 SCHEDULE

A. Provide specified materials at the following locations:

1. Non-slip Aggregate: Non-slip aggregate at all concrete sealer locations.

2. Clear Concrete Sealer: Sealed concrete locations indicated on Drawings.

3. Hardener: Exposed concrete floor scheduled to receive sealer.

END OF SECTION

SECTION 034500 – ARCHITECTURAL PRECAST CONCRETE

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following types of architectural precast concrete as indicated on the drawings and specified herein:

1. Precast Concrete Caps and Sills.

1.02 RELATED SECTIONS

A. Section 042200 – Concrete Masonry Unit Veneer.

1.03 REFERENCES

A. ASTM C 33: Standard Specification for Concrete Aggregate.

B. ASTM C 260: Standard Specification for Air-Entraining Admixtures for Concrete.

C. ASTM C 150: Standard Specification for Portland Cement.

D. ASTM C 979: Standard Specification for Integrally Colored Concrete.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Manufacturer’s product data and installation instructions for each manufactured product specified.

2. Shop Drawings indicating layout and locations, profiles, dimensions, and anchoring conditions and details.

3. Manufacturer’s standard size samples indicating the manufacturer’s full range of colors and textures for the Architect’s selection.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Fabricator shall have a minimum of 5 years of successful experience in the fabrication of architectural precast concrete units.

1. Fabricator shall have sufficient production capacity to produce, transport, and deliver the required units without causing delay in the project.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Products shall be packaged to protect precast concrete units and finish against damage during transport.

B. Deliver precast concrete units to the project site in such quantities and at such times to assure continuity of installation.

1.07 PROJECT CONDITIONS

A. Verify dimensions for precast concrete units by field measurements and indicate measurements on final shop drawings.

1. Do not commence fabrication until field measurements have been confirmed.

B. Maintain the design concept indicated on drawings for precast concrete units without increasing or decreasing sizes of units or altering profiles and alignment.

1. Design modifications to precast concrete units shall only be made as necessary to meet field conditions and to ensure proper fitting of the Work and only as acceptable to the Architect.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Concrete Designs Inc. – Tucson, AZ; 800.279.2278

2. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 CONCRETE MATERIALS

A. Portland Cement: Type 1 portland cement gray or lehigh white complying with ASTM C 150.

1. Use only one brand, type and supply source of cement throughout the project.

B. Aggregate: Coarse and fine sand and gravel which durable, selected and graded; free of material that causes staining or reacting with cement, complying with ASTM C 33.

C. Pigments: Nonfading, resistant to lime and other alkalies, complying with ASTM C 979.

D. Water: Drinkable, free from foreign materials in amounts harmful to concrete and embedded steel.

E. Air-Entraining Admixture: Utilize standard mix designs incorporating admixtures which facilitate the workability, curing and strength of the mix, complying with ASTM C 260.

F. Compressive Strength: 3,500 psi minimum to 5,000 psi maximum at 28 days.

2.03 ACCESSORIES

A. Reinforcing: Manufacturer’s standard type and size used in certain product designs to ensure safe handling.

B. Corrugated Wall Ties: 7/8 inch x 7 inch, 22 gauge mill galvanized steel.

1. Included in moldings as the mechanical fastener.

C. Threaded Inserts: Plastic inserts shall be included in very large castings such as large moldings, columns, and stackable column components.

1. Inserts shall be for mechanical ties and not for lifting purposes.

D. Adhesives: Latex modified mortar used on a stable substrate in conjunction with the mechanical fastener.

1. White cement may be used to adjust the greenish color created by using the latex mortar.

2. Premium grade construction adhesive which comes in tubes, as recommended by the precast concrete unit manufacturer, shall be used for bonding columns and on flat surfaces where latex mortar cannot be used.

2.04 FABRICATION

A. General: Fabricate precast concrete units complying with manufacturing and testing procedures, quality control recommendations, and following dimensional tolerances.

B. Molds: Accurately construct molds mortar-tight and of sufficient strength to withstand pressures due to concrete placing operations and temperature changes.

1. Maintain mold work to provide completed precast concrete units of shapes, lines and dimensions indicated on drawings within specified fabrication tolerances.

C. Dimensional Tolerances of Finished Units: Architectural precast concrete, being tapered by design, is measured for length, width and thickness at the surface from which the mold is loaded maintaining 1/16 inch plus or minus.

1. Overall height and width shall be measured at the face adjacent to the mold at the time of casting.

D. Surface Finish: Fabricate precast concrete units and provide the exposed surface finish as selected by the Architect from the following:

1. Traditional: Smooth, relatively void free texture.

2. Modern: Less voids than traditional but not typically void free.

3. Champagne: Lightly etched texture.

4. Sonoran: Heavily etched texture exposing more aggregate.

5. Antique: High irregular, rusticated finish.

6. Color: As selected by the Architect from the manufacturer's full range of colors.

PART 3 – EXECUTION

3.01 PREPARATION

A. Install clips, hangers and other accessories required for installation of precast concrete units to supporting members and backup materials.

3.02 INSTALLATION

A. Install precast concrete units in accordance with the manufacturer's installation instructions.

B. Install units plumb, level and in alignment.

C. Provide temporary supports and bracing as required to maintain position, stability and alignment as units are being permanently anchored.

D. Maintain horizontal and vertical joint alignment and uniform joint width as installation progresses.

E. Anchor units in final position by bolting, welding, grouting or as otherwise recommended by the manufacturer.

F. Remove temporary shims, wedges and spacers as soon as possible after anchoring and grouting are completed.

3.03 ADJUSTING AND CLEANING

A. Remove and replace precast concrete units which are loose, chipped, cracked, broken or otherwise damaged.

1. Provide new units and install in a manner to eliminate evidence of replacement.

B. Clean exposed facings to remove dirt and stains on units after installation and completion of joint treatments.

C. Protect other work from damage due to cleaning operations.

D. Follow manufacturer's cleaning recommendations and do not use cleaning materials or processes that could change the character of exposed concrete finishes.

END OF SECTION

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SECTION 042200 – CONCRETE MASONRY UNIT VENEER

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section specifies concrete masonry unit veneer including the following:

1. Concrete Masonry Unit Veneer.
2. Reinforcement.
3. Mortar and Grout.
4. Accessories.

1.02 RELATED SECTIONS

A. Section 072500 – Weather Barriers

B. Section 092900 – Gypsum Board (exterior sheathing)

1.03 REFERENCES

A. ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement.

B. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

C. ASTM C150 - Portland Cement.

D. ASTM C207 - Hydrated Lime for Masonry Purposes.

E. ASTM C270 - Mortar for Unit Masonry.

F. ASTM C404 - Aggregate for Masonry Grout.

G. ASTM C476 - Grout for Masonry.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”.

1. Product data and test reports showing compliance with specified requirements.
2. Manufacturer’s written installation and cleaning instructions.
3 Shop drawings indicating typical and special installations and attachments.
4 Block samples to illustrate color, including extremes of color range, and texture.

B. Field Samples:

1. In accordance with Section 014000 “Quality Requirements”, construct field sample wall panels to illustrate cmu veneer, coursing, and mortar joints.
2. Construct one sample for each combination of units.
3. Minimum size: 6 feet x 6 feet.
4. Locate as field conditions allow and acceptable to the Architect.
5. Unacceptable samples shall be removed when rejected by the Architect.

1.05 QUALITY ASSURANCE

A. Obtain masonry units from a single manufacturer.

B. A masonry supervisor, who holds a current Master Certification from the New Mexico Masonry Institute, shall be on-site whenever masonry is being installed.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle masonry units in manner to avoid chipping, breakage, and contact with contaminating materials.

B. Protect reinforcement from rusting.

C. Store cementitious materials in dry, weathertight enclosures or coverings.

D. Do not allow masonry units to sit in standing water.

1.07 PROJECT CONDITIONS

A. Maintain materials and surrounding air temperature within the following limits prior to, during, and 48 hours after completion of masonry work:

1. Minimum: 40 degrees F.

2. Maximum: 90 degrees F.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering concrete masonry unit veneer products which may be incorporated in the work include the following:

1 Del Norte Masonry Products, Inc. – El Paso, TX; 915.584.4453

2. Featherlite – El Paso, TX; 915.859.9171

3. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

a. Architect reserves the right to reject proposed substitutions on the basis of color and surface texture even when materials and fabrication are equivalent.

2.02 CONCRETE MASONRY UNIT VENEER

A. Type: Solid non-load bearing, integrally colored concrete masonry units, ASTM C90, Grade N, Type I moisture controlled.

1. Minimum density: 125 PSI.

2. Minimum compressive strength: 1,000 PSI.

3. Maximum linear shrinkage: 0.30 percent.

4. Maximum moisture content: 25 percent of total absorption.

B. Units and nominal modular sizes (width by height by length):

1. CMU Veneer: Split-Face, 4 inch x 8 inch x 16 inch units.

a Provide special shapes and sizes as required for 90-degree corners and other conditions shown on Drawings.

2. Concrete Cap / Sill Block: Precast concrete cap size as indicated on drawing.

C. Integral color for exposed units: Selected by Architect from manufacturer's full range.

D. Water repellency: Fabricate units with integral, liquid, polymeric water repellant to minimize efflorescence.

1. Dry Block as manufactured by W. R. Grace Construction Products – Cambridge, MA; 800.558.7066.

E. Aggregate: Sand, gravel, colored limestone, scoria, and pumice.

2.03 REINFORCEMENT

A. Joint reinforcement: Ladder type, cold-drawn steel conforming to ASTM A82, 9 gage side rods with 9 gage cross rods.

B. Wall ties:

1. Corrugated formed sheet metal, adjustable, hot dipped galvanized conforming to ASTM A123.

2. Formed steel wire, adjustable, eye and pintle type, hot dipped galvanized conforming to ASTM A123.

2.04 MORTAR AND GROUT

A. Materials:

1. Portland cement: ASTM C150, Type I.

2. Lime: ASTM C270, Type S.

3. Grout aggregate: ASTM C404.

4. Water: Clean and potable.

B. Mortar: ASTM C270, 1900 psi Type S using the Property Method.

1. Use color additive to match concrete masonry unit.

C. Thoroughly mix ingredients in quantities needed for immediate use in accordance with ASTM C270 and ASTM C476.

D. Do not use anti-freeze compounds and other admixtures.

E. Use mortar within two hours after mixing.

2.05 ACCESSORIES

A. Sheet flashing: Provide EPDM sheet flashing which is to remain flexible and waterproof in concealed masonry applications.

1. Thickness shall be 30 mils.

2. Color shall be black.

3. Adhesive for flashing shall be as recommended by the flashing material manufacturer for the required application.

B. Control and expansion joints: Preformed rubber; vertical joints shall be 1/4 inch to ½ inch wide and approximately 3/4 inch deep.

1. Thickness and depth shall be suitable for size of joint required.

2. Sealant color shall be as selected by the Architect.

C. Weep holes: Mortar free, open, partial (approximately 3” minimum) head joint weeps.

1. Tube or chord weeps are not acceptable.

D. Masonry Cleaner: Provide manufacturer's standard strength general purpose cleaner designed for new masonry surfaces.

1. Cleaner shall be expressly approved for masonry units which are to be cleaned.

2. Chemical or harsh physical cleaning will not be permitted as this can open pores of material.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine veneer backup, substrate, and underlayment to ensure a completed installation ready to receive masonry veneer.

3.02 PREPARATION

A. Verify anchors, hollow metal frames, and other built-in items are available, properly sized, and accurately located.

B. Establish lines for levels and coursing indicated.

1. Protect from displacement.

C. Layout work in advance to achieve accurate spacing, uniform joints, and to assess offsets, returns, openings, and control joint locations.

3.03 SHEET FLASHING INSTALLATION

A. At double wythe masonry walls, extend flashing from the exterior face of the outer wythe, through the outer wythe, turned up a minimum of 8 inches, and through the inner wythe to within ½ inch of the interior face of the wall.

B. At masonry veneer and stud framed walls, extend flashing up face of sheathing 8 inches minimum and behind weather barrier.

C. At lintels and shelf angles, extend flashing a minimum of 8 inches into masonry at each end.

D. Flashings shall terminate with end dams formed in accordance with the manufacturer’s written installation instructions.

3.04 LAYING MASONRY UNITS

A. Use full-size units without cutting where possible.
1. Do not lay wet or frozen masonry units.

B. Uniformity:

1. Lay veneer plumb and true.

2. Maintain masonry courses to uniform dimension.

3. Form vertical and horizontal joints of uniform thickness.

C. Coursing: Lay in stacked bond pattern with one unit and one mortar joint to equal 8 inches.

D. Adjustments: Do not shift or tap masonry units after mortar has achieved initial set.

1. If adjustments are required or units are disturbed after laying; remove, clean, and relay with fresh mortar.

E. Interlock intersections and external corners.

3.05 CUTTING

A. Perform site cutting of masonry units with power masonry saw to provide straight, clean, unchipped edges.

1. Prevent broken corners and edges.

B. Cut and fit for pipes, conduit, sleeves, and other penetrations.

1. Avoid the use of less-than half-size units.

3.06 TIES AND REINFORCEMENT

A. Attach masonry veneer to back-up with ties in accordance with the anchor manufacturer's recommendations.

1. Space masonry veneer ties at 16 inches maximum horizontally and vertically.

2. Attach to studs with self-tapping screws.

a. Ensure screws penetrate stud 1/2 inch minimum.

3. Embed ties at least 2 inches in horizontal joint of facing and masonry backing.

4. Provide additional ties at openings as follows:

a. Maximum spacing around the perimeter shall be 24 inches.

b. Install ties within 12 inches of each side of the opening.

B. Horizontal joint reinforcement

1. Maximum spacing: 16 inches.

2. Lap ends 6 inches minimum.

3. Do not continue horizontal joint reinforcement through control and expansion joints.

3.07 MORTAR AND GROUT

A. Lay masonry units with full mortar coverage at horizontal and vertical joints.

1. Tooled mortar joints shall be "Raked" type joints.

B. Keep air spaces and cavities clean of mortar droppings.

1. As the masonry is laid, provide temporary wood or foam strips resting on the veneer ties to catch mortar droppings.

2. As the wall is laid up, carefully remove the temporary strips and mortar in the cavity.

3. Mortar nets may be required by the Architect if the Contractor persists in allowing mortar to enter the cavity.

C. Remove excess mortar from surfaces as work progresses.

1. Do not allow mortar to harden on exposed surfaces.

3.08 WEEP HOLES

A. Provide weep joints in the vertical joints of the exterior wythe of the masonry veneer.

B. Install weeps in accordance with NCMA recommendations.

1. Locate weepholes above grade, ledges, flashing, bond beams, solid fill, or other water-stop locations.

2. Space weep joints at 32 inches on center horizontally maximum.

3. Weep holes shall be located as masonry veneer is laid, and not drilled after completion, obstructing weep drainage.

4. Do not seal joint where thru-wall flashing terminates at exterior face of the wall, obstructing weep drainage.

3.09 CONTROL JOINTS

A. Provide continuous vertical control joints as indicated on drawings, specified herein, and as otherwise recommended by the masonry unit manufacturer.

1. Vertical joints shall be within 4 feet of the corner on one side and within 8 feet to 12 feet of the corner on the other side.

a. Vertical joints shall be spaced on 20 feet to 25 feet centers.

b. Receive the Architect's approval prior to providing vertical control joints at locations other than those indicated on drawings.

2. The mortar shall be omitted from the vertical joints and the control joint placed as the wall is built.

a. After the wall is grouted, cured, and cleaned, install the backing rod (or backup material) and flexible sealant.

b. Place and tool sealant to match the depth of a typical joint.

B. Locate horizontal pressure-relieving joints beneath shelf angles supporting masonry veneer.

C. Provide sealant joints around the outside perimeter of exterior doors, window frames, and other wall openings.

3.10 FIELD QUALITY CONTROL

A. All concealed flashings are to be inspected, while visible, by the Architect and approval is required before work may continue.

B. Mortar and grout samples for testing shall be taken at least once a week while the installation of masonry veneer is in progress.

1. The samples shall be taken in accordance with ASTM C 270 and ASTM C 476 as applicable.

C. Masonry surfaces shall be free of imperfections which detract from the overall appearance when viewed from a distance of 5 feet at 90 degrees normal to the surface.

3.11 TOLERANCES

A. Maximum variation from unit to adjacent unit: 1/32 inch.

B. Maximum variation from plane of wall: 1/4 inch in 10 feet with maximum of 1/2 inch in 20 feet or more.

C. Maximum variation from plumb: 1/4 inch per story non-cumulative with 1/2 inch maximum in two stories or more.

D. Maximum variation from level coursing: 1/8 inch in 3 feet, 1/4 inch in 10 feet, and 1/2 inch in 30 feet.

E. Maximum variation of joint thickness: 1/8 inch in 3 feet.

3.12 ADJUSTING AND CLEANING

A. Remove and replace masonry units which are loose, broken, or otherwise damaged.

1. Provide new units to match adjacent units and install in fresh mortar to eliminate evidence of replacement.

B. Replace defective mortar to match adjacent work.

C. Allow walls to air dry then brush off mortar, grout, and efflorescence with stiff fiber brush.

1. Do not use metallic tools for cleaning.

D. Clean masonry unit surfaces with general purpose acidic type cleaning solution as recommended by manufacturer.

1. Follow manufacturer's cleaning instructions.

END OF SECTION

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SECTION 055000 - METAL FABRICATIONS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following:

1. Shop fabricated steel items.

2. Related attachment hardware.

1.02 RELATED SECTIONS

A. Section 099100 – Painting

1.03 REFERENCES

A. ANSI A14.3: American National Standard for Ladders – Fixed - Safety Requirements.

B. ASTM A 36/A 36M: Standard Specification for Carbon Structural Steel.

C. ASTM A 53/A 53M: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

D. ASTM A 283/A 283M: Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

E. ASTM A 307: Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

F. ASTM A 500: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

G. AWS A2.4: Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society.

H. AWS D1.1/D1.1M: Structural Welding Code - Steel; American Welding Society.

I. SSPC-Paint 15: Steel Joist Shop Primer; Society for Protective Coatings.

J. SSPC-SP 2: Hand Tool Cleaning; Society for Protective Coatings.

1.04 SUBMITTALS

A. Submit in accordance with Section 013300 - Submittal Procedures:

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Steel Sections: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500, Grade B cold-formed structural tubing.

C. Plates: ASTM A 283.

D. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.

E. Bolts, Nuts and Washers: ASTM A307, plain.

F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATED ITEMS

A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.

1. Side Rails: 3 x ¼ inch members spaced at 20 inches apart.

2. Rungs: one inch diameter steel pipe spaced 12 inches on center

3. Space rungs 7 inches from wall surface.

B. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

1. 6 inch O.D. pipe size, unless noted otherwise.

C. Miscellaneous Light Steel Framing: As detailed; prime paint finish.

1. Light steel framing, bracing, supports, clip angles, lintels, shelf angles, plates, etc., shall be of such shapes and sizes as indicated on the drawings or as required for the project condition and shall be provided with all necessary supports and reinforcing such as hangers, braces, struts, clip angles, anchors, bolts, nuts, welds, etc., as required to properly support and rigidly fasten and anchor in place to steel, concrete, masonry and all other connecting and adjoining work.

2. All light steel framing steel shall be furnished and erected in accordance with the applicable requirements of the "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" by the American Institute of Steel Construction and as specified herein.

D. Sleeves in Concrete Walls and Slabs

1. Sleeves through concrete walls shall be of Schedule 40 steel pipe with I.D. 2 inches larger than O.D. of pipe or conduit (including any insulation) to be accommodated.

2. Sleeves shall project one-half inch on each side of finished wall. Provide rectangular one-quarter inch steel plate collar at center, continuously welded to the perimeter of the sleeve, and 6 inches wider than the O.D.

3. Slots in slabs shall be 12 gauge steel sheet, galvanized, of dimensions indicated, with strap anchors welded in place not more than 12 inches on center.

2.03 FABRICATION

A. Fit and shop assemble items in largest practical sections for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush and hairline. Ease exposed edges to small uniform radius.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts, unobtrusively located, consistent with design of component, except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

2.05 FINISHES

A. Prime paint all steel items.

1. Exceptions: Do not prime surfaces in direct contact with concrete or where field welding is required.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Powder coat color as selected by the Architect.

PART 3 – EXECUTION

3.01 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.02 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated on shop drawings.

D. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Obtain the Architect's approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions and surfaces not shop primed, except surfaces to be in contact with concrete.

3.03 TOLERANCES

A. Maximum Variation from Plumb: ¼ inch per story, non-cumulative.

B. Maximum Offset from True Alignment: ¼ inch.

C. Maximum Out-of-Position: ¼ inch.

END OF SECTION

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SECTION 061000 – ROUGH CARPENTRY

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contactor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following as specified herein and shown on the drawings:

1. Framing and Blocking.
2. Plywood.
3. Wood Treatment.
4. Accessories.

1.02 RELATED SECTIONS

A. Section 033000 – Cast In Place Concrete

B. Section 075400 – Thermoplastic Membrane Roofing

1.03 REFERENCES

A. American Forest and Paper Association:

1. AFPA T11: Manual for Wood Frame Construction.
2. AFPA T901: National Design Specifications for Wood Construction.

B. American Plywood Association (APA):

1. APA E30A: Design / Construction Guide – Residential and Commercial.
2. APA PS-1: Construction and Industrial Plywood (ANSI A199.1).

C. American Wood Preservers Association:

1. AWPA C1-86: Pressure Treatment (General Requirements).
2. AWPA C9-85: Pressure Treatment – Plywood.
3. AWPA P5-86: Water Borne Preservative.
4. AWPA U1: Use Category System.

D. National Bureau of Standards (NBS): NBS PS-20 American Softwood Lumber Standard.

E. Wood Associations:

1. National Lumber Grades Authority (NLGA).
2. Northeastern Lumber Manufacturers Association (NELMA).
3. Redwood Inspection Service (RIS).
4. Southern Pine Inspection Bureau (SPIB).
5. West Coast Lumber Inspection Bureau (WCLIB).
6. Western Wood Products Association (WWPA).

1.04 SUBMITTALS

A. Provide material list indicating wood species, stress ratings, grades, and locations in the Work for framing, blocking, and plywood specified herein.

B. Provide material list and product data for types of rough hardware, material, size, and use.

C. Wood Treatment Data:

1. Submit chemical treatment manufacturer's instructions for storing, handling, installing, and finishing of treated material.

2. Preservative Treatment:

a. For each type specified, provide certification by treatment plant stating preservative solutions and pressure process used, net amount of preservative retained, and conformance with applicable standards.

b. For water-borne preservatives, certify that moisture content of materials was reduced to maximum of 19 percent after treatment and prior to shipping to project site.

3. Fire-Retardant Treatment:

a. Provide certification by treatment plant stating that treatment material complies with applicable standards and governing authorities.

b. Include materials test reports from qualified testing laboratory indicating and interpreting test results relative to compliance of fire-retardant treated wood products with requirements indicated.

1.05 QUALITY ASSURANCE

A. Lumber Standards:

1. Lumber Grading Rules and Wood Species: Lumber shall comply with Agencies, Bureaus and Lumber Associations certified by Board of Review, American Lumber Standards Committee or Canadian Lumber Standards Administrative Board.

2. Lumber shall comply with National Bureau of Standards (NBS) PS-20 American Softwood Lumber Standard.

B. Plywood Standards:

1. Plywood Manufacturer shall be a Member of the American Plywood Association (APA).

2. Plywood shall comply with APA PS-1, "U.S. Product Standard for Construction and Industrial Plywood".

C. Grade Marks: Identify lumber and plywood by official grade mark.

1. Factory-mark each piece of lumber and plywood with type, grade, mill and grading agency.

2. Omit markings from surfaces to be exposed with transparent finish or without finish.

D. Connectors: Certain requirements of bracing, notching, lapping or nailing may be waived in lieu of engineered connectors.

1. Code approval and performance of connectors shall be submitted to the Architect for approval.

E. Low Emitting Materials: The volatile organic compound (VOC) content of wood glues and adhesives shall not exceed the limits defined in Rule #1168, "Adhesive and Sealant Applications" of SCAQMD.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store materials 6 inches above ground on framework or blocking.

B. Cover materials with waterproof covering and provide adequate air circulation.

C. Protect materials from weather, humidity, and moisture.

D. Protect sheet materials from broken and damaged surfaces and edges.

E. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

PART 2 – PRODUCTS

2.01 FRAMING AND BLOCKING

A. Lumber:

1. Lumber shall comply with the requirements of the specified grading agencies.

   a. If no species is specified, provide any species graded by the agency specified.

   b. If no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.

2. Lumber dimensions indicated are nominal, actual dimensions are per PS-20.

3. Surface four sides (S4S), unless otherwise indicated.

4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2 inch nominal thickness or less, unless otherwise indicated.

B. Dimension lumber for miscellaneous framing, blocking, and nailers shall be as follows:

1. Size: 1 inch to 1-1/2 inch thick; 2 inches to 12 inches wide as indicated on drawings or as conditions require.

2. Species and Grade: Any commercial softwood; Construction or No. 3 Grade.

3. Moisture Content: S-Dry or MC-15.

C. Treated lumber for wood cants, nailers, blocking, curbs and similar members in connection with roofing, flashing, vapor barriers, waterproofing, and similar exterior and moisture borne installations shall be as follows:

1. Size: 1 inch to 1-1/2 inch thick; 2 inches to 12 inches wide as indicated on drawings or as conditions require.

2. Species and Grade: Any commercial softwood; No. 2 Grade or better.

3. Moisture Content: S-Dry or MC-15.

D. Board Lumber for concealed blocking, nailers, wood furring, and wood grounds shall be as follows:

1. Size: 1 inch to 1-1/2 inch thick; 2 inches to 12 inches wide as indicated on drawings or as conditions require.

2. Species and Grade: WWPA, No. 4 Common; IWP, Utility Grade; SPIB, No.4 Grade.

3. Moisture Content: S-Dry or MC-15.

2.02 PLYWOOD

A. Wall Sheathing: Refer to Structural Drawings and Specification.

B. Roof Sheathing: Refer to Structural Drawings and Specification.

C. Miscellaneous Applications:

1. Communications and Electrical Room Mounting Boards: PS1; A-D plywood as follows:

a. Thickness: 3/4 inch, nominal.

b. Flame spread index of 25 or less and smoke development index of 450 or less when tested in accordance with ASTM E84.

2. Plywood Concealed From View: PS 1, C-D plugged or better, exterior grade.

a. Thickness: As indicated on drawings or as required for the application.

2.03 WOOD TREATMENT

A. Preservative Treatment:

1. Where lumber or plywood is indicated as “Treated”, or is specified herein to be treated, comply with applicable requirements of AWPA Standard C2 for lumber and C9 for plywood.

a. Mark each treated item with the AWPB or SPIB Quality Mark.

b. Do not treat any wood to receive fire-retardant treatment.

2. Pressure treatment for above ground items shall be water-borne preservatives complying with AWPB LP-2.

a. After treatment, rack dry or kiln dry to a maximum moisture content of 15 percent.

b. Creosote and asphaltic preservatives are not acceptable.

3. Treat items indicated on drawings and the following:

a. Lumber for wood cants, nailers, blocking, curbs, sills, and similar members in connection with roofing, flashing, vapor barriers, waterproofing, and similar exterior and moisture borne installations.

1) Wood members for roofing shall be weather resistant to comply with the roof manufacturer’s standards for “Wolmanized” or equal treatment.

b. Wood nailers, blocking, furring, sleepers, curbs, sills and similar members in contact with masonry or concrete.

c. Wood framing members less than 18 inches above grade.

B. Fire-Retardant Treatment:

1. Where fire-retardant lumber or plywood is indicated, required by Code, or specified herein, comply with AWPA C20 Standard for Lumber and C27 Standard for Plywood.

2. Fire-retardant chemicals shall achieve a flamespread rating of not more than 25 when tested in accordance with UL Test 723 or ASTM E 84.

a. Type A treatment for interior uses.

b. Exterior Type for exterior uses.

3. Rack dry or kiln dry treated items to a maximum moisture content of 15 percent.

4. Provide UL label on each piece of fire-retardant treated lumber or plywood.

C. Complete fabrication of treated items prior to treatment, where possible.

1. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment.

2. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.04 SHIMS

A. Material: Cedar shingles, slate, lead, galvanized steel or plastic.

2.05 METAL FRAMING ANCHORS

A. Provide galvanized steel framing anchors of structural capacity, type, and size required for installation of miscellaneous framing, blocking and nailers.

1. Provide products which are compatible with the conditions and applications required and for which evaluation reports exist that are acceptable to authorities having jurisdiction.

2. Provide products with allowable design loads, as published by the manufacturer, that meet or exceed those indicated or required.

B. Provide nail plates, framing anchors, plywood clips, etc. as indicated on drawings and as conditions require.

C. Glavanized Steel Sheet: Hot-dip, zinc coated steel sheet complying with ASTM A 653, G60 (ASTM A 653M, Z180) coating designation.

1. Structural, commercial, or lock-forming quality as standard with the manufacturer for the type of anchor indicated or required.

2. For sheet steel fastened to preservative treated lumber, provide G185 coating.

2.06 FASTENERS

A. Material and Size: Where rough carpentry is exposed to the weather, in contact with the ground, or in areas of relative humidity; all connection plates, angles, hangers, bolts, lag screws, nails, etc. shall be one of the following:

1. Steel shall be zinc plated or galvanized per ASTM A153 or A653, Class G185.

2. Stainless steel shall conform to AISI Type 304.

B. Case Hardened Cut Nails: 8d for 1 inch thick wood; 16d for 2 inch thick wood; toe nailing increase by two sizes.

1. Location: Attachment of non-exposed wood to concrete masonry unit walls.

C. Common Nails: 8d for 1 inch thick wood; 16d for 2 inch thick wood; 40d for 3 inch thick wood; toe nailing increase by two sizes.

1. Location: Attachment of wood to wood.

D. Expansion Shields: Expansion bolt size minimum 1/2 inch bolt; shield length minimum 2-1/2 inches.

1. Location: Attachment into masonry or cement products and materials with density in excess of 40 pcf.

E. Lag Bolts / Screws: Minimum 1/2 inch diameter with length 2 times material passed through.

1. Location: Attachment of assembled units to wood blocking.

F. Wood Screws: 6 inches long TimberLok self-drilling screws by “Fasten Master” or approved equal.

1. Location: Attachment of assembled units to wood blocking.

G. Nuts and Bolts: 3/4 inch, #20 thread, hex head, 1 inch longer than material penetrated.

1. Use carriage bolts (square neck or finned) where head is later inaccessible or in a hazardous location.

2. Location: Attachment of miscellaneous wood framing members to each other or to substrate.

H. Anchor Bolts: 3/4 inch minimum, 12 inches long, with 2 inch hook end, and 4 inches of thread.

1. Location: Embedment in masonry and concrete for blocking.

I. Plate Washers: Size to accommodate fastener, minimum 3/4 inch O.D.

1. Location: Nuts and bolts (all types) penetrating wood or fiber board products.

PART 3 – EXECUTION

3.01 PREPARATION

A. Verify dimensions and details prior to proceeding with the work.

1. Coordinate location of supports so that attached work will be secure and stable to support design loads of applicable wood species.

B. Select material sizes to minimize waste.

1. Discard materials with defects which might impair quality of work, and materials which are too small to use in fabricating work with minimum joints or optimum joint arrangement.

2. Reuse scrap to the greatest extent possible.

3. Clearly separate scrap for use as accessory components, including blocking, bracing, and shims.

C. Verify location and use of treated lumber.

1. Coat all cut surfaces of treated lumber with an approved preservative.

2. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 GENERAL CARPENTRY

A. Utilize materials of longest practical lengths to prevent splicing.

B. Do not use materials with excessive warp, twist or bow.

C. Cut, scribe and cope for an accurate fit.

D. Set work accurately to required lines with members level, plumb and true with intersections to required angles.

E. Shim to lines and levels with full-bearing.

3.03 WOOD FRAMING INSTALLATION

A. Miscellaneous Wood Framing and Nailers:

1. Softwood lumber or plywood in appropriate size and strength for use.

a. No piece less than 6’-0” long, unless required by dimensions.

2. Set wood framing accurately, plumb, level and rigidly secured.

a. Cut, join and tightly fit framing around other work.

b. Do not splice members between supports.

B. Roof Related Carpentry:

1. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing installation.

2. Provide wood curb at all roof openings except where specifically indicated otherwise.

a. Form corners by alternating lapping side members.

C. Blocking and Supports:

1. Softwood lumber or plywood size as indicated below:

a. Size: Thickness required for application x width required for application.

b. Size: Minimum 3/4 inch thick x 6 inches wide.

2. Provide blocking and supports as indicated and as required to support fabrications, fixtures, specialty items, finishes, and trim.

3. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs.

4. Where ceiling-mounting is indicated, provide blocking and supports above ceiling.

5. Specifically provide concealed blocking for the following:

a. Wall brackets
b. Handrails
c. Wall paneling and trim
d. Cabinets and shelf supports
e. Windows, doors, and storefront openings
f. Wall mounted door stops
g. Joints of rigid wall coverings that occur between studs
h. Visual display and marker boards
i. Grab bars
j. Towel and bath accessories
k. Other blocking as indicated on Drawings
l. Anywhere additional substrate nailing is required for a secure installation

3.04 PLYWOOD INSTALLATION

A. Install wall and roof sheathing in accordance with the structural drawings and specification.

1. Where edges of the roof sheathing abut one another, use plywood sheathing clips at 16 inches on center.

B. Miscellaneous Sheathing: Secure with edges over firm bearing, using screws to studs at edges and in field of board.

1. Provide blocking and nailing strips as required for secure attachment between primary framing members.

2. At fire-rated walls, install plywood over wall board indicated as part of the fire-rated assembly.

3. Where plywood is indicated as full floor-to-ceiling height, install with long edge parallel to studs.

4. Install adjacent boards without gaps.

3.05 ANCHORING AND FASTENING

A. Securely attach wood products to each other and to other materials as indicated and as recommended by published standards.

B. Install load carrying components with appropriate devices.

C. Make tight connections between members.

D. Do not allow nails and screws to penetrate opposite sides which will be exposed to view or will receive finish.

E. Nail or screw plywood in accordance with APA publication E30A.

F. Install fasteners without splitting of wood.

1. Pre-drill pilot holes for size larger than 1/8 inch.

G. Set fasteners flush with surface.

1. Counter bore screws, nuts and bolts.

H. Do not hammer threaded fasteners.

1. Tighten without lubrication.

3.06 PROTECTION OF FRAMING

A. Temporariily brace framing to maintain alignment, sustain winds and construction loads.

B. Leave bracing in place until lateral stability is achieved with other design elements.

C. Remove temporary bracing when it is no longer required.

END OF SECTION

SECTION 062000 – FINISH CARPENTRY

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contactor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following types of finish carpentry as indicated on the drawings and specified herein:

1. Shelving.

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1.02 RELATED SECTIONS

A. Section 099100 – Painting

1.03 REFERENCES

A. Architectural Woodwork Institute: AWI Quality Standards.

B. PS 51: U.S. Product Standard for Hardwood and Decorative Plywood.

C. PS 58: U.S. Product Standard for Basic Hardwood.

1.04 SUBMITTALS

A. Shelving: Submit manufacturer's product data and installation instructions for shelving system.

1. Provide full size samples of shelving standard, bracket, and plastic laminate shelving.

B. Wood Trim, Wood Planks, and Veneer Plywood: Submit samples for each species and cut or pattern, both unfinished and finished.

1. Boards: 2'-0" long x full board or trim width.

2. Sheets: 12-inch x 12 inch x sheet thickness.

1.05 QUALITY ASSURANCE

A. Factory-mark each piece of lumber and plywood with type, grade, mill and grading agency, except omit markings from surfaces to be exposed with transparent finish or without finish.

B. Low Emitting Materials: The volatile organic compound (VOC) content of wood glues and adhesives shall not exceed the limits defined in Rule #1168, "Adhesive and Sealant Applications" of SCAQMD.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver finish carpentry materials until wet work, painting, and similar operations have been completed in installation areas.

B. Protect finish carpentry materials during transit, delivery, storage, and handling to prevent damage, soiling, and deterioration.

C. Store materials off the floor, fully protected from damage.

1.07 PROJECT CONDITIONS

A. Do not deliver nor install finish carpentry until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity is maintained at occupancy levels during the remainder of the construction period.

PART 2 – PRODUCTS

2.01 SHELVING

A. Shelf Standards: Heavy duty, 16 gauge steel channel standard, K&V 82 as manufactured by Knape and Vogt.

1. Standards shall have slots to receive shelf brackets.

2. Standards shall be predrilled for screw attachment.

3. Standards shall be manufacturer's standard length suitable for number of shelves and installation height required.

B. Shelf Brackets: Heavy duty, 14 gauge 'L' shaped bracket, K&V 182 as manufactured by Knape and Vogt.

1. Brackets shall have tabs to fit slots in shelf standards.

C. Finish: Shelving standards and brackets shall have a factory-applied epoxy coating.

1. Color shall be as selected by the Architect from the manufacturer's standard colors.

D. Plywood Shelving: 1-inch-thick finish grade plywood shelves with ½ inch x 1 inch hardwood edge.

1. Provide shelf depth and number of shelves as indicated on drawings.

E. Plastic Laminate Shelving: 5/8-inch-thick heavy duty particleboard with square corners as manufactured by Knape and Vogt.

1. Provide shelf depth and number of shelves as indicated on drawings.

2. Shelving color shall be as selected by the Architect from the manufacturer's standard colors.

F. Shelf Fasteners: Steel shelf fastener to secure shelf to bracket as manufactured by Knape and Vogt.

G. Anchors: Provide screws and other anchoring devices as recommended by the manufacturer for secure attachment.

PART 3 – EXECUTION

3.01 PREPARATION

A. Condition wood materials to average prevailing humidity conditions in installation areas prior to installing.

B. Back-prime lumber to receive painted finish which is exposed at the exterior or exposed to moisture and high relative humidity at the interior.

3.02 SHELVING INSTALLATION

A. Install standards, brackets, and shelving in accordance with the manufacturer's written installation instructions.

B. Start standards above the finish floor as indicated on drawings, or if not indicated as per the manufacturer's recommendations.

C. Space standards as indicated on drawings, but never more than per the manufacturer's recommendations.

3.03 PROTECTION AND REPAIRING

A. Protect completed work to insure finish carpentry will be without damage or deterioration at the time of Substantial Completion.

B. Repair or replace damaged and defective finish carpentry to eliminate functional and visual defects.

END OF SECTION

SECTION 064000 - ARCHITECTURAL WOODWORK

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following types of architectural woodwork:

1. Plastic laminate cabinets.

2. Plastic laminate countertops.

3. Cabinet hardware.

C. Architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing wood work items, unless concealed within other construction before woodwork installation.

1.02 RELATED SECTIONS

A. Section 079200 – Joint Sealants.

B. Section 066116 – Solid Surfacing.

1.03 SUBMITTALS

A. Product Data: Submit for each type of product indicated including finishing materials and processes, cabinet hardware, and accessories.

B. Shop Drawings: Submit dimensioned plans, elevations, and large-scale details. Indicate the location of each item and attachment devices.

1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

2. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.

C. Samples: Provide manufacturer's standard size samples for the Architect's selection from manufacturer's full range of colors, patterns, and surface finishes. Upon selection provide actual samples for the Architect's final approval as follows:

1. Plastic-laminate: 8 inches by 10 inches, for each type, color, pattern, and surface finish.

D. Product Certificates: Signed by manufacturer of woodwork certifying that products furnished comply with specified requirements.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

B. Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Quality Standard: Unless otherwise indicated, comply with AWI/AWMAC (QSI) "Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada"; 2005, 8th Edition, Version 2.0, for grades of interior architectural woodwork, construction, finishes, and other requirements.

D. Qualification Data: When requested by the Architect provide information to demonstrate capabilities

and experience. Include lists of completed projects with project names and addresses, names and addresses of owners and architects, and other information as requested.

E. Low Emitting Materials: The volatile organic compound (VOC) content of wood glues and adhesives shall not exceed the limits defined in Rule #1168, “Adhesive and Sealant Applications” of SCAQMD.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas.

B. Do not deliver nor install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

C. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with the requirements specified herein.

1.06 PROJECT CONDITIONS

A. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

2. Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating woodwork without field measurements.

    a. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.07 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other sections to ensure that architectural woodwork can be supported and installed as required.

B. Coordinate plumbing fixtures, electrical devices, and other work which is set into and around architectural woodwork.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, plastic laminate manufacturers and products which may be incorporated in the work include the following:

1. Formica Corporation – Cincinnati, OH; 800.367.6422

2. Nevamar – Shelton, CT; 800.638.4380

3. Wilsonart International – Temple, TX; 800.433.3222

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 MATERIALS

A. Provide materials that comply with requirements of the AWI / AWMAC (QSI) quality standard for each type of woodwork and quality grade specified.

B. Wood products shall comply with the following:

1. Medium-Density Fiberboard: ANSI A208.2, Grade MD.

2. Particleboard: ANSI A208.1, Grade M-2, no added urea formaldehyde.

3. Softwood Plywood: DOC PS 1, Medium Density Overlay.

4. Hardwood Plywood and Face Veneers: HPVA HP-1.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.

1. Adhesive for bonding plastic laminate shall be un-pigmented contact cement.

2. Adhesive for bonding edges shall be hot-melt adhesive.

2.03 PLASTIC LAMINATE CABINETS

A. Quality Standard: Comply with AWI / AWMAC (QSI) Section 400 requirements for laminate cabinets.

B. Grade: All woodwork is Custom grade except woodwork with directional laminate or wood veneer faces. In these cases, grain matching of the casework faces will be "Premium Grade", and all other details will remain Custom grade.

C. AWI Type of Cabinet Construction: Flush overlay.

D. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal surfaces other than tops: HGS.

2. Postformed Surfaces: HGP.

3. Vertical Surfaces: HGS.

4. Cabinet body edges: 1 mm thick edging.

5. Doors and drawers: 3 mm thick vinyl edgebanding.

6. Shelves: Self edge, unless noted otherwise on drawings.

E. Materials for semi-exposed surfaces shall be as follows:

1. Surfaces other than drawer bodies: High-pressure decorative laminate, Grade VGS.

F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces that match Architect’s selections.

G. Provide hardboard above compartments and drawers, unless located directly under tops.

2.04 PLASTIC LAMINATE COUNTERTOPS

A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.

B. Grade: Custom.

C. High-Pressure Decorative Laminate Grade: HGS securely bonded with resin waterproof glue.

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces that match Architect’s selections.

E. Grain Direction (if applicable): Parallel to cabinet fronts. All faces to run in one direction.

F. Edge Treatment: Same as laminate cladding on horizontal surfaces or hardwood edging as indicated on the drawings.

G. Core Material at Sinks: ¾ inch marine grade plywood.

2.05 CABINET HARDWARE AND ACCESSORIES

A. Provide cabinet hardware and accessory materials associated with architectural woodwork.

B. Cabinet hinges: Concealed when door is closed, self-closing, 175 degree opening, suitable for overlap cabinet doors by “Julius Blum”.

C. Extension slides for drawers: “Knape and Vogt” medium duty, side mounted, two per drawer.

D. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter by “Stanley”.

E. Catches: Magnetic cabinet catches by “Stanley”.

F. Door Locks: Manufacturer’s standard key lock type.

G. Drawer Locks: Manufacturer’s standard key lock type.

H. Grommets: Diameter as field conditions require; color as selected by the Architect from the manufacturer’s full range.

I. File hanging rail and support: As selected by the Architect from Manufacturer’s standard types.

J. Self-adhering felt silencers.

K. Exposed Hardware Finishes: For all exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Stainless Steel: BHMA 630.

2.06 CABINET FABRICATION

A. Cabinet Bodies: Flush overlay construction with ¼ inch to 5/16 inch radiused corners on doors and drawers. Construction shall be in accordance with approved manufacturers' standard specifications to ensure stability and prevent racking when fully loaded.

B. Bodies of base cabinets shall be fabricated as follows:

1. Bottom and sides shall be made of ¾ inch industrial particle board, 45-47 lb. density, face side laminated with 8 to 9 mil white melamine resin-saturated overlay and the non-exposed side laminated with a phenolic backing sheet for balanced construction.

2. The back panel shall be made of ¼ inch, 45-47 lb. density industrial particle board with 8-9 mil white melamine resin-saturated overlay on the face side and the non-exposed side with a sealer for balanced construction.

3. Top of the base cabinets and below the top set of drawers shall be fully framed in wood or a full sheet of 3/8 inch particle board sub top may be used.

4. Back panels shall be full bound; captured in grooves on cabinet sides, top, and bottom and secured with staples and a hot weld glue around entire back perimeter.

5. Sides, top and bottom shall be fastened securely in accordance with approved manufacturers standard specifications to ensure stability and prevent racking when fully loaded.

6. Top of base cabinet and between top drawers shall consist of wood frame fastened to the body in accordance with approved manufacturers standard specifications.

C. Bodies of upper and/or full height cases shall be fabricated as follows:

1. These units shall be made of similar materials and construction as described for “Bodies of Base

Cabinets” except the top member shall be solid ¾ inch, 45-47 lb. density industrial particle board laminated with 8 to 9 mil with melamine resin-saturated overlay rather than a wood frame.

2. On wall units, a 3/8 inch x 2-1/2 inch hanging filler strip shall be screwed and glued to the top and bottom of the cabinet.

3. On full-height cabinets, a 3/8 inch x 2-1/2 inch fill strip shall be screwed and glued to the top of the cabinet.

D. Drawers shall be fabricated with high density melamine finished particle board:

1. Drawers shall be ¾ inch.

a. The lipped drawer fronts are to serve as the drawer stop with edges squared.

2. Drawer backs shall be 1/2 inch.

3. Sides of drawers shall be 1/2 inch dove tailed to permit attachment of fronts and backs.

4. Drawer bottoms shall be 1/4 inch and let into sides, back and front.

5. All drawer parts shall be glued and stapled together.

E. Shelves and partitions shall be fabricated as follows:

1. Standard shelves and partitions shall be ¾ inch industrial particle board, 45-47 lb. density laminated both sides with 8 to 9 mil white melamine resin saturated overlay.

a. Shelves 36 inches long shall be 1 inch thick.

b. Front and sides shall be edged with "T" edge.

2. Adjustable shelves shall be installed on recessed KV-255 standards and KV-256 brackets or LH heavy duty nylon or metal self supports with drilled holes at 2 inches on center.

F. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

G. Sand fire-retardant treated wood lightly to remove raised grain on exposed surfaces before fabrication.

H. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of cabinets and edges of solid-wood (lumber) members 3/4 Inch thick or less: 1/16 inch.

2. Edges of rails and similar members more than 3/4 Inch thick: 1/8 inch.

I. Complete fabrication, including assembly, finishing, and hardware application to maximum extent possible before shipment to project site.

1. Disassemble components only as necessary for shipment and installation.

2. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

J. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items.

1. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings.

2. Sand edges of cutouts to remove splinters and burrs.

3. Seal edges of openings in countertops with a coat of varnish.

4. Install stainless steel sink rim.

2.07 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.

1. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.

2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Prior to installation, examine shop-fabricated work for completion including removal of packing and backpriming.

3.02 PREPARATION

A. Prior to installation, condition woodwork to average prevailing humidity conditions in installation areas.

3.03 INSTALLATION

A. Install woodwork in accordance with AWI Section 1700 for the same grade specified herein for each type of woodwork.

B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

C. Scribe and cut woodwork to fit adjoining work. Refinish cut surfaces and repair damaged finish at cuts.

D. Fire Retardant Treated Wood: Handle, store, and install fire retardant treated wood to comply with recommendations of chemical treatment manufacturer, including those for adhesives used to install woodwork.

E. Attach woodwork to anchors or blocking built in or directly attached to substrates.

1. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation.

2. Use fine finishing nails or finishing screws for exposed fastening only when absolutely necessary and only after receiving approval of the Architect.

F. Cabinets:

1. Install cabinets with no more than 1/8 inch in 96 inches sag, bow, or other variation from a straight line.

2. Maintain veneer sequence matching of cabinets with transparent finish.

3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches on center with No. 10 wafer-head screws sized for 1-inch penetration into wood blocking.

4. Install without distortion so doors and drawers fit openings properly and are accurately aligned.

5. Complete installation of hardware and accessory items as indicated.

6. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.

G. Countertops:

1. Set plumb and level and align adjacent countertops in same plane.

2. Install with hairline joints.

a. Fill joints between countertops and adjacent construction with joint sealant, finish flush and smooth.

3. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

4. Secure backsplashes to tops with concealed fastening and to walls with adhesive.
5. Caulk space between backsplash and wall with joint sealant.

6. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

H. Complete work to the extent not completed at shop or before installation of woodwork.

1. Fill nail holes with matching filler where exposed.

2. Apply specified finish coats, including stains and paste fillers, to exposed surfaces where only sealer/prime coats were applied in shop.

3.04 TOLERANCES

A. Maximum variation from level and plumb: 1/8 inch in 96 inches, noncumulative.

B. Maximum variation in plane between adjacent pieces at joint: Plus or minus 1/16 inch.

3.05 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects. Where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

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SECTION 066116 – SOLID SURFACING

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following types of solid surfacing as indicated on the drawings and specified herein.

1. Solid Surfacing Tops and Splashes.

2. Solid Surfacing Window Sills.

1.02 RELATED SECTIONS

A. Section 062000 – Finish Carpentry.

B. Section 064000 – Architectural Woodwork.

C. Section 079200 – Joint Sealants.

D. Division 22 – Plumbing.

1.03 SYSTEM DESCRIPTION

A. Solid Surfacing: Homogenous sheet material composed of acrylic resins, fire-retardant filler materials, and coloring agents.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Manufacturer’s product data and specification of fabrication and construction.

2. Manufacturer’s installation instructions including detailed recommendations for handling, storage, protection, and maintenance.

3. Shop drawings including location, layout, and installation details of each solid surfacing fabrication.

4. Manufacturer’s standard size samples for the full range of colors and patterns for the Architect’s selection.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain products and accessories from a single manufacturer.

B. Fabricator Qualifications: Manufacturer’s certified solid surface fabricator.

C. Installer Qualifications: Company experienced in the application and installation of systems similar in complexity to those required for the project.

1.06 PROJECT CONDITIONS

A. Maintain relative humidity planned for building occupants and an ambient temperature between 65 degrees and 75 degrees F for 48 hours prior to and during installation unless otherwise recommended by the solid surfacing manufacturer.

B. After installation, maintain relative humidity and ambient temperature planned for building occupants.

1.07 WARRANTY

A. Furnish manufacturer’s 10-year warranty on products and fabrications.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers and products which may be incorporated in the work include the following:

1. Dupont (Corian) – USA; 800.441.7515
2. Formica Corporation (Solid Surfacing) – Cincinnati, OH; 800.367.6422
3. Wilsonart International (Gibraltar) – Temple, TX; 800.433.3222
4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.
    a. Architect reserves the right to reject proposed substitutions on the basis of color and surface texture even when materials and fabrication are equivalent.

2.02 SOLID SURFACING

A. Solid Surfacing shall be Gibraltar Solid Surface Sheet as manufactured by Wilsonart International.

1. Sheet Thickness: 0.50 inch.
2. Edge Profile: Full Bullnose.
3. Finish, Patterns, and Colors: As selected by the Architect from the manufacturer’s full range.

B. Material characteristics shall be as follows:

1. Surface burning characteristics shall be Class I or A in accordance with ASTM E 84 and as follows:
    a. Flame Spread: Less than 25.
    b. Smoke Developed: Less than 25.
2. Liquid Absorption per ISO 4586-2 (½ inch thick material): 0.4 percent after 2-hour period.
3. Izod Impact per ASTM D 256, Method A: 0.3 foot pounds per inch.
4. Tensile Modulus per ASTM D 638: 1.2 million pounds per square inch.
5. Thermal Expansion per ASTM D 696: 0.000018 inch per inch per degree F, maximum.
6. Hardness per ASTM D 2583, Barcol Impressor: 57
7. Flexural Toughness per ASTM D 790: 3 (in-lb/in3).
8. Deflection Temperature per ASTM D 648 (under load): 90 degrees C.
9. Stain Resistance per ANSI Z-124.3 Modified, 3.4: No effect.
10. Boiling Water Resistance per NEMA LD 3-3.05: No effect.
11. High Temperature Resistance per NEMA LD 3-3.06: No effect.
12. Radiant Heat Resistance per NEMA LD 3-3.10: No effect.
13. Light Resistance per NEMA LD 3-3.03: No effect.
14. Ball Impact Resistance per NEMA LD 3-3.08 (one half pound ball, unsupported): 125 inches.
15. Specific Gravity (Density per ASTM D 792): 1.60 grams per cubic centimeter.
16. Approximate Weight: 4.20 pounds per square foot.

17. Weatherability per ASTM D 2565: Pass.

18. Fungus Resistance per ASTM G 21: Pass.

19. Bacterial Resistance per ASTM G 22: Pass.

20. Pittsburgh Protocol Toxicity: 66.9 grams.

C. Accessory materials shall be as follows:

1. Joint Adhesive: Manufacturer's standard adhesive to create inconspicuous, nonporous joints with a chemical bond.

2. Sealant: Standard mildew resistant, FDA / UL recognized silicone sealant in color matched or clear formulations.

3. Sink / Bowl Mounting Hardware: Manufacturer's approved bowl clips, brass inserts and fasteners for attachment of sinks and bowls.

2.03 FABRICATION

A. Fabricate components in shop to greatest extent practical to size and shape indicated, in accordance with approved shop drawings and manufacturer's written requirements.

B. Form joints between components using manufacturer's standard joint adhesive.

1. Joints shall be inconspicuous in appearance and without voids.

2. Attach 4-inch-wide reinforcing strip under joints as recommended by the manufacturer.

C. Provide holes and cutouts for plumbing and bath accessories.

D. Rout and finish component edges to a smooth, uniform finish.

1. Rout all cutouts and then sand all edges smooth.

2. Repair or replace defective or inaccurate work.

E. Surfaces shall have a uniform finish.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine substrates to receive solid surfacing and identify conditions detrimental to proper or timely installation.

1. Do not commence installation until conditions have been corrected.

3.02 PREPARATION

A. Precondition solid surfacing in accordance with manufacturer's written instructions.

3.03 INSTALLATION

A. Install solid surfacing plumb and level and in accordance with the manufacturer's written installation instructions.

1. Form joints using manufacturer's approved adhesive, with joints inconspicuous in finished work.

B. Solid Surfacing Tops and Splashes:

1. Install countertops and vanities plumb, level, true and straight.

a. Shim as necessary using concealed shims.

2. Attach tops securely to base unit or support brackets in accordance with the manufacturer's written installation instructions.

3. Anchor sinks and bowls to tops per the manufacturer's recommendations.

a. Coordinate plumbing installation with Division 22 "Plumbing".

4. Provide backsplashes and endsplashes and adhere to tops using manufacturer's recommended silicone sealant.

5. Seal between wall and solid surfacing components with manufacturer's recommended silicone sealant.

C. Solid Surfacing Window Sills:

1. Install window sills full length of window.

2. Window sills shall be plumb, true, and level.

3. Set securely into place using concealed fasteners and manufacturer's approved adhesive.

4. Provide minimum 1/8-inch expansion gaps on both sides of window sills.

a. Seal with manufacturer's approved sealant.

5. Ease edges and sand smooth.

3.04 CLEANING

A. Remove excessive adhesive and sealants and clean components just prior to Substantial Completion.

3.05 PROTECTION AND REPAIRING

A. Protect surfaces from damage until Substantial Completion.

B. Repair or replace damaged materials and components that cannot be repaired to the Architect's satisfaction.

3.06 SPARE PARTS

A. Provide manufacturer's Care and Maintenance Kit and review maintenance procedures with the Owner prior to Final Completion.

END OF SECTION

SECTION 072100 – INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following types of insulation as specified herein and shown on the drawings:

1. Rigid Board Insulation.
2. Thermal Batt Insulation.
3. Sound Attenuation Batt Insulation.
4. Accessories.

1.02 RELATED SECTIONS

A. Section 061000 – Rough Carpentry

B. Section 079200 – Joint Sealants

C. Section 092216 – Non Structural Metal Framing

D. Section 092900 – Gypsum Board

1.03 REFERENCES

A. ASTM C 272: Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.

B. ASTM C 423: Standard Test Method for Sound Absorption Coefficient by the Reverberation Room Method.

C. ASTM C 518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

D. ASTM C 578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

E. ASTM C 665: Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

F. ASTM D 1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

G. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

H. ASTM E 96: Standard Test Methods for Water Vapor Transmission of Materials.

I. ASTM E 119: Standard Test Methods for Fire Tests of Building Constructions and Materials.

J. ASTM E 136: Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 deg C.

K. ASTM E 331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference.

L. ASTM E 2178: Standard Test Method for Air Permeance of Building Materials.

M. NFPA 285: Standard Fire Method for Evaluation of Fire Propagation Characteristics of Exterior Non Load Bearing Wall Assemblies Containing Combustible Components.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Manufacturer’s product data including characteristics, performance criteria, product limitations, and installation instructions.

2. Manufacturer's Certificate certifying that products meet or exceed the specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in the manufacturer’s unopened and undamaged packaging and bundles, fully identified with the manufacturer’s name and product name.

B. Store and protect materials in accordance with the manufacturer’s written instructions to prevent damage, contamination, exposure, and deterioration.

1. Store with packaging and labels intact and legible.

2. For batt and fiberous materials that are subject to wetting and water absorption, store in a sheltered and ventilated location to protect the materials from moisture and soiling.

C. Exercise care to avoid damage during unloading, storing, and installation.

1. Damaged or deteriorated material shall be removed from the job site.

1.06 PROJECT CONDITIONS

A. Do not install insulation or adhesives when temperature or weather conditions are detrimental to successful installation as set forth by the product manufacturer.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Dow Chemical Company – USA; www.dow.com

2. Johns Manville – Denver, CO; 303.978.2000

3. Owens Corning – USA; 800.438.7465

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 RIGID BOARD INSULATION

A. Extruded Polystyrene Board Insulation:

1. Type: Type IV complying with ASTM C 578.

2. Compressive Strength: 25 psi.

3. Thermal Resistance: R 5.0 per inch of thickness with 90 percent lifetime limited warranty on thermal resistance.

4. Water Absorption: Maximum 0.10 percent by volume in accordance with ASTM C 272.

5. Surface Burning Characteristics in accordance with ASTM E 84:

a. Flame spread less than 25.

b. Smoke developed less than 450.

6. Board Thickness: As follows unless otherwise indicated on drawings.

   a. 1 inch at foundation perimeter.

   b. Thickness as indicated on drawings.

7. Board Size: 24 inch x 96 inch and 48 inch x 96 inch as conditions allow.

8. Edge Condition:

   a. Tongue and groove edge boards for horizontal installations.

   b. Square edge boards for vertical installations.

2.03 THERMAL BATT INSULATION

A. Fiberglass Batt Insulation:

1. Type: Type I batt complying with ASTM C 665.

2. R-19 Wall Insulation:

   a. Thermal Resistance: R-19 in accordance with ASTM C 518.

   b. Thickness: 6.25 inches.

   c. Width: Full width batt for use with studs spaced 16 inches on center, or other spacing as required.

   d. Facing: Kraft faced with paper vapor retarder.

3. Length: Use maximum length possible.

   a. Dimensional Stability: Linear shrinkage less than 0.1 percent.

4. Surface Burning Characteristics:

   a. Flame Spread: Less than 25 when tested in accordance with ASTM E 84.

   b. Smoke Developed: Less than 50 when tested in accordance with ASTM E 84.

5. Fire Resistance Rating: Passes ASTM E 119 as part of a complete fire tested wall assembly.

6. Combustion Characteristics: Passes ASTM E 136.

2.04 SOUND ATTENUATION BATT INSULATION

A. Fiberglass Acoustical Batt Insulation:

1. Type: Type I batt complying with ASTM C 665.

2. Thickness: 3.5 inches.

3. Width: Full width batt for use with studs spaced 16 inches on center, or other spacing as required.

4. Facing: Unfaced in walls and concealed locations; Scrim reinforced foil facing when exposed in mechanical plenums and attic locations.

5. Length: Use maximum length possible.

   a. Dimensional Stability: Linear shrinkage less than 0.1 percent.

6. Surface Burning Characteristics:

   a. Maximum Flame Spread: 25 when tested in accordance with ASTM E 84.

b. Maximum Smoke Developed: 50 when tested in accordance with ASTM E 84.

7. Fire Resistance Rating: Passes ASTM E 119 as part of a complete fire tested wall assembly.

8. Combustion Characteristics: Passes ASTM E 136.

2.05 ACCESSORIES

A. Extruded Polystyrene Insulation Board Accessories:

1. Fasteners: Preassembled screw/stress plate fasteners, type and length as recommended by the insulation manufacturer for securing extruded polystyrene insulation board.

2. Joint Sealing Tape: Pressure sensitive, self adhering, acrylic adhesive joint sealing tape complying with AAMA 711 and the following:

a. Recommended by the insulation manufacturer for sealing the joints of extruded polystyrene insulation board.

b. Peel Adhesion Strength: Compliant with ICC-ES AC 148 and AAMA 711.

c. Water Resistance and Joint Sealing: Compliant with ICC-ES AC71.

d. Air Permeance: Air permeance less than or equal to 0.02 L/s/m2 tested in accordance with ASTM E 2178.

e. Service Temperature: Service temperature range shall be at least 0 degrees F to 120 degrees F maximum.

f. Width: 3-1/2 inches minimum.

3. Adhesive: Commercial grade construction adhesive compatible with polystyrene or foamed plastics for adhering extruded polystyrene insulation board.

B. Batt Insulation Accessories:

1. Wires and Metal Straps: Heavy gauge wire and punched metal straps as recommended by the batt insulation manufacturer to hold-in-place friction fit batt insulation.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that wall studs, opening framing, and other framing support members and anchorages have been installed.

B. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

C. Verify mechanical and electrical services within walls have been installed, tested and inspected.

D. For extruded polystyrene insulation installed over spray applied or sheet applied weather barriers, verify chemical compatibility of the polystyrene board and the barrier material.

E. Do not proceed with work of this section until unsatisfactory conditions have been corrected.

3.02 RIGID BOARD INSULATION INSTALLATION AT FOUNDATION PERIMETER

A. Prior to backfilling, install extruded polystyrene (XPS) insulation boards to the exterior of the foundation wall in accordance with the manufacturer's written installation instructions.

1. Install full height on the foundation wall starting from the top of the footing.

2. Install elsewhere as required to complete thermal barrier at building perimeter.

B. Install insulation with long edges horizontal, edges tightly butted, and vertical joints staggered.

1. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Adhere a 12 inch wide strip of polyethylene sheet over construction, control, and expansion joints with double beads of adhesive each side of joint.

1. Extend sheet full height of joint.

2. Extend boards over expansion joints, unbonded to foundation on one side of joint.

D. Secure insulation with construction adhesive compatible with polystyrene or foamed plastics.

1. Apply adhesive in accordance with the adhesive manufacturer's written application instructions.

E. Seal joints and openings with joint sealing tape in accordance with the manufacturer's recommendations.

F. Backfill carefully to avoid damage to insulation boards.

3.03 RIGID BOARD INSULATION INSTALLATION

A. Install extruded polystyrene (XPS) insulation boards over the exterior face of framing, or exterior gypsum board sheathing, or exterior weather barrier in accordance with the manufacturer's written installation Instructions and construction documents.

1. Do not permit the XPS insulation board to come into contact with surfaces or temperatures in excess of temperatures recommended by the insulation manufacturer.

B. Install XPS insulation boar din maximum sizes to minimize joints.

1. Locate joints square to framing members.

2. Center end joints over framing.

3. Stagger end joints a minimum of one stud space from adjacent joints.

4. Provide additional framing members and bracing as required.

C. Insulation board edges shall be butted together tightly and fit around openings and penetrations.

1. Install horizontal tongue and groove joints to fit square and tight with the tongue pointing up.

2. Install square edges to fit square and tight.

D. Fasten the insulation board to the exterior face of the steel stud wall framing using preassembled screw/stress plate fasteners.

1. Spacing shall be minimum 16 inches on center at the board perimeter and 24 inches on center in the field of the board.

2. Drive fasteners so the stress plate is tight and flush with the board surface but do not countersink.

3. Stress plates can bridge between adjoining board edges if the plate is a minimum of 1-3/4 inches in diameter.

4. Do not fasten more than two board edges with one stress plate.

E. Install joint sealing tape in accordance with the manufacturer's recommendations.

1. Insure that the insulation board surface is smooth, clean, dry and free of contaminants.

2. To insure best adhesion, install insulation board joint sealing tape at the same time that the insulation boards are installed.

3. Lap intersections or jointed tapes a minimum of 3-1/2 inches.

F. Cover installation as soon as possible, within 60 days maximum, to avoid discoloration of the insulation and to minimize degradation of the joint sealing tape due to exposure to ultraviolet light.

3.04 BATT INSULATION INSTALLATION

A. Batt Insulation:

1. Fluff thermal batt insulation to full thickness for specified R-value just prior to installation.

2. Install fiberglass batt insulation in accordance with the manufacturer's written installation instructions.

a. Trim batts to fill spaces and voids neatly.

b. Do not compress insulation.

B. Thermal Wall Insulation:

1. Install with Kraft facing towards the interior.

2. Tightly friction fit full width batt insulation into wall stud cavity spaces and framing voids to create a continuous layer without gaps.

3. Within exterior wall framing, install insulation between pipes, mechanical services, electrical boxes and backside of sheathing.

4. Cut or split insulation material as required to fit around conduits and piping.

5. Hold-in-place with wires or metal straps installed every 2 feet on center starting 4 feet above the floor.

C. Sound Attenuation Batt Insulation:

1. Install sound batt insulation in partitions indicated on Drawings.

2. Extend sound batt insulation above ceilings to roof structure.

3. Tightly friction fit full width batt insulation into wall stud cavity spaces and framing voids to create a continuous layer without gaps.

4. Place sound batt insulation around openings, behind and around mechanical, plumbing, and electrical items.

5. Cut or split insulation material as required to fit around conduits and piping.

6. Hold-in-place with wires or metal straps installed every 2 feet on center starting 4 feet above the floor.

7. Install acoustical sealant around penetrations and at partition perimeter in accordance with Section 079200 "Joint Sealants".

3.04 PROTECTION

A. Protect insulation from damage due to weather and physical abuse until protected by permanent construction.

END OF SECTION

SECTION 072400 – EXTERIOR INSULATION AND FINISH SYSTEM

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section specifies exterior insulation and finish system including expanded polystyrene, base coat, reinforcing mesh, finish coat, and accessories.

1.02 RELATED SECTIONS

A. Section 092900 – Gypsum Board

1.03 SUBMITTALS

A. Provide submittals in accordance with Section 013300 “Submittal Procedures”.

B. Submit copies of manufacturer’s product data and written installation instructions.

C. Submit scaled, dimensioned drawings and details of decorative elements indicating profiles which will be fabricated.

D. Provide manufacturer’s standard samples and selection charts of materials to be used including mesh, adhesive, finish, texture, and color.

1. Upon Architect’s selections of texture and color submit a 12-inch x 12 inch sample of each different selection for the Architect’s review.

2. Upon the Architect’s approval of the 12-inch x 12 inch samples, a 6’-0” x 6’-0” field sample shall be provided in the location as directed by the Architect.

    a. A field sample shall be provided for each different texture and color.

    b. The field sample shall be made by the applicator utilizing materials, tools, and techniques proposed for installation.

3. Upon the Architect’s approval of the field sample, the Contractor may proceed with ordering materials and commencing with installations.

1.04 QUALITY ASSURANCE

A. Obtain materials for exterior finish system from a single manufacturer.

B. Prior to shipment of any materials, ensure all items conform with the requirements of the specifications, approved shop drawings, and Architect’s field sample.

C. All finish materials, including maintenance kit, must be ordered and shipped at the same time to insure sequential batches.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store all materials related to the exterior finish system in accordance with the manufacturer’s recommendations.

1. Insulation board shall be stored flat and protected from sunlight and weather.

2. Reinforcing fabric shall be stored under cover, in a dry place.

    a. Materials that become wet shall not be used.

3. Adhesive and finish coating shall be stored under cover in a cool, dry place, protected from sunlight.

a. Do not store material in temperatures below that recommended by the manufacturer.

b. Materials that have been frozen or stored in the direct rays of the sun shall not be used.

1.06 WARRANTY

A. Provide a five (5) year written warranty on materials and workmanship.

1. Contractor shall supply replacement material and application if the wall system fails within this period of time.

2. Replacement shall be acceptable to the Architect and at no cost to the Owner.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. BASF Corporation (Senergy) – Beachwood, OH; 888.338.7170

2. Dryvit Systems, Inc. – Warwick, RI; 800.556.7752

3. Sto Corporation – Atlanta, GA; 800.221.2397

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 MATERIALS

A. Exterior Insulation and Finish System:

1. BASF Corporation (Senergy) – Senerflex System.

2. Dryvit Systems, Inc. – Outsulation System.

3. Sto Corporation – Stowall, Stolit System.

B. Adhesive shall be as recommended by the exterior finish system manufacturer for use with the substrates of this project.

C. Expanded Polystyrene: 1-1/2 inch thick at walls. (U.N.O.)

D. Base coat shall be as recommended by the exterior finish system manufacturer for the required use.

E. Reinforcing mesh shall be as follows:

1. Standard Mesh: 4.5 oz / sy.

2. High Impact Mesh: 15 oz / sy.

3. Corner Mesh: 7.2 oz / sy.

4. Detail Mesh: 4.5 oz / sy.

F. Finish shall be 100 percent acrylic based and as follows:

1. Finish must provide superior “Dirt Pickup Resistance”.

2. Water vapor transmission shall comply with ASTM E 96 with permeability equal to or greater than 5.0 perms.

3. Resistance to wind driven rain per FS TT-C555b.

4. Chalk rating of 8 or greater.

5. Yellowing index of +1.0 or less, after 2000 hours of exposure.

6. Flame spread less than 25 per UL 723 and ASTM E 84.

7. Impact test per EIMA Impact Standard 101.86.

8. Mildew resistance per Military Standard 810B, Method 508.

F. Color and texture shall be as selected by the Architect from the full range of colors and textures offered by the manufacturer.

PART 3 – EXECUTION

3.01 EXAMINATION

A. The surface to be covered shall be sound and free of releasing agents such as silicones and oils, as well as other defects or harmful residues.

B. Surfaces to receive exterior finish shall have no plane irregularities greater than ¼ inch.

3.02 PREPARATION

A. Use clean container for mixing and preparing materials.

3.03 INSTALLATION

A. Apply adhesive and install insulation board in accordance with manufacturer's written installation instructions.

1. Application of insulation board shall begin at the base from firm temporary or permanent support.

2. Adhesion shall be made to clean hard surface and over the specified exterior sheathing as applicable.

3. Precut insulation board as required to fit openings and projections.

4. Stagger vertical joints, and abut all joints tightly for an overall flush level surface.

5. Where the exterior insulation system terminates at roof, windows, or similar surfaces, follow the manufacturer's recommendations to achieve waterproof and weathertight installations.

B. Provide reveals, aesthetic grooves, and control joints as shown on the drawings.

1. Provide additional expansion and control joints as recommended by the manufacturer at wall surfaces and openings after review and approval by the Architect.

C. Install base coat and reinforcing mesh in accordance with the manufacturer's written installation instructions.

1. The finished thickness of the base coating shall be such that the reinforcing fabric is fully embedded.

2. Provide High Impact Mesh to a minimum height of 10'-0".

3. Provide Standard Mesh above 10'-0".

4. Provide Corner Mesh at all building corners and at corners of doorways.

5. Provide Detail Mesh at backwrapping, corners of windows, penetrations, reveals and trim.

D. Install finish coating in accordance with the manufacturer's written installation instructions and in accordance with the Architect's approved field samples.

1. Prime when recommended by the manufacturer.

3.04 CLEANING

A. Upon completion of the exterior finish system installation, remove all excess materials and debris from the project site.

B. Remove spatter, droppings, and other excess material from masonry veneer, aluminum storefront, glazing, and other adjacent finishes.

3.05 EXTRA MATERIALS

A. Furnish a maintenance kit to the Owner which includes a sufficient amount of material to patch 25 square feet.

1. Provide maintenance kit in unopened containers and store where directed by the Owner.

END OF SECTION

SECTION 072500 - WEATHER BARRIER

GENERAL

1.1 WORK INCLUDES

A. Furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. Fluid applied air and moisture barrier membrane; vapor permeable.
   1. Basis of Design: Sto Gold Coat

C. This section includes weather-resistive barriers, including sealing joints and protrusions through membranes, with accessories as required for a complete installation.

1.2 RELATED SECTIONS

A. Section 07 24 00 – Exterior Insulation Finish Systems

B. Section 09 29 00 – Gypsum Board

1.3 REFERENCES

A. The Air Barrier Association of America (ABAA).

B. American Association of Textile Chemists and Colorists (AATCC):
   1. AATCC 127 - Water Resistance: Hydrostatic Pressure Test

C. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Incorporated (ASHRAE):
   1. ASHRAE - Handbook-Fundamentals.
   2. ASHRAE 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
   3. ASHRAE 189.1 - Standard for the Design of High Performance Green Buildings Except Low-Rise Residential Buildings.

D. ASTM International (ASTM)
   1. ASTM C1177/C117M Standrd Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
   2. ASTM C1305/C1305M Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane.
   3. ASTM D522/D522M Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
   4. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
   5. ASTM D4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
   6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   7. ASTM E96/E96M Standard Test Method for Water Vapor Transmission of Materials.

8. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.
9. ASTM E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.
10. ASTM E783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
11. ASTM E1186 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.
12. ASTM E1827 Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door.
13. ASTM E2178 Standard Test Method for Determining Air Leakage Rage and Calculation of Air Permeance of Building Materials.
14. ASTM E2357 Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies.

E. ICC Evaluation Service, LLC.; a subsidiary of the International Code Council.
   1. AC 212 - Water-resistive Coatings Used as Water-resistive Barriers over Exterior Sheathing.
   2. ICC ESR 1233

F. International Building Code (IBC).

G. International Energy Conservation Code (IECC).

H. National Fire Protection Association (NFPA):
   1. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

I. South Coast Air Quality Management District (SCAQMD):
   1. Rule 1113 - Architectural Coatings.

J. United States Environmental Protection Agency (EPA):
   1. 40 CFR Part 59 - National Volatile Organic Compound Emission Standards for Architectural Coatings.

1.4 DEFINITIONS

A. Air Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air Barrier Auxiliary Material: A transitional component that provides air barrier continuity furnished by a source other than the primary air barrier manufacturer.

D. Air Barrier Assembly: The collection of air barrier materials, accessory and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.5 SUBMITTALS

A. Submit, in accordance with Section 01 33 00 “Submittal Procedures”
   1. Product Data:
      a. Manufacturer's data sheets and specifications on each product to be used.
      b. Preparation instructions and recommendations.
      c. Storage and handling requirements and recommendations.
      d. Manufacturer’s installation instructions and details.
      e. Typical installation methods.

   2. Verification Samples
      a. Two 6 inch x 6 inch representative samples of dry (as to be installed) weather barrier.

   3. Shop drawings
      a. Substrate joints, cracks, flashing transitions, penetrations, corners, and terminations
      b. Detail tie-ins with adjoining construction and interfaces with separate materials that form part of the air barrier assembly.

   4. Manufacturer's ICC evaluation report confirming compliance with the IBC, IRC, and IECC as an air barrier and water-resistive barrier.

   5. Manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer Requirements:
   1. Manufacturer of exterior wall air and moisture barrier materials for a minimum of 30 years in North America.
   2. Maintain current registered ISO 9001:2008 Certified Quality System and ISO 14001:2004 Certified Environmental Management System.

B. Installer Requirements:
   1. Knowledgeable in the proper use and handling of manufacturer's materials.
   2. Employ skilled mechanics who are experienced and knowledgeable in waterproofing and air barrier applications and who are familiar with the requirements of the specified work.
   3. Provide the proper equipment, number of workers, and supervision on the job-site to install the air barrier assembly in compliance with the project plans and specifications, shop drawings, and manufacturer's published specifications and details.

C. Regulatory Compliance: Primary air barrier and joint treatment materials.
   1. VOC requirements for Building Envelope Coatings of SCAQMD Rule 1113.
   2. Material requirements of ASHRAE 90.1.
   3. Material requirements of ASHRAE 189.1.
   4. IRC requirement for a continuous air barrier.
   5. Material requirements of IBC and IECC.
   6. Requirements of ICC-ES AC 212 for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing.
   7. Listed by IBC and recognized for use on all types of construction. Refer to ICC ESR

1233 for limitations.
8. Evaluated and Listed by ABAA as an air barrier material.

D. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

E. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
3. Retain mock-up during construction as a standard for comparison with completed work.
4. Do not alter or remove mock-up until work is completed or removal is authorized.

1.7 PRE-INSTALLATION CONFERENCE

A. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.8 PRE-CONSTRUCTION TESTING

A. Conduct site testing by qualified test agency or building envelope consultant.
1. Conduct assembly air leakage testing in accordance with ASTM E783.
2. Conduct adhesion testing to substrates in accordance with ASTM D4541.
3. Conduct wet sealant compatibility testing in accordance with sealant manufacturer's field quality control test procedure.
4. Notify design professional minimum 7 days prior to testing.

1.9 DELIVERY, HANDLING, AND STORAGE

A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product, batch number and shelf life.

B. Handle products in accordance with manufacturer's printed recommendations.

C. Storage
1. Store products in a dry area with temperature maintained between 40 and 80 degrees F (4 and 27 degrees C).
2. Protect from direct sunlight, freezing, and from extreme heat (greater than 100 degrees F (37.7 degrees C).

D. Storage:
1. Protect coatings (pail products) from freezing temperatures and temperatures in excess of 90 degrees F (32 degrees C). Store away from direct sunlight.
2. Protect Portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.
3. Protect and store accessory and auxiliary products in accordance with manufacturer's written instructions.

1.10 PROJECT SITE CONDITIONS

A. Maintain ambient and surface temperatures between 40 degrees F (4 degrees C) and 100 degrees F (38 degrees C), during application and drying period, and for minimum 24 hours after application of air/moisture barrier materials.

B. Provide supplementary heat for installation in temperatures less than 40 degrees F (4 degrees C) or if surface temperature is likely to fall below 40 degrees F (4 degrees C).

C. Provide protection of surrounding areas and adjacent surfaces from application of materials.

D. Prevent water infiltration into walls or behind the applied materials.

1.11 COORDINATION AND SCHEDULING

A. Coordinate the work of this section closely with related sections and trades.
   1. Sequence work to provide protection of construction materials from weather deterioration.

B. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuous air barrier, vapor barrier, and WRB.

C. Provide protection of rough openings before installing windows, door frames, doors, and other penetrations through walls.

D. Provide sill flashing to direct water to the exterior before windows, door frames, and doors are installed.

E. Install window and door frame head flashings immediately after window and door frames are installed.

F. Install diverter flashings to direct water to the exterior at locations where water can enter the assembly.

G. Install parapet cap flashing and similar flashings at copings and sills to prevent water entry into the wall assembly.

H. Cladding Installation
   1. Install cladding within 90 days of air and moisture barrier installation.

1.12 WARRANTY

A. Provide manufacturer's standard warranty.

PART 2 - PRODUCTS

2.1 AVAILABLE MANUFACTURERS

A. Basis of Design Manufacturer

1. Sto Corporation; Atlanta, GA 30331; (800) 221-2397; (404) 346-3666; www.stocorp.com

B. Requests for substitutions will be considered in accordance with the provisions of Section 01 60 00 - Product Requirements.

2.2 FLUID APPLIED AIR AND MOISTURE BARRIER MEMBRANE; VAPOR PERMEABLE

A. Basis of Design: StoGuard with Sto Gold Coat No. A1000G. Ready-mixed flexible spray or roller applied air and moisture barrier material.
   1. Accessory Materials:
      a. Sheathing Joint Treatments: Sto Gold Fill with StoGuard Mesh. Ready mixed coating applied by trowel or knife over nominal 4.2 oz per sq yd (142 g per sq m) self-adhesive, flexible, symmetrical, interlaced glass fiber mesh.
      b. Rough Opening Treatments: Sto Gold Fill with StoGuard Mesh. Ready mixed coating applied by trowel or knife with nominal 4.2 oz per sq yd (142 g per sq m) self-adhesive, flexible, symmetrical, interlaced glass fiber mesh. Also used as a detail component for shingle lap transition at flashing.
      c. Transition Detail Components:
         1) StoGuard Transition Membrane: Flexible air and moisture barrier membrane for continuity at static transition such as sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, and shingle lap transitions to flashing. Also use for dynamic joints such as floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction.
         2) Sto RapidGuard: One component STPE rapid drying gun-applied treatment for sheathing joints, rough openings, seams, cracks, penetrations and other static transitions in above grade wall construction such as shingle lap transition to flashing, wall to balcony floor slab or ceiling, and through wall penetrations; pipes, electrical boxes, and scupper penetrations.

      d. Primers: StoGuard Primer. Rubber resin emulsion primer for use with StoGuard Tape to enhance adhesion.

   2. Patching and Leveling Material for Concrete and Masonry:
      a. Sto Leveler: Polymer modified cementitious patch and leveling material for prepared concrete and masonry surfaces up to 1/4 inch (6 mm).

   3. Auxiliary Materials
      a. Wet sealant: Dow Corning 758, 790, 791, and 795 sealants.
      b. Pre-cured sealant tape: Dow 123.
      c. Spray adhesive: 3M Super 77 Spray Adhesive .
      d. Spray foam: Dow Great Stuff for Gaps and Cracks.

B. Performance Requirements:
   1. Durability per ICC ES AC 212: Resistance to aging, water and water penetration resistance, structural loading. Joint treatment and primary air barrier material.
   2. Flexibility per ASTM D 522: Primary air barrier material, no cracking or delamination before and after aging using 1/8 inch (3 mm) mandrel at 14 degrees F (10 degrees C).
   3. Nail Sealability per ASTM D1970 7.9.1: Primary air barrier passes.

4. Mold Resistance per ASTM D 3273: No mold growth after 28 day exposure.
5. Adhesion per ASTM C 297 or D 4541: Joint treatment and primary air barrier material; greater than or equal to 30 psi (207 kPa), or exceeds strength of glass mat facing on glass mat gypsum substrates.
6. Surface Burning per ASTM E 84: Joint treatment and primary air barrier material. Class A building material.
   a. Flame Spread: Less than or equal to 25.
   b. Smoke Developed: Less than or equal to 450.

7. Water Vapor Permeance per ASTM E 96: Method B, greater than 10 perms (570 ng/Pa/s/sq m).
8. Field Adhesion Testing per ASTM D 4541: Greater than 30 psi (207 kPA) or exceeds strength of glass mat facing on glass mat gypsum substrates.
9. Fire Resistance for ASTM E 119: Permitted for use in exterior walls of fire-resistance-rated construction assemblies. Refer to ICC-ESR 1233.
10. Building Envelope Air Leakage per ASTM E779 or ASTM E1827: Less than 0.4 cfm/sq ft (2 L/s/sq m).
11. Material Air Leakage per ASTM E 2178: Primary air barrier and joint treatment to be less than 0.004 cfm per sq ft at 1.57 psf (0.02 L/s/sq m at 75 Pa).
12. Assembly Air Leakage per ASTM E 2357: Less than 0.04 cfm per sq ft (0.2 L/s/sq m) air leakage after conditioning protocol.
13. Fire Propagation per NFPA 285: Meets requirements for use on all types of construction. Refer to ICC-ESR 1233.
14. Volatile Organic Compounds per SCAQMD Rule 1113: Joint treatment and primary air barrier material less than (100 g/L).
15. Water-resistive Barrier per ICC ES 212, joint treatment and primary air barrier comply and are listed in a valid ICC ESR.

C. Design Criteria:
   1. Structural Wind and Axial Loads:
      a. Design for maximum allowable deflection normal to plane of wall: L/240. Where cladding dictates stiffer deflection criteria use cladding design criteria for maximum allowable deflection.
      b. Design for wind load in conformance with code requirements.

   2. Moisture Control:
      a. Prevent accumulation of water in wall assembly and behind exterior wall cladding:
         1) Minimize condensation within the assembly.
         2) Drain water directly to exterior where it is likely to penetrate components in wall assembly such as windows and doors.
         3) Provide corrosion resistant flashing to direct water to exterior in accordance with code requirements, including above window and door heads, beneath window and door sills, at roof/wall intersections, floor lines, decks, intersections of lower walls with higher walls, and at the base of the wall.

   3. Air Barrier Continuity: Provide continuous air barrier assembly of compatible air barrier components.

   4. Substrates:
      a. Concrete Masonry Units: CMU surfaces in conformance with applicable building

code, and such that a void and pinhole free air barrier is achieved. Provide normal weight units with flush joints (struck flush with the surface) and allow for a minimum of 2 coats of the primary air barrier material applied by spray or roller Alternatively, for "rough" CMU wall surfaces allow for a cementitious parge coat to fill and level irregular surfaces, prior to 1 coat of the primary air barrier material.

b. Sheathing per ASTM C1177: Gypsum sheathing and APA Exterior or Exposure 1 wood-based sheathing, and provide sheathing that meets required design wind pressures.

5. Mechanical Ventilation: Maintain pressurization and indoor humidity levels in accordance with recommendations of ASHRAE. See ASHRAE Handbook - Fundamentals.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which materials will be installed.
   1. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Inspect Concrete Masonry Surfaces:
   1. Contamination: Algae, dirt, dust, efflorescence, form oil, fungus, grease, mildew or other foreign substances.
   2. Surface Deficiencies: Weak, friable, chalkiness, laitance, bugholes, and spalls.
   3. Cracks: Measure crack width and record location of cracks.
   4. Damage or deterioration.
   5. Moisture Content and Damage: Use a moisture meter to determine if surface is dry enough to receive waterproof air barrier and record any areas of moisture damage or excess moisture.
   6. Flush masonry mortar joints completely filled with mortar.

C. Inspect sheathing application for compliance with applicable requirements.
   1. Glass Mat Faced Gypsum Sheathing per ASTM C1177: Consult manufacturer's published recommendations and ICC ES Report. Conform with project requirements for wind load resistance.

D. Notify Architect in writing of unsatisfactory preparation before proceeding.

E. Do not begin installation until substrates have been properly constructed and prepared.

3.2 SURFACE PREPARATION

A. Comply with Manufacturer's Printed Instructions and the Following:
   1. Remove bond-inhibiting materials including oil, mildew, dust, dirt, efflorescence, laitance, coatings, and other foreign matter.
   2. Surface must be frost-free, and between 33 degrees F (0.6 degrees C) and 100 degrees F (37.7 degrees C). Do not apply if temperatures below 33 degrees F (0.6 degrees C) are anticipated within 24 hours of application.
   3. Do not apply to wet surfaces or surfaces with standing water. Wood, concrete or concrete masonry may be damp.

4. Wipe galvanized metal with mild solvent such as isopropyl alcohol to remove oils and bond inhibiting materials.

B. Concrete Masonry:
   1. Surface must be structurally sound and free of weak or damaged surface conditions such as laitance or spalls. Surface must be clean, dry, frost-free, and free of any bond-inhibiting materials such as dust, dirt, oil, algae, mildew, salts, efflorescence, or any other surface contamination. Mortar joints must be struck flush with the surface.
   2. Remove excess mortar from masonry ties, lintels and shelf angles.
   3. Remove loose or damaged material by water-blasting, sandblasting or mechanical wire brushing. Remove surface contamination such as dirt or efflorescence by chemical or mechanical means. Repair surface defects such as spalls, voids and holes with Sto BTS Xtra (up to 1/8 inch (3 mm) thick) or Sto Leveler (up to 1/4 inch (6 mm) thick).
   4. Repair non-structural cracks up to 1/8 inch (3 mm) wide by raking with a sharp tool to remove loose, friable material and blow clean with oil-free compressed air. Apply joint treatment material over crack, embed reinforcement (where applicable), and smooth joint treatment material with a trowel, drywall or putty knife to cover the reinforcement.

C. Sheathing:
   1. Remove and replace damaged sheathing.
   2. Spot surface defects such as over-driven fasteners, knot holes, or other voids in sheathing with knife grade joint treatment material.
   3. Spot surface defects and over-driven fasteners with knife grade joint treatment material or air/moisture barrier coating.

3.3 INSTALLATION

A. Install products in accordance with manufacturer's recommendations, approved submittals and in proper relationship with adjacent construction. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas and landscaping from contact due to mixing, handling and application of materials.

B. Application: Comply with manufacturer's printed instructions and the following:
   1. Mixing not required.
   2. Rough Openings:
      a. Apply Sto RapidGuard with caulk gun.
      b. Apply generous bead of Sto RapidGuard and spread to minimum 12 wet mils (0.3 mm) using plastic spreader.
      c. Coat the entire rough opening surface and return onto exterior face of sheathing minimum 2 inches (51 mm) around perimeter of opening.

   3. Sheathing Joints in Field of Wall:
      a. Fill joints that are wider than 1/4 inch (6.4 mm) with low-expanding spray foam. Trim excess spray foam flush with sheathing.

   4. Sheathing Joints at Corners:
      a. Fill sheathing joints that are wider than 1/4 inch (6.4 mm) with low-expanding spray foam. Trim excess spray foam flush with sheathing.

5. Movement Joints: Joints up to 1 inch (25 mm) wide and up to 50 percent movement, masonry control joints, through-wall joints in masonry or frame construction. Requires StoGuard Transition Membrane.
    a. Insert backer rod sized to friction fit in the joint (diameter 25 percent greater than width of joint. Recess backer rod 1/2 inch (13 mm).
    b. Apply Sto RapidGuard using a caulk gun along both sides of joint.
    c. Center StoGuard Transition Membrane along the joint and immediately press into freshly applied Sto RapidGuard.
    d. Loop StoGuard Transition Membrane into joint minimum against the backer rod surface to provide slack.
    e. Minimum bonded width of StoGuard Transition Membrane shall be 1 inch (25.4 mm) on both sides of joint.
    f. Tool both sides of the Sto RapidGuard and StoGuard Transition Membrane to seal and fully adhere transition membrane.
    g. Where horizontal and vertical expansion joints intersect, install StoGuard Transition Membrane at horizontal joints first. Stop membrane at edge of vertical expansion joints. Install vertical expansion joints to be continuous.
    h. Inspect the installed membrane for fish-mouths, wrinkles, gaps, holes or other deficiencies.
    i. Correct fish mouths by cutting then embedding the area with additional Sto RapidGuard under and over the membrane.
    j. Seal gaps, holes and complex geometries at three-dimensional corners with additional Sto RapidGuard as needed to provide a continuous seal.

6. Transitions to Flashing:
    a. StoGuard Mesh:
        1) Apply strip of StoGuard Mesh along upper leg of flashing and extending minimum 2 inches (51 mm) onto wall surface.
        2) Apply Sto RapidGuard to minimum thickness of 12 wet mils (0.3 mm) and fully coating the reinforcing mesh.

    b. StoGuard Transition Membrane:
        1) Apply Sto RapidGuard to vertical flashing leg and surface of wall to receive transition membrane.
        2) Place StoGuard Transition Membrane in wet Sto RapidGuard and tool flat, using excess StoGuard RapidGuard to embed edges of transition membrane.
        3) Apply additional Sto RapidGuard along top edge of StoGuard Transition Membrane and tool to provide a continuous lap onto the transition membrane.
        4) Inspect the installed membrane for fish-mouths, wrinkles, gaps, holes or other deficiencies.
        5) Correct fish mouths by cutting then embedding the area with additional Sto RapidGuard under and over the membrane.
        6) Seal gaps, holes and complex geometries at three-dimensional corners with additional Sto RapidGuard as needed to provide a continuous seal.

7. Transitions to Dissimilar Substrates (no expansion joint in substrate construction):
    a. Sto RapidGuard:
    b. StoGuard Transition Membrane:
        1) Apply Sto RapidGuard to substrates on both sides of the joint between dissimilar substrates.

2) Place StoGuard Transition Membrane in wet Sto RapidGuard and tool flat, using excess Sto RapidGuard to embed edges of transition membrane.
3) Apply additional Sto RapidGuard along top edge of StoGuard Transition Membrane and tool to provide a continuous lap onto the transition membrane.
4) Inspect the installed membrane for fish-mouths, wrinkles, gaps, holes or other deficiencies.
5) Correct fish mouths by cutting then embedding the area with additional Sto RapidGuard under and over the membrane.
6) Seal gaps, holes and complex geometries at three-dimensional corners with additional Sto RapidGuard as needed to provide a continuous seal.
7) StoGuard Transition Membrane Overlaps:
   a) Shingle-lap, minimum 2 inches (51 mm), StoGuard Transition Membrane where required for vertically oriented applications.
   b) Overlap horizontal applications of StoGuard Transition Membrane minimum 2 inches (51 mm).
   c) Use Sto RapidGuard to bond layers of StoGuard at overlaps.

8. Top-Coating Sto RapidGuard:
   a. Apply the specified StoGuard waterproof air-barrier coating to Sto RapidGuard within 48 hours after Sto RapidGuard has achieved initial cure. Sto RapidGuard may have a tacky feel, but material will be firm and will not transfer with firm pressure and contact.

C. Air/Moisture Barrier Installation over Glass Mat Faced Gypsum Sheathing per ASTM C 1177, and concrete masonry (CMU) wall construction.
   1. Coordinate work with other trades to ensure air barrier continuity with connections at foundation, floor lines, flashings, lintels and shelf angles, openings and penetrations such as pipes, vents, windows and doors, masonry anchors, rafters or beams, joints in construction, projections such as decks and balconies, and roof line.
   2. Transition Detailing: detail transition areas with Sto RapidGuard or StoGuard Transition Membrane to achieve air barrier continuity. For illustrations of installation, refer to Sto Guide Details and Sto RapidGuard Installation Guide or StoGuard Transition Membrane Installation Guide.
   3. Rough Opening Protection: Install rough opening protection. Refer to Sto details and applicable Sto product bulletins.
   4. Sheathing Joints: Install joint treatment material over sheathing joints. Refer to Sto details and applicable Sto product bulletins.
   5. Air and Moisture Barrier Coating:
      a. Concrete Masonry: Install one liberal coat of Sto Gold Coat by spray or roller in a uniform, continuous film to the prepared concrete masonry substrate. Backroll spray applications. Allow to dry. Install a second liberal coat in a uniform, continuous film, and backroll spray applications, to achieve a void and pinhole free surface. Depending on the condition of the surface a minimum of 10 wet mils up to a maximum of 30 wet mils per coat is required. Apply additional coats if needed to achieve a void and pinhole free surface. Do not install over working or moving joint sealants.
      b. Sheathing:
         1) Glass Mat Faced Gypsum Sheathing: Install one coat of Sto Gold Coat by spray or roller in a uniform, continuous film of 10 wet mils to the prepared glass mat gypsum substrate to achieve a void and pinhole free surface. Do

not install over working or moving joint sealants.

D. CI Installation:
   1. General Rules for Installation of CI:
      a. Cut boards at 16 or 24 inch (406 or 610 mm) score lines as needed to accommodate spacing of clips, ties, or furring in wall assembly.
      b. Install boards in a running bond pattern with vertical joints offset. Stagger joints minimum 6 inches (152 mm) from sheathing joints. Cut insulation in an "L" shape around openings in the wall to avoid alignment of joints with corners. Tightly abut insulation board joints and interlock boards at inside and outside corners.
      c. Trim or rasp boards for flush, square corners.
      d. Where brick ties or other elements penetrate the insulation pre-fit and cut the insulation, or install in a manner to avoid breakage and gaps in the insulation.
      e. Seal gaps and open joints in insulation with StoTurboStick Mini or Sto TurboStick spray foam. After adhesive sets, rasp or shave expanded foam flush with the surface if necessary for cladding attachment. Do not install CI over working or moving joints or joint sealants.

   2. Adhesive Attachment Methods with Sto ExtraSeal:
      a. Notched Trowel Method (where drainage behind the insulation board is required):
         1) Apply a uniform coat of Sto ExtraSeal at approximately 3/8 inch (9 mm) thick by spray or trowel to the wall surface.
         2) Form vertical ribbons of adhesive with a 1/2 x 1/2 x 2 inch (13 x 13 x 51 mm) "U"- notched trowel.
         3) Alternatively, apply adhesive uniformly to the back of the insulation board and form vertical ribbons of adhesive with the notched trowel.

      b. Immediately place insulation boards against the wall surface before adhesive "skins". If adhesive "skins" remove and apply fresh material. Install insulation with firm, even pressure applied along the full dimension of the boards in courses starting from the base of the wall in a running bond pattern.

   3. Adhesive Attachment Method with Sto TurboStick Mini or Sto TurboStick (where drainage behind the insulation board is required):
      a. Apply uniformly spaced vertical ribbons of adhesive at no more than 7 inches (178 mm) on center and spaced approximately 3/4 inch (19 mm) from board ends and 1/2 inch (13 mm) from board edges.
      b. Install boards with light even pressure across the face of the boards.
      c. Several minutes after the boards are placed it may be necessary to re-apply light even pressure with a straight edge to maintain the plane of the insulation boards, as the adhesive expands slightly while curing.

3.4 FIELD QUALITY CONTROL

A. Inspections
   1. Air barrier materials are subject to inspection to verify compliance with requirements.
      a. Condition of substrates and substrate preparation.
      b. Installation of primary air barrier material, accessory materials, and compatible auxiliary materials over structurally sound substrates and in conformance with architectural design details, contractor's shop drawings, project mock-up, and manufacturer's written installation instructions.

c. Air barrier continuity and connections without gaps and holes at foundation, floor lines, flashings, lintels and shelf angles, openings and penetrations such as pipes, vents, windows and doors, masonry anchors, rafters or beams, joints in construction, projections such as decks and balconies, and roof line.

B. Tests
   1. Air barrier materials and assembly are subject to tests to verify compliance with performance requirements.
      a. Qualitative air leakage test: ASTM E1186
      b. Quantitative air leakage test: ASTM E779, E783, and E1827.
      c. Adhesion test: ASTM D4541
      d. Qualitative adhesion and compatibility testing: wet sealant manufacturer's field quality control adhesion test

C. Repair non-conforming substrates and air barrier material installation to conform to project requirements.

D. Take corrective action to repair and replace, or reinstall materials, seal openings, gaps, or other sources of air leakage to conform to project performance requirements.

3.5 CLEANING AND PROTECTION

A. Protect air barrier materials from damage during construction caused by wind, rain, freezing, continuous high humidity, or prolonged exposure to sun light.

B. Protect air barrier materials from damage from trades, vandals, and water infiltration during construction.

C. Repair damaged materials to meet project specification requirements.

D. Clean spills, stains, soiling from finishes or other construction materials that will be exposed in the completed work with compatible cleaners.

E. Remove all masking materials after work is completed.

END OF SECTION – 072500 AIR & MOISTURE BARRIER

SECTION 072614 - UNDER SLAB VAPOR RETARDER

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes vapor retarder, seam tape, mastic, and pipe boots or collars for installation under concrete slabs.

1.02 RELATED SECTIONS

A. Cast-In-Place Concrete

1.03 REFERENCES

A. ACI 302.1R-96: Vapor Retarder Location, Addendum to Guide for Concrete Floor and Slab Construction.

B. ASTM D4263 – 83: Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

C. ASTM E 1745-97: Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs

D. ASTM E 96-95: Standard Test Methods for Water Vapor Transmission of Materials.

E. ASTM E 1643-98: Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

F. ASTM F1869-04: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

G. ASTM F2170: Test Method for Determining Relative Humidity in Concrete Floor Slabs Using Probes.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”.

1. Manufacturer's product data and installation instructions.

2. Test results from an independent laboratory showing compliance with ASTM & ACI Standards.

3. Manufacturer’s standard size samples of each product specified.

1.05 QUALITY ASSURANCE

A. Pre-installation Meeting: Convene a pre-installation meeting before start of installation of under slab vapor retarder.

1. Require attendance of parties directly affecting work of this section, including Contractor, Concrete Subcontractor, Installer and Architect.

2. Review installation, protection, and coordination with other work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in clean, dry area in accordance with the manufacturer’s instructions.

C. Protect materials during handling and installation to prevent damage.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Fortifiber Building Systems Group – Fernley, NV; 800.773.4777
2. Stego Industries, LLC – New Mexico; 480.634.8048
3. W.R. Meadows – Goodyear, AZ; 623.932.9383
4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 MATERIALS

A. Under slab vapor retarder shall meet the following requirements:

1. Permeance: Less than 0.01 perms when tested in accordance with ASTM E 1745, Section 7.
2. Strength: Comply with the requirements of ASTM E 1745 Class A.
3. Acceptable Manufacturers providing material meeting the requirements are as follows:
    a. Moistop Ultra 15 - Fortifiber Building Systems Group.
    b. Stego Wrap Vapor Barrier (15 mil) – Stego Industries, LLC
    c. Perminator - W. R. Meadows.

B. Accessories:

1. General: Accessories shall be from the same manufacturer as the under slab vapor retarder.
2. Seam tape: Four-inch (4”) wide tape with a permeance rating matching that of the vapor retarder and approved by the vapor retarder manufacturer.
3. Mastic: Mastic shall be approved by the vapor retarder manufacturer.
4. Pipe Boots or Collars: Pipe boots or collars shall be fabricated in accordance with requirements of the vapor retarder manufacturer explicitly for use with the under slab vapor retarder being used for this project.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine the area to receive the vapor retarder and notify the General Contractor if areas are not acceptable.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Vapor retarder installation shall be in accordance with the manufacturer's written installation instructions and shall comply with ASTM E 1643-98 (2005) "Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs”.

1. The option for granular fill over the membrane is not allowed.

B. Level and tamp or roll granular base.

C. Place vapor retarder sheeting with the longest dimension parallel with the direction of concrete pour, completely covering the area where the concrete slab will be placed.

D. Lap vapor retarder over footings and seal around penetrations such as utilities and columns in order to create a monolithic membrane between the surface of the slab and moisture sources below the slab and at the slab perimeter.

1. The area of adhesion should be free from dust, dirt and moisture to allow maximum adhesion.

E. Lap joints 6 inches or as recommended by the manufacturer, and seal with the manufacturer's recommended adhesive or pressure sensitive tape or both in accordance with the manufacturer's installation instructions.

F. All penetrations must be sealed. All pipe, ducting, rebar and wire penetrations shall be sealed using collars, tape, mastic, and/or membrane as directed by the vapor retarder manufacturer's instructions.

3.03 PROTECTION AND REPAIRING

A. Take precautions to protect vapor retarder from damage during installation of reinforcing steel and utilities and during placement of concrete.

B. Use only concrete brick type reinforcing bar supports, or provide 6 inch by 6 inch protective pads of asphaltic hardboard or other material recommended by the vapor retarder manufacturer to protect the vapor retarder from puncture.

C. Avoid use of stakes driven through vapor retarder.

1. If stakes must be used, do so only in strict conformance with the manufacturer's recommendations for stake and pin penetration sealing.

D. Repair vapor retarder damaged during placement of reinforcing or concrete using vapor retarder material and as instructed by the vapor retarder manufacturer.

1. Lap beyond damaged areas a minimum of 6 inches; clean all adhesion areas of dust, dirt and moisture; and seal as prescribed for sheet joints.

END OF SECTION

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SECTION 074213 – METAL WALL PANELS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Concealed fastener, coil coated, wall panel and secondary metal subgirt framing.

1.02 RELATED REQUIREMENTS

A. Section 072500 – Weather Barrier

B. Section 079200 – Joint Sealants

1.03 REFERENCE STANDARDS

A. American Architectural Manufacturer's Association (AAMA):

1. AAMA 620 – Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Aluminum.

2. AAMA 2605 – Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. American Society of Civil Engineers (ASCE):

1. ASCE 7 – Minimum Design Loads for Buildings and Other Structures.

C. ASTM International (ASTM):

1. ASTM B 209 – Specification for Aluminum and Aluminum Alloy Sheet and Plate.

2. ASTM B 221 – Specification for Aluminum and Aluminum-Allory Extruded Bars, Rods, Wire, Profiles, and Tubes.
3. ASTM D 3359 - Standard Test Methods for Measuring Adhesion by Tape Tests.
4. ASTM E 329 – Standard Specification for Agencies Engaged in construction In section and/or Testing.
5. ASTM E 72 – Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide modular metal wall panel system meeting performance as determined by application of specified tests by a qualified testing agency on manufacturer's standard assemblies.

B. Structural Performance: Design modular metal wall panel system fabricated to withstand the effects of applicable wind loads. Refer to Structural Drawings.

C. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Approved manufacturer with minimum 10 years' experience in manufacture of similar products in successful use in similar applications.

B. Wall Systems Installer Qualifications: Experienced installer with minimum of 5 years' experience with successfully completed projects of similar nature and scope.

1.06 SUBMITTALS

A. Product Data: Manufacturer's data sheets for specified products.

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B. Shop Drawings: Provide shop drawings prepared by manufacturer or manufacturer's authorize dealer. Include full elevations showing openings and penetrations. Include details of each condition of installation and attachment. Provide details at a minimum scale 3-inch per foot of all required trim and extrusions needed for a complete installation.

1. Include data indicating compliance with performance requirements.

2. Indicate points of supporting structure that must coordinate with modular metal panel system installation.

C. Field Measurements: Verify locations of structural members, adjoining construction and wall openings dimensions by field measurement before panel fabrication and indicate measurements on final shop drawings.

D. Samples for initial Selection: For each product specified including sealants and gaskets. Provide representative color charts of manufacturer's full range of colors.

E. Samples for Verification: Provide 24-inch (600 mm) section of wall panel showing, horizontal joinery, vertical joint return, panel stiffener and anchoring details. Provide 12-inch (300 mm) long pieces of each extruded aluminum trim.

F. Product Test Reports: Indicating compliance of products with requirements, from a qualified independent testing agency.

G. Maintenance data.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect products of modular metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage.

1. Deliver, unload, store, and erect modular metal wall panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.

1.08 WARRANTY

A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal wall panel assemblies that fail in materials and workmanship within two (2) years from date of Substantial Completion.

B. Special Panel Finish Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace wall panels which indicate evidence of finish deterioration within twenty (20) years from date of Substantial Completion.

PART 2 – PRODUCTS

2.01 SYSTEM DESCRIPTION

A. **Modular Metal Wall Panels:** Modular metal wall panels applied as exterior cladding over a metal-framed wall assembly.

2.02 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Centria Architectural Systems – Moon Township, PA; 800.759.7474.

2. IMETCO – Norcross, GA; 800.646.3826.

3. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options.”

2.03 MATERIALS

A. Aluminum Sheet: Smooth surface coil-coated sheet, ASTM B209, 3105-H14 Alloy.

1. Aluminum Material: Tension-leveled

2. Thickness: 0.060” nominal

3. Weight: Approximately 1.5 lb per square foot

2.04 MODULAR METAL PANELS

A. Modular Metal Panels: Factory-formed, aluminum-faced panels fabricated from 0.60” thick aluminum coil-coated sheet.

1. Panel Depth: 1-3/8” (35mm).

2. Panel Flatness: Maximum allowable distortion: 1/32 inch in 24 inches (0.813 mm in 610 mm) in any direction. Panel lines, breaks, and angles shall be sharp and true, and surfaces shall be free from warp or buckle.

3. Clips: Manufacturer’s standard clips as required to meet performance requirements.

4. Panel Joints: ¾” (19mm)

5. Panel Sizes: As indicated on drawings.

6. Installation: Horizontal.

B. Sheet Surface: Smooth.

C. Aluminum Face Sheet Coil-Coated Finish:

1. Fluoropolymer Two-Coat System: 0.8 mil primer with 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621.

a. Basis of Design: **CENTRIA Duragard**.

2. Color: As selected by Architect form manufacturer’s full range of colors.

D. Unexposed finish: Manufacturer’s standard nominal 0.5 mil nominal DFT backer coating.

E. Exposed trim, flashings and Fastener Finish: Match panel finish.

1. Thickness: 0.060” nominal

2.05 SECONDARY METAL SUBGIRT FRAMING

A. Secondary metal subgirt framing components shall be cold-formed metallic-coated steel sheet complying with ASTM A 653M, G90 (Z180).

1. Hat Channels: As recommended by the Manufacturer for the installation conditions.

2. Sill Channels: As recommended by the Manufacturer for the installation conditions.

2.06 ACCESSORIES

A. Provide manufacturer’s factory-formed clips, shims, flashings, sealants, and tapes for a complete installation.

2.07 FABRICATION

A. General: Fabricate modular metal panels and accessories at factory identical to tested units using manufacturer's standard procedures and processes necessary to meet performance requirements.

1. Provide components of modular metal panel system that are products of one manufacturer, including modular metal panels, head and sill trim, bottom weep, starter flash, and metal copings.

B. Modular Metal Panels: Fabricate modular metal panels requiring no further fabrication or modification in field.

1. Horizontal Joints: Dry seal, drained and back ventilated

2. Vertical Joints: Pre-formed returns

3. Reveals: ¾" (19mm)

4. Standard System Depth: 1-3/8" (35mm)

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine modular metal panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of modular metal panel system.

1. Inspect framing that will support modular metal panel system manufacturer:

a. Maximum deviations acceptable to modular metal panel system manufacturer:

1) ¼ -inch in 20 feet (6.4 mm in 6 m) vertically or horizontally from face plane of framing.

2) ½-inch (12.7 mm) maximum deviation from flat substrate on any building elevation.

3) 1/8-inch in 5 feet (3.2 mm in 1.5 m).

2. Confirm presence of acceptable framing members to match installation requirements of modular metal panel system.

3. Verify that window, door, louver and other penetrations match layout on shop drawings.

B. Advise General Contractor of out-of-tolerance work and other deficient conditions prior to proceeding with modular metal wall panel system installation.

3.02 SECONDARY METAL SUBGIRT FRAMING INSTALLATION

A. Install secondary metal framing components in accordance with the manufacturer's written installation instructions and approved shop drawings.

3.03 MODULAR METAL PANEL SYSTEM INSTALLATION

A. General: Install modular metal panel system in accordance with approved shop drawings and manufacturer's recommendations.

B. Installation: Attach panels to metal sub-framing using recommended clips, screws, fasteners, sealants, and adhesives indicated on approved shop drawings.

1. Horizontal Joinery: Working from base of installation to top, connect upper panel to lower panel at joinery.

2. Vertical Joinery: Provide reveal between vertical ends of panels as shown on shop drawings.

3. Galvanic Action: Where elements of modular metal wall system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.

C. Rainscreen Installation: Proceed with installation of manufacturer's dry seal horizontal joinery. Keep open spaces in horizontal joinery intended to ventilate cavity behind system.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a service representative authorized by metal wall panel manufacturer to inspect completed installation. Submit written report. Correct deficiencies noted in report.

3.05 CLEANING AND PROTECTION

A. Remove temporary protective films within 2 weeks of erection. Clean finished surfaces as recommended by metal wall panel manufacturer. Clear weep holes and drainage channels of obstructions, dirt, and sealant. Maintain in a clean condition during construction.

B. Replace damaged panels and accessories that cannot be repaired by field repair.

END OF SECTION

SECTION 075400 – THERMOPLASTIC MEMBRANE ROOFING

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes a single ply, fully adhered, thermoplastic membrane roofing system over decking and includes the following:

1. Insulation.
2. Cover Board.
3. Roofing Membrane.
4. Accessories.

1.02 RELATED SECTIONS

A. Section 006100 – Rough Carpentry

B. Section 076200 – Sheet Metal Flashing and Trim

C. Section 077233 – Roof Hatch

1.03 QUALITY ASSURANCE

A. Single Source: Components of roof system including rigid insulation, membrane, flashings, fasteners, and accessories shall be provided by a single manufacturer and shall be products of that manufacturer or specifically approved by manufacturer for installation as part of roof system.

B. Manufacturer Qualifications: Manufacturer shall be manufacturer of existing warranted roof system to maintain consistency in materials, assemblies, and warranties.

C. Installer Qualifications: Installer shall be original installer of existing warranted roof system or installer certified by the manufacturer to modify existing warranted roof system.

D. Inspections: The Manufacturer of the roofing system shall attend the roof pre-installation conference to accept the conditions of the work and shall perform interim inspections during installation.

1. After the roof installation is complete, the Manufacturer's technical representative shall inspect the work and inform (by written report) the Architect, Contractor, and Installer of defective / incomplete work to be remedied.
2. Those areas indicated shall be corrected to the full satisfaction of the Architect and Manufacturer.
3. The Manufacturer shall submit written acceptance of the project to the Architect indicating the roofing system has been installed according to the Manufacturer's published specifications and details.
    a. Acceptance shall include issuance of the roofing warranty.

1.04 REFERENCES

A. ASTM C 1289: Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

B. ASTM C 1371: Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.

C. ASTM C 1549: Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.

D. ASTM D 751: Standard Test Methods for Coated Fabrics.

E. ASTM D 6878: Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.

F. FMDS 1-28: Wind Design; Factory Mutual Research Corporation.

G. NRCA ML104: The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association.

H. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.

I. Underwriters Laboratories (UL): Roofing Systems and Materials Guide.

1.05 SUBMITTALS

A. Provide submittals in accordance with Section 013300 “Submittal Procedures”.

1. Product Data: Provide data indicating membrane materials, flashing materials, insulation, surfacing, and fasteners.

2. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.

3. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, and expansion joint locations.

4. Samples: Submit 3 samples, 12 inches x 12 inches in size, illustrating roof membrane seam.

5. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

6. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, and supplementary instructions given.

7. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Store products in weather protected environment, clear of ground and moisture.

C. Protect foam insulation from direct exposure to sunlight.

1.07 COORDINATION

A. Pre-installation Meeting: Convene one week before starting work of this section.

B. Review preparation and installation procedures and coordinating and scheduling required with related work, including, but not limited to:

1. Weather conditions forecast.

2. Preparation of substrate and penetrations through roof.

3. Availability of roofing materials.

4. Coordination with installation of flashing.

5. Protection of installed items and finishes.

1.08 WARRANTY

A. Refer to Section 017800 “Closeout Submittals” for additional information for submitting warranties.

B. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind, hail or other natural causes.

1. Warranty Term: 20 years total.

a. Total System includes insulation, recovery board, membrane, flashings, fasteners, plates, adhesives, and sealants.

2. For repair and replacement include costs of both material and labor in warranty.

3. No dollar limit on repair costs.

4. Exceptions NOT Permitted:

a. Improper installation, damage from environmental contaminants, damage from ponding water, or damage from water that does not drain freely.

b. Damage due to wind of speed not less than 70 mph.

C. Roofer’s Guarantee: Provide written guarantee from the Contractor stating that the Contractor will respond within 24 hours and repair within 5 business days, any leaks in the roofing assembly for the initial 2 years at no cost to the Owner.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Carlisle Syn Tec – Carlisle, PA; 800.479.6832

2. Firestone Building Products – Indianapolis, IN; 800.428.4442

3. GAF Materials Coporation – Dallas, TX; 972.851.0500

2.02 ROOFING

A. Thermoplastic Membrane Roofing: Everguard TPO 60 mil thermoplastic single ply roofing membrane by GAF Materials Corporation.

B. Roofing Requirements:

1. Roof Covering External Fire-Resistance Classification: UL Class ‘A’.

2. Factory Mutual Classification: Class I and Windstorm Resistance of I-75 in accordance with FM DS 1-28.

C. Insulation Requirements:

1. Minimum 2 layers of polyisocyanurate board.

2. Thermal Value: Minimum average R of 30.0.

2.03 INSULATION

A. Rigid Polyisocyanurate Board Insulation:

1. Material: Polyisocyanurate insulation complying with ASTM C 1289.

2. Board Size: 4’-0” x 4’-0” and 4’-0” x 8’-0”.

3. Edge: Square.

4. Thermal Resistance: R value of 6.0 per inch.

5. UL listed for Class A construction.

6. Water Absorption: 1.5 percent by volume tested in accordance with ASTM D 209.

7. Dimensional Change: Less than 2 percent lengthwise and crosswise tested in accordance with ASTM D 2126.

8. Compression Resistance: 20 psi tested in accordance with ASTM D 1621.

9. Tensile Strength: 4 psi tested in accordance with ASTM C 209.

10. Moisture Vapor Transmission: Less than 1.0 perm tested in accordance with ASTM E 96.

11. Flame Spread: Less than 75 tested in accordance with ASTM E 84.

12. Provide tapered units for crickets and as required to provide positive drainage.

2.04 COVER BOARD

A. GP Dens-Deck Roof Board as distributed by GAF Materials Corporation.

1. Overlayment board with a water resistant and silicone treated gypsum core with glass fiber facers embedded on both sides.

2. Flame Spread and Smoke Development: 0 tested in accordance with ASTM E84.

3. Size: 48 inches x 48 inches.

4. Thickness: ½ inch.

2.05 ROOFING MEMBRANE

A. Membrane:

1. Material: Thermoplastic polyolefin (TPO) complying with ASTM D 6878.

2. Thickness: 60 mil minimum.

3. Breaking Strength: 330 lbf x 310 lbf tested in accordance with ASTM D 751, Grab Method.

4. Factory Seam Strength: 120 lbf (membrane failure) tested in accordance with ASTM D 751.

5. Elongation at Break: 30 percent tested in accordance with ASTM D 751.

6. Heat Aging: 100 percent tested in accordance with ASTM D 573.

7. Tear Strength: 70 lbf x 150 lbf tested in accordance with ASTM D 751.

8. Puncture Resistance: 380 lbs tested in accordance with FTM 101C Method 2031.

9. Cold Brittleness: -40 degrees C tested in accordance with ASTM D 2137.

10. Permeance: 0.070 perms tested in accordance with ASTM E 96.

11. Dimensional Change: 0.4 percent tested in accordance with ASTM D 1204.

12. Water Absorption: 0.7 percent tested in accordance with ASTM D 471.

13. Hydrostatic Resistance: 430 psi tested in accordance with ASTM D 751 Method D.

14. Ozone Resistance: No visible deterioration at 7x magnification tested in accordance with ASTM D 1149.

15. Reflectivity (White): 0.76 tested in accordance with ASTM C 1549.

16. Emmitance (White): 0.90 tested in accordance with ASTM C 1371.

17. Sheet Width: Factory fabricated into largest sheets possible.

18. Color: White.

2.06 ACCESSORIES

A. Plates and Fasteners: As recommended by the manufacturer for type of decking and installation required.

1. Fastener length as required for thickness of insulation material and penetration of deck.

B. Adhesives, Sealants, and Primers: As recommended by manufacturer.

C. Seaming Materials: As recommended by the membrane manufacturer.

D. Flashing Materials: Materials and accessories as recommended by the manufacturer for project conditions.

1. Use same material and thickness as roofing membrane whenever possible.

E. Termination Bars: Manufacturer's standard termination bars and fasteners.

F. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.

G. Roofing Expansion Joints: Manufacturer's standard roofing expansion joints for roof-to-roof, roof-to-wall, and other project conditions.

H. Walkway Pads: Manufacturer's standard type and size.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Inspect substrate for deficiencies.

1. Verify the deck is supported and secured.

2. Verify deck is clean, smooth, and flat; free of depressions, waves, or projections; properly sloped, and suitable for installation of roofing system.

3. Verify substrate is dry and free of snow or ice.

4. Do not proceed with roofing installation until all deficiencies have been corrected.

5. Start of roofing shall constitute acceptance of substrate and conditions.

B. Verify that roof openings, curbs, and penetrations through roof are solidly set, and nailing strips are in place.

3.02 PREPARATION

A. Install treated wood nailers at roof edges, metal flashings, gutters, and elsewhere indicated on drawings and approved shop drawings, and as required by the roofing system manufacturer.

B. Fasten to structural roof and wall framing with fastener heads countersunk with the surfaces of the nailer.

1. Space fasteners at 18 inches minimum or as required by the roofing system manufacturer.

3.03 INSTALLATION

A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's written installation instructions.

B. Do not apply roofing during unsuitable weather.

1. Do not apply roofing to damp or frozen deck surface or when precipitation is expected or occurring

2. Do not apply roofing when ambient temperature is outside the temperature range recommended by manufacturer.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

D. Coordinate the work with installation of associated counterflashings installed by other sections as the work of this section proceeds.

3.04 INSULATION AND COVER BOARD

A. Insulation:

1. Do not apply roof insulation until all other work has been completed which requires foot or equipment traffic on deck.

2. Do not install wet, damaged, or warped insulation boards.

3. Install insulation boards with staggered board joints in one direction.

a. Install insulation boards snug.

b. Gaps between board joints which exceed ¼ inch must be filled with like insulation material.

c. Do not kick insulation boards into place.

d. Miter and fill the edges of the insulation boards at ridges, valleys, and other changes in plane to prevent open joints or irregular surfaces.

4. Avoid breaking or crushing of the insulation at the corners.

5. Cut insulation to fit neatly to perimeter blocking and around penetrations.

6. Lay subsequent layers of insulation with joints staggered minimum 6 inches from joints of preceding layer.

7. Do not install any more insulation than will be completely waterproofed each day.

B. Roof Cover Board:

1. Install one layer of roof cover board over insulation.

2. Fit per manufacturer’s recommendations and installation instructions.

C. Mechanically fasten insulation to decking in accordance with the roofing manufacturer's written installation instructions.

a. Use fasteners of sufficient length to attach the cover board and insulation into the decking.

3.05 MEMBRANE APPLICATION

A. Start the application of membrane plies at the low point of the roof or at the drains so that the flow of water is over or parallel to, but never against the laps.

B. Use full width rolls in the field and perimeter region of roof.

1. Place membrane so that wrinkles and buckles are not formed.

a. Any wrinkles or buckles must be removed from the sheet prior to permanent attachment.

C. Roof membrane shall be fully adhered immediately after it is rolled out, followed by welding to adjacent sheets.

1. Fully adhere membrane sheets to the substrate with hot roofing asphalt at the rate recommended by the manufacturer.

2. Prevent seam contamination by keeping the asphalt application a few inches back from the seam area.

3. Adhere approximately one half of the membrane sheet at a time.

4. Roll membrane with a weighted roller to insure complete bonding between asphalt and membrane.

D. Overlap roof membrane a minimum of 3 inches for side laps and 3 inches for end laps.

1. Install membrane so that the side laps run across the roof slope lapped towards drainage points.

2. Membrane laps shall be hot-air-welded together.

a. All welds shall be continuous, without voids or partial welds.

b. Welds shall be free of burns and scorch marks.

E. All cut edges of reinforced membrane shall be sealed with EverGuard TPO Cut Edge Sealant.

3.06 FLASHING

A. Flash roof edges, intersections with vertical surfaces, curbs, ducts, scuppers, and penetrations in accordance with manufacturer’s details and written installation instructions to comply with warranty requirements.

1. Flash with coated metal, membrane flashing, and flashing accessories as required for project conditions.

2. Install termination bar and fasten in accordance with manufacturer’s details.

B. All penetrations shall be a minimum of 24 inches from curbs, walls, and edges to provide adequate space for proper flashing.

1. Flash pipes with TPO pre-molded pipe flashing where their installation is practical.

3.07 ROOF DRAINS

A. Refer to roof plan and plumbing drawings for size, type, and location of roof drains.

B. Roof drains shall be provided with a minimum 36 inch x 36 inch sump.

1. Slope of tapered insulation within the sump shall not exceed 4 inches in 12 inches.

2. Lap seam shall not be located within the sump area.

C. The roofing membrane shall be set in a full bed of water block on the drain flange prior to securement.

3.08 EXPANSION JOINTS

A. Install roofing expansion joints where indicated.

B. Install prefabricated joint components in accordance with manufacturer's instructions.

1. Expansion joint cover bellows shall be a minimum of 1.5 times the expansion joint opening.

3.09 WALKWAY INSTALLATION

A. Install walkway pads at all roof access locations, roof mounted equipment locations, and areas of repeated rooftop traffic (even if not shown on roof plan).

B. Walkway pads shall be spaced a minimum of 2 inches apart to allow for drainage between pads.

C. Fully adhere walkway pads to the roof membrane in accordance with the manufacturer's recommendations.

3.10 FIELD QUALITY CONTROL

A. Contractor shall require site attendance of roofing material manufacturer a minimum of once during installation of the roofing work and once after completion.

3.11 CLEANING

A. Do not allow trash, waste, or debris to collect on the roof. These items shall be removed from the roof on a daily basis.

B. Properly clean the finished roof surface after completion, making sure drains and gutters are not clogged.

3.12 PROTECTION

A. Protect all partially and fully completed roofing work from other construction operations until completion.

B. Stage materials in such a manner that foot traffic is minimized over completed roof areas.

C. Temporary tie-ins shall be installed at the end of each workday and removed prior to commencement of work the following day.

END OF SECTION

SECTION 076200 – SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section specifies fabricated sheet metal items including the following:

1. Trim, Flashing and Counterflashing.

2. Parapet Cap.

3. Gutters, Scuppers and Downspouts.

1.02 RELATED SECTIONS

A. Section 075400 – Thermoplastic Membrane Roofing

1.03 REFERENCES

A. AAMA 2605: Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. ASTM A 653/A 653M: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM D 226: Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

D. ASTM D 4479: Standard Specification for Asphalt Roof Coatings, Asbestos-Free.

E. ASTM D 4586: Standard Specification for Asphalt Roof Cement, Asbestos-Free.

F. SMACNA (ASMM): Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association.

1.04 SUBMITTALS

A. Provide submittals in accordance with Section 013300 “Submittal Procedures”.

1. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

2. Color Chart: Submit color chart indicating full range of standard and custom color options for selection by Architect.

3. Samples: Submit two samples 6-inch x 6 inch in size illustrating metal finish color for Architect’s final approval.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation.

1. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 – PRODUCTS

2.01 SHEET MATERIALS

A. Galvanized Steel: ASTM A 653/A 653M with G90/Z275 zinc coating.

1. Minimum 0.03-inch-thick base metal unless otherwise indicated.

B. Pre-Finished Galvanized Steel: ASTM A 653/A 653M with G90/Z275 zinc coating.

1. Minimum 0.024-inch-thick base metal unless otherwise indicated.

2. Shop pre-coated with PVDF coating.

a. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.

b. Color as selected from manufacturer's full range of standard and custom colors.

2.02 ACCESSORIES

A. Underlayment: Organic roofing felt, Type I (No. 15), complying with ASTM D 226.

B. Slip Sheet: Rosin sized building paper.

C. Primer: Zinc chromate type.

D. Protective Backing Paint: Asphaltic mastic, Type I, complying with ASTM D 4479.

E. Plastic Cement: Type I complying with ASTM D 4586.

F. Fasteners: Galvanized steel with soft neoprene washers.

G. Sealant: Exterior type compatible with the conditions.

2.03 TRIM, FLAHSING AND COUNTERFLASHING FABRICATION

A. Fabricate exposed to view sheet metal with pre-finished material.

B. Form sections true to shape, accurate in size, square, and free from distortion or defects.

1. Form pieces in longest possible lengths.

2. Form material with flat lock seams, except where otherwise indicated.

a. At moving joints use sealed, lapped, bayonet-type or interlocking hooked seams.

3. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.

4. Hem exposed edges on underside 1/2 inch.

a. Miter and seam corners.

C. Corners: Fabricate corners from one piece with minimum 18-inch-long legs.

1. Seam for rigidity and seal with sealant.

D. Concealed Cleats: Fabricate concealed cleats of same material as sheet, except unfinished, interlocking

with sheet.

E. Pitch Pans: Form sheet metal pans 6 inches square nominal size with 3 inches upstand and 4-inch flanges.

2.04 PARAPET CAP FABRICATION

A. All parapet cap designs, fabrication and installation shall be tested for resistance in accordance with ANSI / SPRI ES-1.

B. Form from 22 gage pre-finished galvanized sheet.

1. Provide cap in 10 feet lengths.

a. Cut segments shall be 5 feet minimum.

2. Profile with dimensions shown on Drawings.

a. Vary width to accommodate different parapet wall thicknesses.

3. Provide drip edges and pitch top 5 degrees minimum to roof surface.

C. Splice plates: Fabricate from 24 gage galvanized sheet steel in 6 inch minimum widths.

1. Shape to fit inside parapet cap and interlock with front and back drip edges.

2. Splice plates shall be concealed when installed and shall lock adjoining cap segments in alignment while allowing for expansion and contraction of parapet cap.

3. Finish to match parapet cap.

D. Corners: Shop fabricate as one piece matching parapet cap profile.

1. Extend legs 18 inches minimum.

2. Miter cut pieces, seam, and solder.

E. Anchor cleats: Fabricate from 18 gage galvanized sheet steel in 12-inch minimum widths.

1. Shape to interlock with front and back drip edges of parapet cap.

2.05 GUTTER, SCUPPER AND DOWNSPOUT FABRICATION

A. Gutters, Scuppers and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 10 years in accordance with SMACNA Architectural Sheet Metal Manual.

1. Gutters and Scuppers: Rectangular profile unless otherwise indicated on drawings.

2. Downspouts: Rectangular profile unless otherwise indicated on drawings.

B. Fabricate gutters, scuppers and downspouts from pre-finished galvanized sheet in accordance with SMACNA requirements and seal all joints.

C. Anchorage Devices: Hangers and Straps shall be profiled to suit gutters and downspouts.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mils.

3.03 TRIM, FLASHING AND COUNTERFLASHING INSTALLATION

A. Fit flashings tight in place with corners square, surfaces true and straight in planes, and lines accurate to profiles.

B. Apply plastic cement compound between metal flashings and felt flashings.

C. Coat dissimilar materials in contact with sheet metal and flashings:

1. Concrete and masonry: One coat bituminous paint.

2. Wood: Two coats aluminum paint.

D. Secure flashings in place using concealed fasteners.

1. Use exposed fasteners only when approved by the Architect.

2. Cover fasteners with sealant.

E. Seal metal joints watertight.

3.04 PARAPET CAP INSTALLATION

A. Parapet cap / edge flashing securement shall meet all requirements as outlined in IBC 2015, Section 1504.5 “Edge Securement for Low Slope Roofs”

B. Attach anchor cleats to wood blocking at parapet top.

1. Space cleats at 5 feet maximum.

2. Provide anchor cleats at all parapet cap joints and terminations.

C. Install splice plates at parapet cap joints.

1. Attach splice plate by interlocking to cleat.

D. Locate parapet cap butt joints over splice plates.

1. Allow 1/4 inch between abutting sections for expansion.

2. Apply two beads of sealant to splice plate prior to installing lengths of parapet cap.

E. Interlock parapet cap to cleats and splice plates.

3.05 GUTTER, SCUPPER AND DOWNSPOUT INSTALLATION

A. Gutter hanger spacing shall be 24 inches on center.

B. Secure scuppers to wall with concealed fasteners.

C. Anchor downspouts with straps at top, bottom and at midpoints no more than 5-0” on center.

1. Terminate downspouts and provide 12-inch x 30 inch prefabricated concrete splashblock.

END OF SECTION

SECTION 077233 - ROOF HATCH

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes manufactured roof hatch with safety post extension, integral support curb, hardware, and counterflashing.

1.02 RELATED SECTIONS

A. Section 055000 – Metal Fabrications

B. Section 061000 – Rough Carpentry

C. Section 075400 – Thermoplastic Membrane Roofing

1.03 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Submit manufacturer’s product data and installation instructions.

2. Submit shop drawings showing configurations, dimensions, fastening methods, and installation details.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Bilco Company - New Haven Connecticut; 203.934.6363

2. Milcor Incorporated - Lima, Ohio; 419.228.1411

3. Nystrom, Inc. - Brooklyn Park, MN; 800.547.2635

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 ROOF HATCH

A. Type: Aluminum, single leaf, integral curb, insulated roof hatch; Model S-50 as manufactured by Bilco Company.

B. Nominal Size: 30 inches x 36 inches.

C. Curb and Frame: 11 gage mil finish aluminum with 1 inch rigid insulation.

1. Provide with integral cap flashing to receive roof flashing and extended flanges for mounting to roof.

D. Cover: 11 gage mill finish aluminum exterior cover and 1 inch fiberglass insulation retained by 18 gage aluminum inner liner.

1. Provide with closed cell rubber weather seal.

E. Hinges: Heavy duty pintle type.

F. Hardware:

1. Manually operated type with compression spring operators in telescopic tubes.

2. Positive snap latch with turn handles inside and out, and padlock hasp inside.

3. Automatic hold-open arm with vinyl covered grip handle for easy release.

4. Provide hardware with cadmium plated finish.

G. Fabrication:

1. Fabricate free of visual distortion and defects. Weld corners and joints

2. Design to support 40 PSF roof load.

3. Provide weathertight assembly.

2.03 SAFETY POST EXTENSION

A. Type: Safety post extension for fixed ladders constructed of tubular steel sections with adjustable mounting brackets for attachment to ladder rungs; Model LU-1 as manufactured by Bilco Company.

B. Operation: Upward and downward movement controlled by spring balancing mechanism activated by release rod.

1. Automatically locks when fully extended.

C. Operating Instructions: Permanently mounted on safety post to be plainly visible to ladder users.

D. Finish: Black enamel.

PART 3 – EXECUTION

3.01 ROOF HATCH INSTALLATION

A. Install roof hatch in accordance with the manufacturer's written installation instructions.

1. Coordinate with installation of roofing system and flashings.

B. Anchor hatch securely to roof structure to withstand lateral forces and inward and outward pressures.

C. Apply bituminous paint on aluminum surfaces in contact with dissimilar metals.

B. Test operable components and adjust for proper operation.

3.02 SAFETY POST EXTENSION INSTALLATION

A. Coordinate provision of safety post extension with roof hatch and access ladder.

B. Install safety post extension on roof access ladder in accordance with manufacturer's written installation instructions.

C. Attach to top two rungs of ladder and center between side rails.

D. Adjust post to extend 42 inches above top rung when roof hatch is open, and post is fully extended.

END OF SECTION

SECTION 078400 – FIRE STOPPING

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes fire stopping and fire safing materials, accessories and installation.

1.02 RELATED SECTIONS

A. Division 22 – Plumbing

B. Division 23 – Mechanical

C. Division 26 - Electrical

1.03 SYSTEM DESCRIPTION

A. Fire Stopping is required to prevent the passage of flame and products of combustion through concealed spaces and openings including, but not limited to the following:

1. Openings in fire rated walls or partitions which extend to the underside of structure above ceilings.

2. Openings around pipes, conduits, ducts, and other construction passing through fire rated wall, floor, and roof assemblies.

3. Openings related to mechanical systems, electrical panels, and other construction that penetrates or in any other way interrupts fire rated wall, floor, and roof assemblies.

4. Openings in locations that would permit the free travel of flame and products of combustion through fire rated assemblies.

1.04 REFERENCES

A. ASTM E814: Methods for Fire Tests of Through-Penetration Fire Stops.

1.05 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Manufacturer’s product specifications and installation instructions for each type of material and application required.

2. Certified test reports on performances, including as applicable, heat resisting and burning characteristics, densities, compressive strength, and thermal insulating values for each material.

1.06 QUALITY ASSURANCE

A. Provide products which have been tested in accordance with ASTM E 119, UL 263, ANSI A2.1, or NFPA 251 for fire resistance, and rated by UL or other industry recognized agency for required resistances.

B. Provide products which have been tested and listed by UL for required surface burning characteristics including flame spread, fuel contributed, and smoke developed in accordance with ASTM E 84.

1. Provide complete installations with maximum flame spread of 25 unless otherwise indicated.

C. Low Emitting Materials: The volatile organic compound (VOC) content of sealants and sealant primers shall not exceed the limits defined in Rule #1168, “Adhesive and Sealant Applications” of SCAQMD.

1.07 SCHEDULING

A. Schedule fire stopping with other work so that fire stopping will not be damaged, and will be installed prior to installation of enclosing or concealing work.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. 3M – St. Paul, MN; 888.364.3577
2. Hilti – Tulsa, OK; 800.333.1150
3. Specified Technologies Inc. (STI) - Somerville, NJ; 800.992.1180
4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 FIRESTOPPING

A. Fire Stopping Material: SpecSeal Series 100 Sealant as manufactured by Specified Technologies Inc.

1. Single component, latex, water based, resilient, intumescent sealant.
2. Volume Increase in Fire: 500 percent minimum.
3. Actuation Temperature: 300 degrees F maximum.
4. Durability and Longevity: Permanent.
5. Non-toxic during installation and no long-term side effects.
6. Applicable for small and medium sized openings including the following:
    a. Combustible and non-combustible piping and conduit.
    b. Insulated pipe with 1-1/2 inches maximum insulation thickness.
    c. Loose cable.

B. Fire Safing Materials:

1. Mineral Fiber Safing Insulation: Manufacturer’s standard felted semi-rigid board of nonasbestos mineral fibers plus binders, rated noncombustible in accordance with ASTME 136, listed and labeled by UL, and listed in UL Designs similar to applications indicated.
    a. Thermafiber Safing Insulation as manufactured by United States Gypsum Company.
    b. Insulation shall have a thermal resistivity K-value at 75 degrees F of 0.25.
    c. Thickness shall be 4” unless otherwise indicated, and not less than the thickness required to obtain required fire rating.
    d. Fire Safing Density shall be nominal 4 lb/cf.
2. Mineral Wool: Loose mineral wool, rated noncombustible in accordance with ASTM E 136, free of asbestos fiber and glass fiber, suitable for stuffing into metal deck flute openings above steel structural members and as follows:
    a. Fire Safing Density shall be nominal 6 to 12 lb / cf in-place.

2.03 ACCESSORIES

A. Types recommended by fire stopping manufacturer for specific conditions and substrate surfaces:

1. Backing material, temporary dams, clips, collars, fasteners, and other devices required to position and retain materials in place.

2. Primer.

3. Wrap strip: Intumescent material used in conjunction with sealant to achieve fire rating for large combustible piping and insulated piping with insulation greater than 1-1/2 inches.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Review required fire stopping with governing authority.

1. Prior to proceeding with installation, obtain approval of thicknesses and installation methods.

3.02 INSTALLATION

A. Install fire stopping in accordance with the manufacturer's written installation instructions.

1. Consult with the manufacturer's technical representative for conditions not covered by printed instructions.

B. Provide fire stopping material as required to provide ratings or hours of fire endurance protection.

1. Comply with UL designs unless otherwise required by governing authorities.

C. Anchor fire stopping to substrate with manufacturer's recommended anchorage system and in compliance with UL designs.

D. Fire stop all interruptions to fire rated assemblies, materials, and components including where conduits, piping, and other items penetrate fire rated assemblies.

1. Do not use damaged materials.

2. Install fire stopping without gaps and voids.

3. Insure uniform density and texture.

4. Remove and replace misfitted work.

3.03 FIELD QUALITY CONTROL

A. Coordinate installation of fire stopping with other work to minimize cutting into or removal of installed fire stopping by other trades.

B. As work of other trades is completed, repair or replace fire stopping installations which have been damaged or removed.

C. Maintain complete coverage of full thickness in locations to be protected.

3.04 PROTECTION AND REPAIRING

A. Provide protection which will insure fire stopping is without damage or deterioration at time of Substantial Completion.

B. Provide protection from harmful exposures and repair or replace fire stopping which has been damaged.

END OF SECTION

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SECTION 079200 - JOINT SEALANTS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes installation of sealants in interior and exterior joints, around door frames and other components, around items penetrating structure, and wherever indicated or required to seal joints and prevent flow of air and / or water.

1.02 RELATED SECTIONS

A. Sealants specified in this section are to be installed as part of work specified in other sections. Coordinate requirements.

B. Section 078400 – Firestopping.

1.03 REFERENCES

A. ASTM C834: Latex Sealing Compounds.

B. ASTM D1056: Flexible Cellular Materials; Sponge or Expanded Rubber.

C. FS TT-S-001543: Sealing Compound: Silicone Rubber Base for Caulking, Sealing, and Glazing in Buildings and Other Structures.

D. FS TT-S-001657: Sealing Compound: Single Component, Butyl Rubber Based, Solvent Release Type.

E. FS TT-S-00227: Sealing Compound: Elastomeric Type, Multi-Component For Caulking, Sealing, and Glazing in Buildings and Other Structures.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. List of proposed products and data indicating sealant chemical characteristics, performance criteria, limitations, and colors available.

2. Samples of available colors to be selected by the Architect so that appearance is compatible with surrounding surfaces.

3. Manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

A. Low Emitting Materials: The volatile organic compound (VOC) content of sealants and sealant primers shall not exceed the limits defined in Rule #1168, “Adhesive and Sealant Applications” of SCAQMD.

1.06 PROJECT CONDITIONS

A. Do not install solvent curing sealants in enclosed building spaces without proper ventilation.

B. Maintain temperature and humidity recommended by the manufacturer before, during and after installation.

C. Store expansion joint sealer at 65 degrees F minimum for 12 hours prior to installation.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Bostik, Inc. – Wauwatosa, WI; 414.774.2250
2. Dow Corning Corporation – Midland, MI; 800.248.2481
3. Sika Corporation – Lyndhurst, NJ; 201.933.8800
4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 SEALANTS

A. Type A - Polyurethane, FS TT-S-00227, Type I, Class A:

1. Multi-component, self leveling.
2. Movement: 25 percent.
3. Joint Size Limitation:
   a. Minimum: 3/8-inch x 3/8 inch.
   b. Maximum: No width limitation, 1/2 inch deep.
4. Life Expectancy: 10 years.
5. For application with colored concrete surfaces, provide colored sealant to match color of concrete.

B. Type B - Silicone Sealant, FS TT-S-001543, Class A:

1. Single component, low modulus, ultraviolet resistant.
2. Movement: 100 percent expansion, 50 percent contraction.
3. Service Temperature Range: -65 degrees F to 300 degrees F.
4. Joint Size Limitation:
   a. Minimum: 1/8-inch x 1/8 inch.
   b. Maximum: 1-inch-wide x 1/2 inch deep.
5. Life Expectancy: 30 years.

C. Type C - Butyl, FS TT-S-001657, Type I:

1. Single component.
2. Movement: 5 percent.
3. Joint Size Limitation:
   a. Minimum: 1/4-inch x 1/4 inch.
   b. Maximum: 1/2-inch-wide x 3/8 inch deep.
4. Life Expectancy: 10 years.

D. Type D - Acrylic Latex, ASTM C 834:

1. Single component, fast setting, paintable.

2. Movement: 12 percent.

3. Joint Size Limitation:

a. Minimum: 1/4-inch x 1/4 inch.

b. Maximum: 3/4-inch-wide x 1/2 inch deep.

4. Life Expectancy: 10 years.

E. Type E - Acoustical Sealant, meeting ASTM C834 Standard Specification for Latex-Based Sealing Compounds.

1. Tested in accordance with ASTM C731, ASTM C732, ASTM C733, ASTM C734, ASTM C736, ASTM D217, ASTM D2202, ASTM D2203, and ASTM D2377.

2. Also tested in accordance with ASTM E84 (surface burning characteristics), ASTM E90 (sound tests), ASTM E1966 (fire resistant joint systems), and ASTM E814 (through-penetration firestop systems).

3. Non-hardening and non-shrinking.

4. Joint Size Limitation: 1/2 inch maximum.

5. Life Expectancy: 20 years.

2.03 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive, non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: ASTM D1056 round polyethylene foam rod oversized 30 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that joint openings are ready to receive sealants.

B. Beginning installation implies installer accepts existing surfaces.

3.02 PREPARATION

A. Clean and prime joints in accordance with the manufacturer's written installation instructions.

B. Remove loose materials and foreign matter which might impair adhesion of sealant.

C. Protect surrounding surfaces from damage or disfiguration.

3.03 INSTALLATION

A. Install products in accordance with the manufacturer's instructions.

B. Sealants:

1. Completely seal joints as required to render weathertightness, close openings, and allow movement of materials.

a. Seal around all conduit penetrations of structure.

2. Install joint backing to achieve a sealant depth no greater than 1/3 joint width.

a. Install backing with blunt instrument.

b. Do not twist rod.

3. Apply sealant within recommended application temperature ranges.

a. Consult manufacturer when sealant cannot be applied within these ranges.

4. Apply sealant with minimum exposure to air using pressure gun with nozzle cut to fit joint width.

5. Install sealant free of air pockets, foreign embedded material, ridges, and sags.

6. Tool joints concave unless otherwise noted.

7. Do not lap or feather onto adjacent surfaces.

3.04 ADJUSTING AND CLEANING

A. Clean adjacent soiled surfaces.

B. Repair or replace defaced and disfigured finishes caused by Work of this Section.

3.05 PROTECTION AND REPAIRING

A. Protect sealants until cured.

B. Visually inspect joints after 30 days.

1. Replace joints showing bond failure, excessive shrinkage, cracking, or improper curing

3.06 SCHEDULE

A. For the following locations and conditions provide the type of sealant listed except where firestopping is required. For conditions not listed follow manufacturer's recommendations.

1. Concrete Paving: Type A.

2. Aluminum Frames: Type B or as recommended by manufacturer of frames.

3. Ceramic Tile, Plastic Laminate Countertops, and Other Interior Locations Subject to Water Exposure: Type B.

4. Flashing and Sheet Metal: Type B.

5. Glass Block Expansion Joints: Type B.

6. Under Thresholds: Type B.

7. Glazing: Type C.

8. Hollow Metal Frames: Type C.

9. Gypsum Board Partitions and Other General Interior Use: Type D.

10. Around Perimeter of Sound Barrier Partitions and Items Penetrating Them as well as Other Acoustical Applications: Type E.

END OF SECTION

SECTION 081100 - STEEL DOORS AND FRAMES

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes non-rated and fire-rated interior and exterior hollow steel doors, hollow steel door and window frames, and grouting of hollow steel frames.

1.02 RELATED SECTIONS

A. Section 081400 - Wood Doors

B. Section 087100 - Finish Hardware

C. Section 088000 - Glazing (Glazing for full glazed steel doors, vision lights, and hollow metal window frames).

D. Section 099100 - Painting

E. See Door Schedule on drawings for sizes and fire ratings of hollow metal doors and frames.

1.03 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI A250.6: Hardware on Standard Steel Doors (Reinforcement Application).

2. ANSI A250.8: Recommended Specifications for Standard Steel Doors and Frames.

3. ANSI A250.10: Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

4. ANSI A250.11: Recommended Erection Instructions for Steel Frames.

B. American Society of Testing and Materials (ASTM):

1. ASTM A366: Steel, Carbon, Cold Rolled Sheet, Commercial Quality.

2. ASTM A653: Steel Sheet, Carbon, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.

3. ASTM A780: Practice for Repair of Damaged Hot-Dip Galvanized Coatings.

4. ASTM A924: General Requirements for Sheet Steel, Metallic Coated by the Hot-Dip Process.

5. ASTM C578: Rigid, Cellular Polystyrene Thermal Insulation.

C. Door Hardware Institute (DHI): Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.

D. International Conference of Building Officials (ICBO): ICBO UBC 7-2 - Positive Pressure Fire Tests of Door Assemblies.

E. National Fenestration Rating Council (NFRC): NFRC 400 - Procedure for Determining Fenestration Product Air Leakage.

F. National Fire Protection Association (NFPA):

1. NFPA 80: Fire Doors and Windows.

2. NFPA 105: Installation of Smoke-Control Door Assemblies.

G. Steel Door Institute (SDI) Publications: SDI 117 - Manufacturing Tolerances Standard Steel Doors and Frames.

H. Steel Structures Painting Council (SSPC):

1. SSPC Paint 20: Zinc-rich Primers (Type I, Inorganic, and Type II, Organic).

2. SSPC SP 5: White Metal Blast Cleaning.

3. SSPC SP 8: Pickling.

1.04 SUBMITTALS

A. Submit in accordance with Section 013300 - Submittal Procedures:

1. Manufacturer's product data.

2. Shop drawings indicating door and frame elevations, dimensions, frame configurations and profiles, cutouts for hardware, reinforcement, anchors, and details for fabrication, glazing, and installation.

3. Door and frame schedule: Use same reference numbers as indicated in Contract Documents.

4. Certificates documenting successful testing for applicable and specified requirements for fire testing, R-value, and air leakage.

5. Warranty information.

1.05 QUALITY ASSURANCE

A. Conform to the requirements of ANSI A250.8.

B. Fire rated doors and frames: Provide units identical to assemblies tested and listed by Factory Mutual (FM), Underwriters Laboratories (UL), Warnock Hersey, or other testing agency acceptable to Architect. Units shall bear testing agency labels.

1. Positive pressure: Provide certificate that fire rated doors have been tested for positive pressure in accordance with ICBO UBC 7-2.

C. Thermal resistance rating: Provide certificate that exterior doors have been tested to provide minimum R-value of 3.8 when tested in accordance with ASTM C236.

D. Air-leakage: Provide certificate that exterior doors and frames have been tested in accordance with NFRC 400 as door assembly (including weatherstripping and gaskets) with maximum air leakage of 0.4 cubic feet per minute per square foot.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Frame spreaders: Before shipment, install temporary spreaders at bottom of frames; do not remove until frames are in place.

B. Protection: During shipping and storage protect doors with cardboard or other resilient packaging. Immediately remove wrappings that become wet.

C. Storage: Store under cover in dry, vented, humidity free, protected space. Place units on blocking in upright position with a minimum of 1/4 inch air circulation space between units.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Amweld International - Irving, TX; 888.775.2397.

2. Ceco Door Products - Milan, Tennessee; 731-686-8345.

3. Steelcraft - Cincinnati, Ohio; 513-745-6400.

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 MATERIALS

A. Cold-rolled steel sheet: Commercial quality, stretcher level for flatness complying with ASTM A366.

B. Galvanized steel sheet: Comply with ASTM A924 and coated by hot dip process in accordance with ASTM A653 to A60 or G60 coating.

C. Door core:

1. Honeycomb: Resin impregnated cardboard honeycomb with 1 inch maximum cells.

2. Polystyrene: Rigid, extruded, fire retardant, closed cell board complying with ASTM C578.

D. Galvanizing repair paint: Comply with SSPC - Paint 20.

E. Primers:

1. Galvanized steel: Zinc-dust, zinc-oxide, air-dried primer.

2. Cold rolled steel: Rust-inhibiting primer complying and compatible for field applied finish paint coats. Factory applied and either air-dried or thermoset.

F. Glazing: As specified in Section 088000 - Glazing.

G. Grout: Perlite gypsum type. Mix with only enough water for stiff workable mixture.

2.03 DOOR AND WINDOW FRAMES

A. Type: Hollow steel construction manufactured in compliance with ANSI A250.8.

B. Fabrication:

1. Fabricate frames as welded units. Welds shall be full length of joint and ground smooth.

2. Mortise, reinforce with plates, and drill frames to receive hardware in accordance with ANSI A250.6. Coordinate with hardware supplier to ensure proper preparation of frames for mounting hardware items.

3. Prepare door frames for 3 silencers if required.

C. Profile: Combination type with integral stop and trim of size and configuration shown on Drawings. Minor variations to accommodate manufacturer's standard fabrication is acceptable.

D. Exterior frames:

1. ANSI A250.8 Grade: Level III - Extra Heavy Duty.

2. Material: 16 gage minimum, galvanized steel sheet.

E. Interior frames:

1. ANSI A250.8 Grade: Level II - Heavy Duty.

2. Material: 16 gage minimum, cold rolled steel sheet.

F. Provide anchors for mechanical attachment of frames to adjacent structure. Provide 3 anchors minimum for each door jamb.

1. Masonry: T strap or strap and stirrup adjustable anchors for embedment in mortar joints.

2. Metal studs: Sheet metal Z screw attached to studs.

3. Floor anchors: 18 gage, adjustable base anchor for direct attachment to floor.

4. Anchors for galvanized frames shall have hot dip galvanized finish.

G. Fire-rated frames: Provide fire-rated units as indicated in Door and Window Schedules on Drawings.

1. Characteristics of fire-rated frames shall be as indicated on schedules and specified herein.

2.04 STEEL DOORS

A. Type: Hollow steel construction manufactured in compliance with ANSI A250.8.

B. Thickness: 1-3/4 inches.

C. Fabrication:

1. Edges: Smooth, seamless, unbroken edges with no visible seams along hinge, lock, and face surfaces. Interlocking joints shall be tack welded, filled, and ground smooth.

2. Exterior Doors: Close top and bottom edges flush as integral part of door. Seal joints against water penetration.

3. Prepare doors to receive hardware in accordance with ANSI A250.6. Provide hardware reinforcement plates welded in place. Coordinate with hardware supplier to ensure proper preparation of doors for mounting hardware items.

4. Coordinate cut-outs for louvers to ensure integrity of fire rated doors.

5. Manufacturing Tolerances: Comply with SDI 117.

6. Door Numbers: Permanently stamp hinge side of door with reference number as designated on Drawings.

D. Exterior flush panel doors:

1. ANSI A250.8 Grade: Level III - Extra Heavy Duty, Model 2.

2. Face sheet: 16 gage minimum, galvanized steel sheet.

3. Core: Polystyrene rigid insulation.

4. Sound Transmission Class: STC 31, minimum.

E. Interior flush panel doors:

1. ANSI A250.8 Grade: Level II - Heavy Duty, Model 2.

2. Face Sheet: 18 gage minimum, cold rolled steel sheet.

3. Core: Honeycomb.

4. Sound Transmission Class: STC 33, minimum.

F. Fire-rated doors: Provide fire-rated units as indicated in Door Schedule on Drawings.

1. Characteristics of fire-rated doors shall be as indicated on schedule and specified herein.

2. Permanently attach fire-rating label to door edge.

2.05 FACTORY APPLIED FINISHES

A. Cold rolled steel doors and frames:

1. Preparation: In accordance with SSPC-SP 1, clean with non-petroleum solvent to remove oil, dirt, grease, and other contaminants.

    a. Remove mill scale and rust to comply with SSPC SP 5 or SSPC SP 8.

2. Pretreatment: Immediately after preparation, apply conversion coating compatible with primer.

3. Primer: Immediately after pretreatment, apply primer to prepare units for site applied paint finish.

B. Galvanized steel doors and frames:

1. Preparation: Clean with non-petroleum solvent to remove oil, dirt, grease, and other contaminants.

    a. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint in accordance with ASTM A780.

2. Pretreatment: Immediately after preparation, apply conversion coating compatible with primer.

3. Primer: Immediately after pretreatment, apply primer to prepare units for site applied paint finish.

2.06 DOOR GLAZING

A. Equip openings with glazing frames and moldings that are flush with door face.

1. Frames for fire-rated doors shall be of size and type to maintain fire rating.

B. Glazing stops: Rectangular profile.

1. Exterior stop to be non-removable.

2. Interior stop to be removable snap-on type or attached with countersunk screws.

C. Glazing: Factory glaze doors with glazing as specified in Section 088000 “Glazing”.

2.07 WINDOW GLAZING

A. Glazing stops: Provide sidelight, transom, and window frames with channel shaped glazing stops with mitered corners.

1. Provide permanent frame stop on secure side of glazing.

2. On opposite side, attach stops with countersunk screws.

B. Glass shall be as specified in Section 088000 “Glazing”.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install door and window frames in accordance with approved shop drawings, manufacturer's instructions, and ANSI A250.11.

B. Placing Frames:

1. Place frames before constructing enclosing walls and ceilings.

2. Center in opening, plumb, square and level.

3. Door jamb anchors: Install 3 minimum each jamb at hinge and strike locations.

4. Floor anchors: Install anchor directly to floor at each jamb.

C. Fully grout all hollow steel frames.

D. Seal joints around frames in accordance with Section 079200 - Joint Sealants.

E. Fit steel doors accurately in frames in accordance with ANSI A250.8.

F. Install fire-rated frames and door assemblies in accordance with NPPA 80 for class indicated in Door Schedule on Drawings.

G. Hardware: Install door hardware in accordance with Section 087100 “Finish Hardware”.

1. Locate hardware as indicated on approved shop drawings or, if not indicated, in accordance with DHI Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.

3.02 ADJUSTING AND CLEANING

A. Immediately after erection, sand smooth all rusted and damaged areas of prime coat.

1. Touch-up with compatible, air-drying primer.

B. Check and readjust hardware items, leaving doors and frames in proper operating condition.

END OF SECTION

SECTION 081400 - WOOD DOORS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes non-rated and fire-rated interior wood doors and vision lights as shown on the Drawings and numerated in the Door Schedule.

1.02 RELATED SECTIONS

A. Section 081100 – Steel Doors and Frames

B. Section 087100 – Finish Hardware

C. Section 088000 – Glazing

1.03 REFERENCES

A. ASTM E152: Methods for Fire Tests of Door Assemblies.

B. AWI: Quality Standards for Architectural Woodwork Institute.

C. UL 10 (c): Fire Tests for Door Assemblies, Positive Pressure.

D. NFPA-80: Fire Doors and Windows.

1.04 SUBMITTALS

A. Provide submittals in accordance with Section 013300 “Submittal Procedures”.

1. Submit product data indicating door core materials, door thickness, construction, veneer species, cut color and matching, and blocking options.

2. Submit shop drawings showing to/from locations, hand, elevation, sizes, dimensions, manufacturers door series reference, fabrication details, location of internal blocking for hardware, and glazing installation.

3. Submit samples of factory finishes for selection by Architect.

4. Submit manufacturer’s installation instructions.

1.05 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacture of wood doors with minimum 5 years’ experience building flush architectural grade doors.

B. Conform to the requirements of AWI Quality Standard Section 1300.

C. Labeled Doors shall be listed and conform to the requirements of Intertek Testing Services-Warnock Hersey (ITS-WH).

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect doors under provisions of AWI, WDMA, WIC and manufacturers written instructions.

B. Store flat on level surface in clean, dry, well-ventilated area.

1. Avoid extreme heat. HVAC systems should be operating and balanced prior to arrival of doors.

2. Do not store in damp or wet areas, including areas where curing cement or wall finishes are present.

3. Relative humidity: 30 percent minimum; 55 percent maximum.

C. Cover to keep clean, but permit air circulation.

1. Protect doors from exposure to natural and artificial light after delivery.

D. Do not drag one door across another.

1.07 WARRANTY

A. Submit in accordance with Section 017700 “Closeout Procedures”.

1. Warranty against defects in manufacturing, warping, and delamination of facing for interior solid core flush doors per AWI recommended tolerances for life of initial installation.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Algoma Hardwoods, Inc. - Algoma, Wisconsin; 800.678.8910.

2. Eggers Industries - Neenah, Wisconsin; 920.722.6444.

3. Marshfield Door Systems - Marshfield, Wisconsin; 800.869.3667.

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 WOOD DOORS

A. Flush interior doors.

1. Solid core, 5-ply construction.

2. 1-3/4 inches thick x Size indicated in Door Schedule.

3. Fire rated as indicated in Door Schedule.

4. Suitable for transparent finish.

B. Construction:

1. Comply with AWI Section 1300, PC-5 ME, Custom Grade, with A grade faces.

2. Stiles and rails sanded and bonded to core.

a. Stiles: 1-1/2 inch minimum hardwood, same species as face veneer with no finger joints.

b. Top and bottom rails: 1-1/8 inches minimum solid wood.

3. Core: Particleboard, ANSI A208.1, 1-LD-1 Grade.

a. Provide solid wood blocking for installation of locksets, closers, and exit devices where through bolts are not scheduled to be used.

4. Face: Select red oak, plain sliced veneer suitable for transparent finish.

a. Veneer leaves shall be balanced and book matched.

C. Fire-rated doors:

1. Comply with AWI Section 1300, FD-5.

2. Labeled doors shall be provided as “Category A”.

a. All components required for label shall be provided as an integral part of the door construction.

3. Attach positive pressure fire rating label to door edge.

a. Fire rating label shall include the “S” label, where required for smoke.

4. Coordinate requirements of labeled door assembly with related door frame and hardware components provided in other sections to ensure complete compliance with tested assemblies.

2.03 FACTORY FINISH

A. Factory finish wood doors in accordance with AWI Quality Standard Section 1500, System TR-6, Satin Finish, Custom Quality.

B. Wood grain shall be filled.

C. Factory seal top and bottom door edge, and all cutouts, with 2 coats clear sealer.

D. Color: As selected by Architect from manufacturer's full range of available colors.

2.04 VISION LIGHTS

A. Acceptable manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Anemostat - Carson, California; 213.775.7441

2. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

B. Type: Metal frame with countersunk mounting holes; FGS-75 as manufactured by Anemostat.

1. Material: 18 gage cold rolled steel.

2. Finish: Factory primed.

3. Provide fire rated vision lights with UL listing for locations indicated in Door Schedule to be fire rated.

C. Size: Refer to Drawings.

D. Glazing as specified in Section 088000 “Glazing”.

PART 3 – EXECUTION

3.01 PREPARATION

A. Verify frames have been properly installed and prepared for hardware.

B. Allow doors to become acclimated to finished building temperature and humidity before hanging.

C. Verify exact size for vision light to be provided and coordinate cut-outs for vision lights to insure integrity of fire rated doors.

3.02 INSTALLATION

A. Install doors and vision lights in accordance with manufacturer’s written installation instructions.

B. Install fire rated and non-rated doors in accordance with NFPA80 and ITS-WH requirements.

C. Coordinate Installation of doors with installation of frames and hardware.

D. Drill pilot screw and bolt holes using templates provided by hardware manufacturer.

E. Consult door manufacturer for maximum allowable field modification of doors including, but not limited to lock preps, and undercut or trimming to insure label and/or warranty is not voided.

3.03 ADJUSTING AND REPAIRING

A. Adjust for smooth and balanced door movement.

B. Reseal or refinish any doors that require field alteration.

END OF SECTION

SECTION 083113 - ACCESS DOORS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes non-rated, and fire rated access doors and frames as specified herein.

1.02 RELATED SECTIONS

A. Section 042000 – Unit Masonry

B. Section 092900 – Gypsum Board

C. Section 099100 – Painting

D. Divisions 22 through 28: Requirements to provide access to concealed equipment.

1.03 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Provide the manufacturer’s product data for each type of access panel.

2. Provide the manufacturer’s installation instructions for each different installation condition.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. CESCO Products - Minneapolis, Minnesota; 888.422.3726.

2. J.L. Industries - Bloomington, Minnesota; 612.835.6850

3. Milcor - Holland, Ohio; 800.528.1411

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 NON-RATED ACCESS DOORS

A. Type: Flush mounted, hinged access door and frame suitable for gypsum board or masonry opening.

1. Fabricate with bead on outer frame for receiving gypsum board joint compound.

B. Material:

1. Frame: 16-gauge steel.

2. Door: 14-gauge steel.

C. Hardware:

1. Concealed hinge opening to 165 degrees minimum.

2. Keyed cylinder lock.

D. Finish: Phosphate dipped steel with prime coat.

2.03 FIRE RATED ACCESS DOORS

A. Type: UL listed, flush mounted, hinged access door and frame suitable for gypsum board or masonry opening.

1. Fabricate with bead on outer frame for receiving gypsum board joint compound.

B. Material:

1. Frame: 16-gauge steel.

2. Door Panel: 20-gauge steel, insulated sandwich type.

C. Hardware:

1. Continuous hinge.

2. Automatic panel closer.

3. Self -latching lock with interior release and exterior knurled knob.

D. Finish: Phosphate dipped steel with prime coat.

PART 3 – EXECUTION

3.01 PREPARATION

A. Provide access doors where shown on the drawings and as required to provide access to concealed equipment and components for inspection, maintenance, and replacement.

1. Provide sizes shown on drawings or as required to provide functional access.

2. Receive the Architect’s approval of proposed locations prior to proceeding.

B. Verify rough openings for door and frame are correctly sized and located.

C. Provide fire-rated access doors in fire rated walls and ceilings.

3.02 INSTALLATION

A. Install access doors in accordance with the manufacturer’s installation instructions.

B. Position access doors to provide convenient access to concealed work requiring access.

C. Install frame plumb and level in wall opening.

D. Secure access doors rigidly in place in accordance with the manufacturer's installation instructions.

END OF SECTION

SECTION 084313 – ALUMINUM FRAMED STOREFRONTS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following applications for aluminum framed storefront as indicated on the drawings and specified herein:

1. Aluminum storefront for exterior applications.

2. Aluminum storefront for interior applications.

3. Entrance doors.

1.02 RELATED SECTIONS

A. Section 079200 – Joint Sealants

B. Section 087100 – Finish Hardware

C. Section 088000 – Glazing

1.03 PERFORMANCE REQUIREMENTS

A. Aluminum framed storefront systems shall withstand the effects of the following performance requirements without failure due to defective manufacture, installation, or other defects in construction.

1. Design Wind Loads: Refer to Structural Engineering Drawings.

2. Performance Requirements: Uniform load, thermal resistance, air infiltration, water resistance, condensation resistance, sound transmission, windborne debris impact resistance, operating force, forced entry resistance and any other performance criteria shall be consistent with the manufacturer's performance requirements for the specified aluminum storefront and doors.

1.04 SUBMITTALS

A. Provide the following in accordance with Section 013300 "Submittal Procedures":

1. Product Data: Provide material descriptions and installation instructions for each type of aluminum framed storefront component specified.

2. Shop Drawings: Include plans, elevations, dimensions of individual profiles, construction details, hardware, finishes, attachments to other work, operational clearances, and installation details.

3. Color Charts: Provide manufacturer's standard size material samples indicating the full range of colors for selection by the Architect.

4. Samples: Provide manufacturer's standard size sample of each storefront framing system component indicating Architect's color selection for final approval.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications: A manufacturer capable of providing an aluminum framed storefront system that meets or exceeds the performance requirements indicated, including documentation of performance by test reports and calculations.

B. Installer Qualifications: An installer which has a minimum of 3 years successful documented experience with installations of the same or similar storefront systems required for this project.

C. Obtain storefront framing and doors from a single manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store materials protected from exposure to harmful weather conditions.

C. Protect storefront materials against damage from elements, construction activities, and other hazards before, during, and after storefront installation.

1.07 PROJECT CONDITIONS

A. Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting of work.

1.08 WARRANTY

A. Provide manufacturer's standard two-year warranty commencing from the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Kawneer Company, Inc. – Dallas, TX; 972.438.1212

2. Other manufacturers as submitted and approved in accordance with Section 016200 "Product Options".

2.02 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by the aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish.

1. Not less than 0.070-inch wall thickness at any location for the main frame.

2. 6063-T6 alloy and temper complying with ASTM B 221.

B. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel / chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions; or zinc-coated steel or iron complying with ASTM B 633 for SC 3 sever service conditions or other suitable zinc coating.

1. Provide sufficient strength to withstand design pressure indicated.

C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials which are non-corrosive and compatible with aluminum storefront framing members and other components.

D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel; or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating.

1. Provide sufficient strength to withstand design pressure indicated.

E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by the sealant manufacturer for joint size and movement.

2.03 ALUMINUM STOREFRONT

A. Aluminum storefront framing system for exterior applications shall be Kawneer Trifab VG 451T as follows:

1. Framing Members: 2-inch x 4-1/2 inch suitable for 1 inch insulated glazing.

2. Glass: Center glazed.

3. Thermal Barrier: Kawneer IsoLock thermal break with a ¼ inch separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.

B. Aluminum storefront framing system for interior applications shall be manufacturer's standard aluminum framing system as follows:

1. Framing Members: 1-3/4 inch x 4 inch suitable for the type and size glazing scheduled.

2. Glass: Center glazed.

2.04 ENTRANCE DOORS

A. Aluminum entrance doors shall be Kawneer Tuffline 350.

1. 2-inch-deep single acting door with 3-3/8 inch top, 3-1/2 inch vertical stile, and code required minimum bottom rail.

B. Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion resistant material compatible with aluminum; designed to operate smoothly, tightly close, and securely lock.

2.05 ACCESSORIES

A. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

B. Fasteners and Accessories: Manufacturer's standard corrosion resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Fasteners and accessories shall be stainless steel where exposed.

C. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

2.06 FABRICATION

A. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.

2. Accurately fit joints.

a. Make joints flush, hairline, and weatherproof.

3. A means to drain water passing joints, condensation within framing members, and moisture migrating within system to exterior.

4. Physical and thermal Isolation of glazing from framing members.

5. Accommodation for thermal and mechanical movement of glazing and framing to maintain required glazing edge clearances.

6. Provisions for field replacement of glazing.

7. Weather-stripping in door panels or frames.

8. Anchors, fasteners, and connection devices that are concealed from view to greatest extent possible.

B. To greatest extent possible, complete fabrication, assembly, finishing, hardware application, and other work before shipment to the project site.

C. Install reinforcing as necessary for performance requirements.

1. Separate dissimilar metals with gasketing or other separator which will prevent corrosion.

D. Welding shall comply with AWS recommendations to avoid discoloration.

1. Grind exposed welds smooth and restore finish.

E. After fabrication, clearly mark components to identify their location in accordance with approved shop drawings.

2.07 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for designating and applying finishes.

B. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

C. Provide factory finishing as follows:

1. Kawneer Permanodic, Architectural Class I Clear (AA-M12C22A41) Anodic Coating complying with AAMA 611.

2. Noticeable variations in finish for a single framing member is not acceptable.

a. Variations in appearance of abutting or adjacent frames is not acceptable within ½ of the range of approved samples.

3. Protect mechanical finishes from damage by application of strippable, temporary protective covering prior to shipment.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine openings, structural support, and other conditions for compliance with requirements for installation.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine weather barriers, wall flashings, and other built-in components to ensure a coordinated, weather-tight aluminum storefront system installation.

3.02 INSTALLATION

A. Comply with approved shop drawings and manufacturer's installation instructions for installation of aluminum framed storefront system, accessories, and other components.

B. Install aluminum framed storefront system level, plumb, square, and true to line; without distortion or rack of framing members, doors, or panels; anchored securely in place to structural support.

C. Separate aluminum and other metal surfaces from sources of corrosion using materials and methods recommended by the manufacturer.

D. Set sill members in bed of sealant, providing joint fillers or gaskets as required for weather-tight construction.

E. Install aluminum framed storefront members to drain water, condensation and migrating moisture.

F. Refer to Section 088000 "Glazing" for installation of glass into aluminum storefront framing and doors.

3.03 FIELD QUALITY CONTROL

A. Provide manufacturer's field service consisting of site visits for inspection of product installation.

3.04 ADJUSTING AND CLEANING

A. Adjust operating hardware to function properly, without binding, and to provide a tight fit at contact points and weather-stripping.

B. Clean aluminum surfaces immediately upon completion of aluminum framed storefront system installation.

1. Avoid damaging protective coatings and finishes.

2. Remove excess sealants, dirt, and other substances.

3.05 ENTRANCE DOOR HARDWARE SCHEDULE

A. Exterior Manual Doors: 103, 104, 105, 108, 109, 110

1. Pivot: Kawneer engineered heavy duty top, bottom, and intermediate pivots.

2. Closer: LCN 4041 Heavy Duty Series Door Closer.

3. Push/Pull Handles: Kawneer Architects Classic No. CO-9.

4. Exit Device: Kawneer Paneline II CR-90 with concealed vertical rod device.

5. Coordinate locking and keying requirements with Section 087100 "Finish Hardware".

6. Kickdown Holder: Stainless steel door mounted type with rubber bumper.

7. Threshold: 4-inch-wide x 1/2-inch-high x door length, aluminum with tested water performance.

8. Weather stripping: Sealair weathering system in the door and frame consisting of a dense, bulb polymeric material.

a. Provide EPDM blade gasket sweep strip applied to the bottom door rail with concealed fasteners.

B. Exterior Electrically Operated Doors: 101, 106, 107

1. Pivot: Kawneer engineered heavy duty top, bottom, and intermediate pivots.

a. Intermediate pivot shall be EL (Electronic) Type.

2. Closer: LCN 4041 Heavy Duty Series Door Closer.

3. Push/Pull Handles: Kawneer Architects Classic No. CO-9.

4. Exit Device: Kawneer Panel line EL (Electronic Version) with concealed vertical rod device.

a. Power supply for exit device (one per two doors).

b. Power Transfer (one per EL exit device required for access control).

5. Coordinate locking and keying requirements with Section 087100 "Finish Hardware".

6. Kickdown Holder: Stainless steel door mounted type with rubber bumper.

7. Threshold: 4-inch-wide x 1/2-inch-high x door length, aluminum with tested water performance.

8. Weather stripping: Sealair weathering system in the door and frame consisting of a dense, bulb polymeric material.

a. Provide EPDM blade gasket sweep strip applied to the bottom door rail with concealed fasteners.

9. Removable Mullion: Provide manufacturer's standard “keyed” removable center mullion at all double door locations.

10. Card reader supplied and installed under allowance. Refer to Section 012100 for “Allowances.”

    a. Contractor to provide conduit and rough-in; refer to electrical drawings.

    b. Contractor to ensure compatibility with card reader prior to purchase of electronic entrance door hardware.

END OF SECTION

SECTION 085113 - ALUMINUM WINDOWS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. Extent of each type of aluminum window is indicated on the drawings and includes the following:

1. Single hung window.

1.02 RELATED SECTIONS

A. Section 061000 – Rough Carpentry

B. Section 088000 – Glazing.

1.03 SYSTEM DESCRIPTION

A. Aluminum windows include individual pre-glazed units set in conventional wall construction.

1.04 PERFORMANCE REQUIREMENTS

A. Windows shall conform to all AAMA / WDMA / CSA 101/I.S.2/A440-08 requirements and the following performance requirements:

1. Air Infiltration Test: With window sash closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf.

   a. Air infiltration shall not exceed 0.23 cfm/SF of unit.

2. Water Resistance Test: With window sash closed and locked, test unit in accordance with ASTM E 331 / ASTM E 547 at a static air pressure difference of 8.0 psf.

   a. There shall be no uncontrolled water leakage.

3. Uniform Load Structural Test: With window sash closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 52.5 psf, both positive and negative.

   a. At the conclusion of the test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.

4. Forced Entry Resistance: Windows shall be tested in accordance with ASTM F 588 or AAMA 1302.5 and meet the requirements of performance level 40.

5. Condensation Resistance Test (CRF): Test unit in accordance with AAMA 1503.1.

   a. Condensation Resistance Factor shall not be less than 44 when glazed with a center of glass U-Factor of 0.24, 0.29, or 0.47.

6. Condensation Resistance (CR): With ventilators closed and locked, test unit in accordance with NFRC 500-2010.

   a. Condensation Resistance (CR) shall not be less than 38 when glazed with a center of glass U-Factor of 0.24, 0.29, or 0.47.

7. Thermal Transmittance Test (Conductive U-Factor): With ventilators closed and locked, test unit in accordance with NFRC 100-2010.

   a. Conductive Thermal Transmittance U-Factor shall not be more than 0.0 BTU / hr.ft2.deg f when glazed with a center of glass U-Factor of 0.24, 0.29, or 0.47.

B. Wind Loads: Windows shall be designed to withstand positive and negative wind pressures as required by applicable building codes as calculated by ANSI A58.1.

1. Refer to Structural Drawings for design wind pressure for the project.

2. 20.0 psf shall be the minimum design wind pressure.

1.05 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Submit manufacturer’s technical product data, certified laboratory test reports, and installation instructions for each window type.

2. An NFRC Component Modeling Approach (CMA) generated label certificate shall be provided by the manufacturer.

a. The label certificate shall be project specific and will contain the thermal performance ratings of the manufacturer’s framing combined with the specified glass and the glass spacer used in the fabrication of the glass, at NFRC standard test size as defined in Table 4-3 in NFRC 100-2010.

3. Submit shop drawings including manufacturer’s standard aluminum window details, installation details, and means of anchorage.

4. Submit manufacturer’s standard size sample aluminum sections for color selection by the Architect.

1.06 QUALITY ASSURANCE

A. Provide test reports from AAMA accredited laboratories certifying the performance as specified.

B. Test reports shall be accompanied by the window manufacturer’s letter of certification stating the tested window meets or exceeds the referenced criteria for the appropriate window type.

1.07 WARRANTY

A. Window Material and Workmanship: Provide manufacturer’s written guarantee against defects in material and workmanship for a period of five (5) years from the date of Substantial Completion.

B. Glass: Provide manufacturer’s written warranty for insulated glass units that they will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship for a period of ten (10) years.

C. Finish: Warranty period shall be for a minimum of five (5) years from the date of Substantial Completion.

D. Total Window Installation:

1. The Contractor shall warrant for one year from the date of Substantial Completion, the satisfactory performance of the total window installation which includes window, hardware, glazing, anchorage and setting system, sealing, and flashing as it relates to air, water, and structural adequacy.

a. Any deficiencies shall be corrected by the Contractor during the warranty period.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporate in the work include the following:

1. EFCO Corporation – Monett, MO; 800.221.4169

2. Kawneer Company, Inc. – Dallas, TX; 972.438.1212

3. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 MATERIALS

A. Windows shall be pre-glazed, pre-finished, fixed aluminum windows.

B. Aluminum: Extruded aluminum shall be 6063-T6 alloy and tempered.

C. Weatherstrip: All primary weatherstrip shall be manufacturer’s standard.

F. Glazing:

1. Insulated glass shall be 1 inch thick constructed as follows:

a. Refer to drawings for glazing designations and glazing schedule.

b. Refer to Section 088000 “Glazing” for glazing types.

G. Thermal Barrier: All exterior aluminum shall be separated from interior aluminum by a rigid, structural
l thermal barrier.

1. A structural barrier is defined as a system that shall transfer shear during bending and therefore promote composite action between the exterior and interior extrusions.

a. A nonstructural thermal barrier is unacceptable.

2.03 FABRICATION

A. Prior to Fabrication:

1. Check actual window openings in construction work by accurate field measurement and show recorded measurements on final shop drawings.

a. Coordinate fabrication schedule with construction progress to avoid delay of work.

B. General:

1. All aluminum frame and vent extrusions shall have a minimum wall thickness of 0.062 inches.

2. Mechanical fasteners, welded components, and hardware items shall not bridge thermal barriers.

a. Thermal barriers shall align at all frame and vent corners.

3. Depth of frame shall not be less than 3-1/4 inch.

C. Frame: Frame components shall be mechanically fastened.

D. Sash: All sash extrusions shall have a minimum wall thickness of 0.062 inches.

1. All horizontal sash extrusions shall be tubular.

2. Corner connections shall be mechanically fastened.

E. Screens:

1. Screen frames shall be extruded aluminum.

2. Screen mounting holes in the window frame shall be factory drilled.

3. Screen mesh shall be aluminum or fiberglass.

F. Glazing: All units shall be glazed with the manufacturer’s standard sealant process provided the glass is held in place by a removable, extruded aluminum, glazing bead.

1. The glazing bead must be isolated from the glazing material by a gasket.

G. Finish: Finish all exposed areas of aluminum windows and components with electrostatically applied powder coat complying with AAMA 2604-98 with 50 percent PVDF fluoropolymer Ultraflur resin.

1. Color shall be as selected by the Architect from the window manufacturer's full range of colors.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, and provide a solid anchoring surface.

3.02 INSTALLATION

A. Comply with the manufacturer's installation instructions for installation of windows and accessory components.

B. Set windows plumb, level, and true to line, without warp or rack of frames or sash.

C. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action.

D. Set sill and other members as recommended by the manufacturer to provide weather-tight construction and provide sill flashing.

E. Anchor windows securely in place to maintain position permanently when subjected to normal thermal movement, building movement, and wind loads.

F. Furnish and apply sealants to provide a weather-tight installation at all joints and intersections and at opening perimeters.

1. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

3.03 ADJUSTING AND CLEANING

A. Adjust windows for proper operation after installation.

1. Lubricate hardware and moving parts in accordance with the manufacturer's recommendations.

B. Clean aluminum surfaces promptly after installation, using care to avoid damaging protective coatings and finishes.

1. Remove excess sealant, glazing compound, labels, dirt, and other substances.

2. Clean window glazing promptly after installation and again just prior to Substantial Completion.

3.04 PROTECTION AND REPAIRING

A. After installation, initiate and maintain protections and precautions required to ensure windows are without damage or deterioration at the time of Substantial Completion.

B. Replace all windows, glazing, and accessories which have been or become damaged.

END OF SECTION

SECTION 085659 – ALUMINUM SERVICE WINDOWS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes aluminum service windows as indicated on the drawings and specified herein.

1.02 RELATED SECTIONS

A. Section 088000 - Glazing

1.03 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Manufacturer’s product data and installation instructions for each window type.

2. Shop drawings including elevations, details, hardware, and installation requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver windows to the project site, crated to provide protection during transit and storage.

B. Store windows at the project site, under cover in a dry location, protected from damage and deterioration.

1.05 PROJECT CONDITIONS

A. Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting of work.

1.06 WARRANTY

A. All materials and workmanship shall be warranted against defects for a period of one year from the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. C.R. Laurence Co., Inc. – Dallas, TX; 800.421.6144

2. Creative Industries, Inc. – Indianapolis, IN; 317.248.1102

3. Nissen & Company, Inc. – South El Monte, CA; 626.579.5666

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 ALUMINUM SERVICE WINDOWS

A. Aluminum service windows shall be Fixed Window with Transaction Pass-Thru.

1. Type: Aluminum, medium-duty, interior, fixed service window.

2. Model: One fixed panel,

B. Frames: Aluminum frames shall be constructed of 6063-T5 extruded aluminum.

1. Frame size shall be as indicated on drawings.

C. Finish: Clear anodized.

D. Glazing: 1/4-inch tempered glass; refer to Section 088000 “Glazing”.

E. Options:

1. Frame: 1-3/4 inch x 4 inch, head, jamb, and sill frame.

2. Full Bottom Frame: Yes, except at pass thru.

3. Screen: No.

4. Pass-thru opening, same as indicated on drawings.

5. Speaker: Manufacturer’s standard manual speaker.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Comply with approved shop drawings and manufacturer’s written installation instructions for installation of aluminum service windows and accessories.

B. Install windows level, plumb, square, and true to line; without distortion or rack of framing members; anchored securely in place to supports.

C. Separate aluminum and other metal surfaces from sources of corrosion using materials and methods recommended by manufacturer.

D. Refer to Section 08800 “Glazing” for installation of glass into windows.

3.02 FIELD QUALITY CONTROL

A. Repair damaged windows to the Manufacturer’s and Architect’s satisfaction or replace with new windows.

3.03 ADJUSTING AND CLEANING

A. Adjust operating hardware to function properly without binding.

B. Clean aluminum surfaces immediately upon completion of installation complying with the manufacturer’s recommendations.

1. Avoid damaging protective coatings and finishes.

2. Remove excess sealants, glazing materials, dirt, and other substances.

END OF SECTION

SECTION 085659 – ALUMINUM SERVICE WINDOWS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes aluminum service windows as indicated on the drawings and specified herein.

1.02 RELATED SECTIONS

A. Section 088000 - Glazing

1.03 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Manufacturer’s product data and installation instructions for each window type.

2. Shop drawings including elevations, details, hardware, and installation requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver windows to the project site, crated to provide protection during transit and storage.

B. Store windows at the project site, under cover in a dry location, protected from damage and deterioration.

1.05 PROJECT CONDITIONS

A. Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting of work.

1.06 WARRANTY

A. All materials and workmanship shall be warranted against defects for a period of one year from the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. C.R. Laurence Co., Inc. – Dallas, TX; 800.421.6144

2. Creative Industries, Inc. – Indianapolis, IN; 317.248.1102

3. Nissen & Company, Inc. – South El Monte, CA; 626.579.5666

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 ALUMINUM SERVICE WINDOWS

A. Aluminum service windows shall be CRL Horizontal Sliding Pass-Thru as manufactured by CR Laurence Co., Inc.

1. Type: Aluminum, medium-duty, interior, sliding service window.

2. Model: Two fixed panels and one center sliding panel.

B. Frames: Aluminum frames shall be constructed of 6063-T5 extruded aluminum.

1. Frame size shall be as indicated on drawings.

2. Window rolls on top-hung ball bearing rollers.

3. Catch locks shall be included with all sliding panels.

C. Finish: Clear anodized.

D. Glazing: 1/4 inch tempered glass; refer to Section 088000 “Glazing”.

E. Options:

1. Overhead Track: 1-3/4 inch x 3 inch, Model No. D1670

2. Full Bottom Track: No.

3. Keyed Lock: Yes.

4. Screen: No.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Comply with approved shop drawings and manufacturer’s written installation instructions for installation of aluminum service windows and accessories.

B. Install windows level, plumb, square, and true to line; without distortion or rack of framing members; anchored securely in place to supports.

C. Separate aluminum and other metal surfaces from sources of corrosion using materials and methods recommended by manufacturer.

D. Refer to Section 08800 “Glazing” for installation of glass into windows.

3.02 FIELD QUALITY CONTROL

A. Repair damaged windows to the Manufacturer’s and Architect’s satisfaction or replace with new windows.

3.03 ADJUSTING AND CLEANING

A. Adjust operating hardware to function properly without binding.

B. Clean aluminum surfaces immediately upon completion of installation complying with the manufacturer’s recommendations.

1. Avoid damaging protective coatings and finishes.

2. Remove excess sealants, glazing materials, dirt, and other substances.

END OF SECTION

SECTION 087100 - FINISH HARDWARE

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. Types of door hardware specified in this section include the following:

1. Locksets, latchsets and keying.
2. Hinges.
3. Door closers.
4. Stops and door trim.
5. Exit devices.
6. Coordinators and flush bolts.
7. Soundstripping and weatherstripping,
8. Thresholds.

C. Types of door hardware not specified in this section includes any hardware which is specified in a door or door system section of this project manual which is intended to be supplied with the door.

1.02 RELATED SECTIONS

A. Section 081100 – Steel Doors and Frames.

B. Section 081400 – Wood Doors.

C. Section 084313 – Aluminum Framed Storefronts

D. Section 099000 – Painting.

1.03 SYSTEM DESCRIPTION

A. “Hardware” includes items known commercially as finish hardware which are required for operation of swinging, sliding, and folding doors.

1.04 QUALITY ASSURANCE

A. Obtain each type of hardware from a single manufacturer.

B. Hardware shall be in strict compliance with all applicable codes and shall be of quality and grade for high traffic use.

C. ANSI / BHMA designations used to describe hardware items, and to define quality or function, are derived from industry and reference standards. Provide products complying with these standards, as well as additional industry and reference standards as may be applicable.

D. Provide hardware for fire-rated openings in compliance with NFPA 80 and local building code requirements.

1. Only provide hardware which has been tested and listed by UL or FM for types and sizes of doors required and complies with requirements of door and frame labels.

2. Where emergency exit devices are required on fire-rated doors, provide UL or FM label on exit devices indicating “Fire Exit Hardware”.

E. Supplier Qualifications: Hardware supplier shall be a recognized architectural finish hardware supplier with warehousing facilities, who has been furnishing hardware in the project’s vicinity for a period of not less than 5 years.

1. The hardware supplier must have in employment an Architectural Hardware Consultant (AHC), as recognized by the Door And Hardware Institute, with a minimum of 5 years of Architectural Hardware experience, who shall be responsible for the detailing, scheduling, and ordering of the finish hardware for this project.

1.05 SUBMITTALS

A. Submit manufacturer’s cut sheets, installation instructions, and maintenance recommendations for each item of hardware indicated.

1. Include all information necessary to show compliance with the specified requirements.

2. Include certification that each item meets or exceeds applicable reference standards.

B. Submit hardware schedule as follows:

1. Door and hardware schedule shall be provided in identical format to the Architect’s drawings and schedules.

a. Failure to comply with the requested format shall result in rejection without review.

2. Hardware schedule shall be organized into “Hardware Sets” indicating designations of each item required for every door or opening.

3. Coordinate hardware with doors, frames and related work to insure proper size, thickness, hand, function, and finish of hardware.

4. Submit schedule at the earliest possible date, particularly where acceptance of hardware schedule must precede fabrication of other work which is critical in the project construction schedule.

C. Upon approval of the finish hardware schedule and prior to final ordering of finish hardware, submit one sample of each type of exposed finish hardware.

1. Hardware samples shall be finished as specified herein.

2. Hardware samples shall be tagged with a full description for coordination with the hardware schedule.

3. Finish hardware may be ordered upon the Architect’s approval of the finish hardware samples.

D. Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware.

E. Maintenance Manuals: Furnish 3 copies of maintenance manuals for finish hardware. Each manual shall consist of printed sheets from the hardware manufacturer bound in a three-ring binder and properly indexed. Include the following information in the maintenance manuals:

1. Address and telephone number of the hardware supplier.

2. Address and telephone number of each hardware manufacturer.

3. Maintenance instructions and parts list for each type of operating hardware.

4. Warranty information for each hardware component.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Properly package and clearly identify each item relative to the hardware schedule.

B. Deliver hardware to the jobsite only after proper provision for storage has been made.

C. The hardware supplier's representative shall be present when all finish hardware is delivered to the jobsite. The supplier's representative shall check-in each item and turn over to the General Contractor for storage in a secure place under lock and key.

1.07 WARRANTY

A. Furnish 3 copies of the Written Warranty to be included in the Maintenance Manuals:

1. Starting date for all warranty periods shall be the date of Final Completion.

2. Warranty against failure of parts of all hardware for a period of 1 year.

3. Warranty against failure of locksets and cores for a period of 5 years.

4. Warranty against mechanical failure of door closers for a period of 10 years.

5. Provide a lifetime warranty on Lever sag.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Locksets, Latchsets and Keying: Chaves County standard – Sargent door hardware as specified.

2. Hinges: Bommer, Hager, McKinney, Stanley

3. Door Closers: LCN, Dorma

4. Stops and Door Trim: Trimco, Rockwood, Stanley

5. Overhead Stops: Glynn-Johnson

6. Exit Devices: Von Duprin

7. Coordinators and Flush Bolts: Glynn-Johnson

8. Soundstripping and Weatherstripping: National Guard, Reese, Zero

9. Thresholds: National Guard, Reese, Zero

10. Other manufacturers as submitted and approved in accordance with Section 016200 "Product Options".

2.02 MATERIALS AND FABRICATION

A. Hand of Door: The drawings show the direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of the door movement as shown.

B. Base Metals: Produce hardware units of the basic metal and forming method indicated using the manufacturer's standard metal alloy, composition, temper, and hardness.

1. Do not furnish "optional" materials or forming methods for those indicated except as otherwise specified.

C. Fasteners: Manufacturers hardware shall conform to published templates generally prepared for machine screw installation.

1. Do not provide hardware which has been prepared for self-tapping screws except as specifically indicated.

2. Furnish screws for installation with each hardware item.

a. Provide Phillips flat-head screws except as otherwise indicated.

b. Finish exposed screws to match the hardware finish or if exposed in surfaces of other work to match the finish of such other work as closely as possible including “prepared for paint” in surfaces to receive painted finish.

3. Provide concealed fasteners for hardware units which are exposed when the door is closed except to the extent no standard units of the type specified are available with concealed fasteners.

a. Do not use thru bolts for installation where the bolt head or the nut on the opposite face is exposed in other work except where it is not feasible to adequately reinforce the work.

D. All items shall be of proper type for attaching securely to type of material on which they occur.

2.03 LOCKSETS, LATCHSETS AND KEYING

A. Locksets and latchsets shall be Sargent 10 Line Heavy Duty Cylindrical Lever Locksets.

1. All locksets and latchsets shall conform to the requirements of ANSI A 156.2, Series 4000, Grade 1 UL listed.

a. Locksets shall be heavy-duty cylindrical type with 2-3/4 inch backset.

b. Locks shall have solid shank with no opening for access to keyed lever keeper.

B. Interchangeable core cylinders shall be supplied and installed by the General Contractor.

1. Cylinders shall be Sargent 6 pin RA Keyway type.

2. Finish shall match lockset trim or storefront doors as applications require.

3. Confirm compatibility with locksets prior to purchase.

C. All hardware shall be lever type to comply with accessibility requirements.

1. Lever handles shall be zinc material with a minimum wall thickness of 0.060 inch.

2. Levers shall be 5 inches long, with 2-1/2 inch projection.

3. Provide with contour angle return and 3-inch convex trim.

4. Levers shall have a free-wheeling, clutch mechanism.

5. Levers which contain a hollow cavity are not acceptable.

6. Provide tactile lever for identification of hazardous areas.

D. Supply standard strike package with sufficient strike lip to protect door trim.

1. Furnish wrought boxes with all lock strikes.

2. Strike lips shall not project more than 1/8 inch beyond the frame at single doors or face of the inactive leaf at pairs of doors.

E. Keys and Keying shall be as follows:

1. Provide construction cores and keys during the construction period.

a. Construction cores and keys shall not be part of the Owner’s permanent keying system or furnished on the same keyway as the Owner’s permanent keying system.

2. Supplier shall meet with Architect and Owner to finalize keying requirements and make a written proposal of the complete key system.

3. Permanent cores shall be provided prior to Substantial Completion.

4. All keys shall be made of nickel silver.

    a. Permanent cores and keys shall be stamped with the applicable key mark for identification.

    b. These visual key control marks shall not include actual key cuts.

    c. Permanent keys shall be stamped “Do Not Duplicate”.

5. Furnish keys in the quantities requested for each of the following:

    a. Construction master key.

    b. Change key per each keyed core.

    c. Master key per set.

    d. Grand Masterkey.

6. Keys shall be transmitted directly to the Owner prior to occupancy.

F. Lockset and latchset functions shall be as follows:

1. Classroom Lockset:

    a. Latch operated by rotating the inside lever, or by turning the key in the outside lever, or by rotating the outside lever when not locked by the key.

    b. Outside lever is locked by turning the key in the outside lever.

    c. Outside lever is unlocked by turning the key in the outside lever.

    d. Inside lever cannot be locked and is always unlocked.

2. Dormitory Lockset:

    a. Latch operated by rotating the inside lever, or by rotating the outside lever when inside turn button is in unlocked position, or by turning the key in the outside lever.

    b. Outside lever is locked by turning the inside turn button.

    c. Outside lever is unlocked by turning the inside turn button.

    d. Inside lever cannot be locked and is always unlocked.

3. Passage Latchset:

    a. Latch operated by rotating the inside or outside lever.

    b. Outside lever cannot be locked and is always unlocked.

    c. Inside lever cannot be locked and is always unlocked.

4. Privacy Lockset:

    a. Latch operated by rotating the inside lever, or rotating the outside lever only when the inside push button is out.

    b. Outside lever is locked by pushing the inside button.

    c. The outside lever is unlocked by rotating the outside slotted button, or by rotating the inside lever, or by closing the door.

    d. Inside lever cannot be locked and is always unlocked.

5. Storeroom Lockset:

a. Latch operated by turning the key in the outside lever, or rotating the inside lever.

b. Outside lever is always locked.

c. Inside lever cannot be locked and is always unlocked.

2.04 HINGES

A. Provide steel ball bearing, standard weight, template produced hinges as follows:

1. 4-1/2 inches x 4-1/2 inches for high frequency use on standard weight doors.

a. 5 inches for doors over 3'-6" wide.

2. Provide the number of hinges indicated for each hardware set, but not less than 3 hinges for each door leaf 90 inches or less in height.

a. Add one hinge for each 30 inches of additional height.

3. Hinges shall be of sufficient width to clear trim projection when door swings 180 degrees.

4. Fire rated doors over 8'-0" shall have heavy weight hinges.

B. Provide hinge pins as follows.

1. Steel Hinges: Steel pins.

2. Non-ferrous Hinges: Stainless steel pins.

3. Exterior Doors: Non-removable pins.

4. Interior doors: Non-rising pins.

5. Tips: Flat button and matching plug, finished to match leaves.

C. Furnish 'Phillips' flat-head machine screws and / or wood screws appropriate for the required installation.

1. Screw finish shall match surface of hinges or pivots.

D. Provide full-mortise heavy duty continuous hinge where indicated.

2.05 DOOR CLOSERS

A. Closers shall be "LCN" 4041 Heavy Duty Series Door Closers.

1. All closers shall be non-handed.

2. All outswinging doors shall be supplied with heavy duty parallel arm.

3. Supply thru bolts for mounting.

B. Closers shall be fully hydraulic, full rack and pinion action with a one-piece forged steel piston 1-1/2 inch diameter minimum at heavy duty closers, with a cast iron or cast aluminum case.

1. Pinion shaft shall be minimum 5/8-inch diameter. Barrier-free at all interior doors.

2. Separate adjusting valves shall be provided for closing speed, latching speed, and backcheck.

3. Adjusting valves shall be of a metal material, concealed, adjustable only with special wrench, and shall be seated with "O" type rings.

4. Hydraulic fluid shall be of a type requiring no seasonal adjustments for temperatures from 120 degrees F to -30 degrees F.

C. Comply with manufacturer's recommendations for size of door closer depending upon size of door, draft pressure, and sound / smoke seal requirements.

1. Anticipate high use frequency at all door locations.

2. Comply with opening force requirements of the Americans with Disabilities Act.

3. Closers at fire rated doors shall be in compliance with all applicable codes and certified for positive pressure.

a. Comply with minimum opening force requirements for fire doors.

2.06 STOPS AND DOOR TRIM

A. Provide wall and floor stops with rubber bumper as follows:

1. Material shall be brass, bronze, or stainless steel as appropriate for required finish.

2. Convex wall stop with concealed mounting.

a. Approximate 2-1/2 inch diameter with approximate ¾ inch projection.

3. Floor stops shall only be used in locations where they do not act as a trip hazard, and only when wall stops are unable to be mounted.

a. Floor stop type shall be as recommended by the manufacturer for the application, and as approved by the Architect.

B. Kickdown holders shall be door mounted type with rubber bumper.

1. Material shall be brass, bronze, or stainless steel as appropriate for required finish.

C. Door trim shall be as follows:

1. Material shall be 18-gauge minimum brass, bronze, or stainless steel as appropriate for required finish.

a. Edges of plates shall be beveled and polished.

2. Protection Plates: Plates shall be 10 inches high x 2 inches less than the door width.

3. Push Plates: 4 inches x 16 inches.

4. Pull Plates: 4 inches x 16 inches. Grip shall be extruded, cast bronze, or stainless steel located on center of plate.

2.07 EXIT DEVICES

A. Exit devices shall be "Von Duprin" 9875 and 9975 mortise lock devices with the following features:

1. Device shall be field sizeable with fluid damper (to decelerate push pad on its return stroke to reduce noise).

2. Mortise lock shall be fully reversible with ¾ inch thro anti-friction latch bolt, and latch bolt deadlocking.

3. Provide "Von Duprin" dummy or lever trim as scheduled.

a. Lever trim shall have a clutch break away mechanism to disengage lever from operating mechanisms should excess force be applied.

B. Electrified lever trim for "Von Duprin" exit devices shall be "Von Duprin" E996 with power supply, power transfer, control device and all other components required for a complete and operating electrical lock controlled by a remote device.

1. Provide conduit as required for routing of wiring.

2. Install electrified lever trim in “Fail Safe Operation”.

C. Provide “Von Duprin” keyed removable mullion as follows:

1. Easily removed by a single operation of the mortise cylinder and self locking when reinstalled.

2. Height shall be appropriate for frame conditions.

3. Finish shall match door frame

D. Where exit devices are mounted on doors with raised glass beads / kits, supply the appropriate glass bead kit for that condition.

2.08 COORDINATORS AND FLUSH BOLTS

A. Coordinators shall be “Glynn-Johnson” COR Series with the following features:

1. Nylon roller for silent operation.

2. Adjustable holding power and override.

B. Flush bolts shall be “Glynn-Johnson” FB6 manual flush bolts with spring loaded snap action lever.

2.09 SOUNDSTRIPPING AND WEATHERSTRIPPING

A. Provide soundstripping at each edge of indicated doors.

1. Soundstripping shall be adhesive backed, compression bulb type.

B. Provide gasketing at each edge of fire rated doors:

2. Gasketing shall seal against smoke, fire, air, and sound.

a. Material shall be self-extinguishing and nontoxic.

b. Smoke seals at fire-rated doors shall be in compliance with all applicable codes and certified for positive pressure.

C. Provide continuous weatherstripping at each edge of every exterior door frame.

1. Weatherstripping at heads and jambs shall be surface applied metal retainer strip and bumper-type resilient insert as follows:

a. 0.062-inch extruded aluminum with finish color to match door frame.

b. Closed-cell sponge neoprene insert, 3/16-inch x 5/8 inch, conforming to MIL R 6130A, Type II, Grade C.

2. Weatherstripping at door bottoms shall be stainless steel housing door bottom with contact type resilient insert as follows:

a. Solid neoprene wiper, with 1-inch maximum drop, conforming to MIL R 6055, Class II, Grade 40.

3. Provide non-corrosive fasteners as recommended by manufacturer for applicable installations.

2.10 THRESHOLDS

A. Provide metal threshold at each exterior door location as follows:

1. 4 inch wide, 1/2-inch maximum height, x door width.

2. Grooved profile.

3. Aluminum mill finish.

2.11 HARDWARE FINISHES

A. Provide manufacturer's standard finish, but in no case shall finishes be less than the minimum established by BHMA or other applicable reference standards.

B. Provide matching finishes for hardware components at each door opening.

1. Reduce differences in color and overall finish as much as possible where the base metal is different for individual hardware components exposed at the same door or opening.

C. The designations used to indicate hardware finishes are those listed in ANSI A 156.18 "Materials & Finishes Standard".

1. All hardware finishes shall be US26D "Satin Chrome".

2.12 TOOLS FOR MAINTENANCE

A. Furnish a complete set of specialized tools as needed for Owner's continued adjustment, maintenance removal, or replacement of the finish hardware.

PART 3 – EXECUTION

3.01 PREPARATION

A. Furnish all items of hardware with attachment screws, bolts, nuts, etc., as required to attach hardware to type of material as conditions require and with finish to match hardware with which they are to be used.

1. Make all attachments to metal by template machine screws.

B. Provide sex nuts and thru bolts for door closers, forearm shoes of closers, and holding devices.

C. Mount hardware at heights indicated in "Recommended Locations for Builders Hardware" published by the Door and Hardware Institute, except as may be required to comply with governing regulations, or as otherwise directed by the Architect.

3.02 INSTALLATION

A. All finish hardware shall be installed in accordance with the manufacturer's recommendations and written installation instructions.

1. Do not install surface mounted items until finishes have been completed on the substrate.

2. Set units level, plumb and true to line and location.

3. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

4. Drill hardware items which are not factory-prepared for fasteners. Space fasteners in accordance with the manufacturer's instructions and countersink.

B. Attach hardware to masonry or concrete with expansion bolts or similar drilled anchors to develop full strength of attached device.

1. Set expansion anchors in solid masonry, not mortar joints.

C. Run soundstripping or weatherstripping full height of both jambs and full width of head. Run door bottoms full width of doors.

D. Run thresholds full width of opening and set thresholds in full bed of sealant.

3.03 FIELD QUALITY CONTROL

A. Do not install door silencers, kickplates, pushplates, door bottoms, and wall stops until after painting is complete.

1. Loosen locksets and panic hardware prior to painting and re-tighten after painting is complete.

2. Mask all hardware or otherwise protect during painting operation.

3.04 ADJUSTING AND CLEANING

A. Check each door and each hardware item to insure proper function and operation.

1. Replace items which cannot be adjusted to operate freely and smoothly as intended for the application.

B. Return to the work just prior to the Architect's Substantial Completion Inspection and make final adjustment of all hardware items.

1. Perform final cleaning of all hardware items.

2. Adjust hardware items as necessary to ensure proper function including compensation for final operation of heating and ventilating equipment.

3. Replace items which cannot be adjusted to operate freely and smoothly as intended for the application.

4. Adjust all closers to meet ADA requirements for sweep time and opening force. Set the closer's backcheck valve to slow the doors opening from 85 degrees on.

5. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes during the final adjustment of hardware.

3.05 HARDWARE SCHEDULE

A. The Hardware Schedule which follows includes items of finish hardware necessary to complete the work. Incomplete hardware sets shall be fulfilled by the hardware supplier in accordance with the products specified herein for a completely functioning door.

B. Quantities indicated are per individual location. Quantities should be totaled as required for complete hardware installation.

END OF SECTION

[HARDWARE SCHEDULE FOLLOWS]

HARDWARE SCHEDULE

HARDWARE SET #1: Door 101, 103, 104, 105, 106, 107, 108, 109, 110, exterior fence main gate.
1 ea. Keyed Cylinder

HARDWARE SET #2: Door 124, 127, 140, 162, 165, 171
1 ea. Privacy Lockset
3 ea. Hinges
1 ea. Wall Stop
1 ea. Soundstripping

HARDWARE SET #3: Door 114, 116, 117, 118, 119, 120, 121, 122, 135, 136, 137, 142, 144, 145, 146, 147, 148, 149, 150, 151, 153, 154, 155, 156, 157, 158, 159, 160, 173, 174, 175, 176, 178, 179, 180

1 ea. Lever Lockset (blank plate no exterior trim)
3 ea. Hinges
1 ea. Wall Stop
1 ea. Soundstripping

HARDWARE SET #4: Door 102
1 ea. Lever Lockset (blank plate no exterior trim)
3 ea. Hinges
1 ea. Closer
1 ea. Kickplate
1 ea. Weatherstripping
1 ea. Threshold
1 ea. Rain Drip

HARDWARE SET #5: Door 111, 125, 131, 141
1 ea. Dormitory Lockset
3 ea. Hinges
1 ea. Closer
1 ea. Wall Stop
1 ea. Kickdown Holder
1 ea. Kickplate
1 ea. Soundstripping

HARDWARE SET #6: Door 123, 139, 168
1 ea. Dormitory Lockset
3 ea. Hinges
1 ea. Closer
1 ea. Wall Stop
1 ea. Kickdown Holder
1 ea. Kickplate
1 set Door Silencers

HARDWARE SET #7: Door 129
1 ea. Dormitory Lockset
4 ea. Hinges
1 ea. Closer
1 ea. Kickplate
1 set Door Silencers

HARDWARE SET #8: Door 132, 133
3 ea. Hinges
1 ea. Closer
1 ea. Wall Stop
1 ea. Kickdown Holder
1 ea. Kickplate
1 ea. Push Plate and Pull Plate
1 ea. Soundstripping

HARDWARE SET #9: Door 112, 126, 161, 172, 177
1 ea. Dormitory Lockset
3 ea. Hinges
1 ea. Wall Stop
1 set Door Silencers

HARDWARE SET #10: Door 130
1 ea. Dormitory Lockset
3 ea. Hinges
1 set Door Silencers

HARDWARE SET #11: Door 128, 134, 163, 164, 170
1 ea. Passage Latch set
3 ea. Hinges
1 ea. Closer
1 ea. Wall Stop
1 ea. Kickdown Holder
1 ea. Kickplate
1 ea. Sound stripping

HARDWARE SET #12: Door 113, 116, 169
1 ea. Dormitory Lockset
3 ea. Hinges
1 ea. Closer
1 ea. Wall Stop
1 ea. Kickplate
1 set Gasketing

HARDWARE SET #13: Door 115, 134, 152, 167
1 ea. Passage Latch set
3 ea. Hinges (4 ea. Hinges at Door 115)
1 ea. Closer
1 ea. Wall Stop
1 ea. Kick Plate
1 set. Gasketing

END OF HARDWARE SCHEDULE

SECTION 088000 – GLAZING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes glazing and accessories for the following applications as indicated on the drawings and specified herein:

1. Exterior window frames.

2. Interior window frames.

3. Door view panels.

1.02 RELATED SECTIONS

A. Section 081100 – Steel Doors and Frames

B. Section 081400 – Wood Doors

C. Section 084313 – Aluminum Framed Storefronts

D. Section 085659 – Aluminum Service Windows

1.03 PERFORMANCE REQUIREMENTS

A. Provide and install glass to withstand thermal movement and wind and impact loads without breakage, loss, and other failure in accordance with ASTM E 1300 loads determined by ASCE 7.

B. Provide and install gaskets and seals to resist water and air penetration.

1.04 REFERENCES

A. ANSI Z97.1: Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.

B. ASTM C 1036: Flat Glass.

C. ASTM C 1048: Heat Treated Float Glass, Kind HS, Kind FT Coated and Uncoated.

D. ASTM C 1172: Laminated Architectural Float Glass.

E. ASTM E 546: Frost Point of Sealed Insulating Glass Units.

F. ASTM E 576: Frost Point of Sealed Insulating Glass Units in Vertical Position.

G. ASTM E 773: Accelerated Weathering for Sealed Insulating Glass Units.

H. ASTM E 774: Classification of the Durability of Sealed Insulating Glass Units.

I. ASTM E 1300: Practice for Determining the Minimum Thickness and Type of Glass Required to Resist a Specified Load.

J. CPSC 16 CFR 1201: Consumer Product Safety Commission Safety Standard for Architectural Glazing Materials.

K. FGMA: Glazing Manual, Flat Glass Marketing Association.

1.05 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”.

1. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling requirements, and installation instructions.

2. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, and special application requirements.

3. Samples:

a. Submit two 12-inch x 12-inch samples of each different glass type.

b. Provide manufacturer’s standard size material samples indicating the full range of glazing compound colors for the Architect’s selection.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in the manufacture of glazing units specified for use on this project with 5 years minimum successful experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.

C. Regulatory requirements: Comply with current applicable regulations of the Environmental Protection Agency (EPA) as related to volatile organic compound content of products.

1. Provide flooring, adhesive, and other products with low or zero volatile organic compound (VOC) content and containing no hazardous or carcinogenic ingredients.

1.07 PROJECT CONDITIONS

A. Do not install glazing when the ambient temperature is not within the range recommended by the glazing manufacturer.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds unless otherwise recommended by the manufacturer.

1.08 WARRANTY

A. Sealed Insulating Glass Units: Provide a ten (10) year warranty for product failure including, but not limited to, seal failure and inter-pane dusting or misting.

1. Warranty shall cover materials and installation for a complete replacement of the failed units at No Cost to the Owner.

B. Glass Installation: Provide 5-year labor warranty on glazing installation.

1. Warranty shall cover complete replacement of failed installation and any corresponding product failure at No Cost to the Owner.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. PPG Industries, Inc. – Pittsburg, PA; 800.377.5267.

2. Guardian Industries Corp. – Auburn Hills, MI; 248.340.1800.

3. Southwall Technologies – Palo Alto, CA; 650.962.9111.

4. Manufacturers of equivalent products submitted and approved in accordance with Section 016200

"Product Options".

2.02 GLASS MATERIALS

A. Insulated Glass: Solarban 60 Solar Control Low-E Tinted Insulating Glass by PPG Industries, Inc.

1. Type: Solarban 60 (2) Optigray + Clear.
    a. Outdoor Lite: Optigray Glass.
    b. Indoor Lite: Clear Float Glass.
    c. Low-E Coating: Solarban 60 Solar Control.
2. Thickness:
    a. Thickness of each Glass Pane: 1/4 inch
    b. Air Space Thickness: 1/2 inch
    c. Total Insulated Glass Thickness: 1 inch
3. Physical Properties:
    a. Transmittance:
        1) Ultraviolet: 10 percent
        2) Visible: 50 percent
        3) Total Solar Energy: 23 percent
    b. Reflectance:
        1) Exterior Light: 8 percent
        2) Interior Light: 11 percent
    c. U-Value:
        1) Winter Nighttime: 0.29
        2) Summer Daytime: 0.27
    d. Shading Coefficient: 0.35
    e. Solar Heat Gain Coefficient: 0.30
    f. Light to Solar Gain: 1.67
    g. Outdoor Visible Light Reflectance: 8 percent

B. Float Glass: Clear, annealed, float glass conforming to ASTM C 1036.

1. Type I, Class 1, Quality q3.
2. Thickness: 1/4 inch

2.03 GLASS FABRICATION

A. Thickness: Glass thickness indicated is the minimum.

1. Provide glass with thickness as required for glass type, size, and to accommodate performance requirements.

B. Insulated Glass: Fabricate insulated glass with two panes separated by air space.

1. Seal edge and purge inter-pane space with dry hermetic air.

2. Comply with ASTM E 546, ASTM E 576, ASTM E 773, and ASTM E 774.

C. Heat Treatment: Provide heat strengthened or fully tempered glass units where indicated or as required to accommodate performance requirements.

1. Heat Strengthened Glass: Annealed glass heat treated in accordance with ASTM C 1048, Kind HS.

2. Fully Tempered Glass: Annealed glass heat treated in accordance with ASTM C 1048, Kind FT.

a. Tempered glass shall comply with the requirements of ANSI Z97.1 and CPSC 16 CFR to qualify as safety glass.

D. Laminated Glass: Fabricate laminated glass by bonding two or more glass panes with transparent, flexible inter-layment material in accordance with ASTM C 1172.

1. Laminated glass shall comply with the requirements of ANSI Z97.1 and CPSC 16 CFR to qualify as safety glass.

E. Frosted Glass: Shop apply frosting film to glazing in accordance with the manufacturer's recommendations and installation instructions.

1. The glazing area of coverage shall receive final approval from the Architect prior to fabrication and application.

F. Clean cut glass to accommodate opening sizes and edge and bite conditions.

2.04 ACCESSORIES

A. Provide glazing accessories as recommended by the glass manufacturer as required for a complete installation.

B. Setting Blocks: Neoprene or EPDM, Shore A durometer hardness between 70 to 90.

C. Spacer Shims: Neoprene, 50 Shore A durometer hardness.

D. Glazing Tape: Preformed butyl compound, 10 to 15 Shore A hardness, coiled on release paper, black.

E. Sealants: Compatible with materials and conditions as recommended by the glass manufacturer.

PART 3 – EXECUTION

3.01 PREPARATION

A. Verify glass framing is accurately sized, structurally sound, square, and without bow.

B. Verify surfaces of glazing channels and recesses are clean, free of obstructions, and ready to receive glazing.

C. Inspect edges of glass and install only glass with clean cut edges.

D. Clean contact surfaces with solvent and wipe dry.

E. Prime surfaces as required for adhesion of sealants.

3.02 INSTALLATION

A. Install fabricated glass in accordance with the glass manufacturer's installation instructions.

B. Install setting blocks and spacers as recommended by referenced glazing standards and the glass manufacturer's recommendations.

C. Provide edge blocking as required to prevent sideway movement of glass in glazing channel.

D. Do not bump, drag, or brush edges against sash or other hard objects and avoid scratching.

E. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.

1. Tape glazing:

a. Cut glazing tape to length and set against permanent stops, projecting slightly above sightline.

b. Rest glass on setting blocks and push against tape for full contact at perimeter of pane.

c. Place spacers below sightline and install removable glazing stop against spacers.

d. Fill gap between pane and removable glazing stop with sealant to uniform line level with bite of frame.

e. Knife trim protruding edge of glazing tape.

2. Gasket glazing:

a. Fabricate two-piece compression gaskets to exactly fit openings.

b. Install soft compression gasket against permanent stops.

c. Miter cut and bond corners together.

d. Rest glass on setting blocks.

e. Insert dense compression gasket to press glass against soft gasket and lock in place against removable stop.

f. Apply sealant to gasket joints.

3. Wet sealant glazing:

a. Install spacers and sealant backing between glass and stops.

b. Position to control depth and width of sealant.

c. Apply sealant to glazing channels without voids.

d. Ensure complete bond of sealant to glass and channel surfaces.

e. Tool exposed sealant surfaces to provide wash away from glass.

3.03 ADJUSTING AND CLEANING

A. Clean glass immediately following installation complying with glass manufacturer's written recommendations.

B. Remove sealants and other glazing materials from adjacent finished surfaces.

C. Remove non-permanent labels and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.04 GLAZING SCHEDULE

A. The following are glazing descriptions which correspond with the drawings:

1. Type G1: 1-inch thick tinted, insulated glass with annealed interior pane and annealed exterior pane.

2. Type G2: 1-inch thick tinted, insulated glass with tempered interior pane and tempered exterior pane.

3. Type G3: 1/4-inch thick clear, annealed glass.

4. Type G4: 1/4-inch thick clear, tempered glass.

END OF SECTION

SECTION 089119 – LOUVERS AND VENTS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes prefinished aluminum louvers as indicated on the drawings and specified herein.

1.02 REFERENCES

A. Sheet Metal and Air Conditioner National Contractors' Association (SMACNA).

1.03 SUBMITTALS

A. Submit the following in accordance with Section 013300 "Submittal Procedures":

1. Manufacturer's product information and installation instructions for each type of louver and vent specified.

2. Shop drawings for each type and size of louver indicating profile, dimensions, installation conditions and anchoring details.

3. Manufacturer's standard size material samples indicating full range of colors for selection by the Architect.

4. When requested by the Architect, provide manufacturer's standard size samples for frame and blade members.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Construction Specialties, Inc. – Muncy, PA; 800.233.8493

2. Reliable Metal Products – Los Angeles, CA; 323.225.4553

3. Ruskin Manufacturing – Grandview, MO; 816.761.7476

4. Other manufacturers as submitted and approved in accordance with Section 016200 "Product Options".

2.02 MATERIALS

A. Frames and louver blades shall be fabricated from 0.081-inch extruded aluminum.

1. Size and depth as indicated on the drawings.

2. Blade angle shall be 45 degrees unless otherwise indicated.

B. Provide each exterior louver with bird / insect mesh screen formed of aluminum wire.

2.03 ANCHORS AND FASTENERS

A. Utilize anchors and fasteners of the same basic metal and alloy as fastened metal.

1. Do not use metals which are corrosive or incompatible with materials joined.

2. Use type, size, and material required for type of loading and installation conditions.

3. Use Phillips type machine screws for exposed fasteners.

4. Use nonferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance.

5. Use toothed steel or expansion bolt devices for drilled-in-place anchors.

2.04 FABRICATION

A. Fabricate louvers and vents to comply with requirements indicated for design, dimensions, materials, joinery, and performance.

B. Preassemble louvers in shop to minimize field splicing and assembly.

1. Disassemble units as necessary for shipping and handling limitations.

a. Clearly mark units for re-assembly and coordinated installation.

C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

D. Fabricate frames, including integral sills, to fit in openings of size indicated with allowances made for fabrication and installation tolerances of louvers, adjoining construction, and perimeter sealant joints.

E. Include supports, anchorages, and accessories required for complete assembly.

F. Provide sill extensions and loose sills made of same material as louvers, where indicated, or required for drainage to exterior and to prevent water penetrating to interior.

G. Join frame members to one another and to fixed louver blades as follows:

1. With fillet welds concealed from view; or mechanical fasteners; or a combination of these methods; as standard with louver manufacturer.

H. Finish with factory baked-on enamel finish, color as selected by the Architect.

PART 3 – EXECUTION

3.01 PREPARATION

A. Coordinate setting drawings, diagrams, templates, directions and instructions for the installation of anchors which are to be embedded in concrete or masonry construction.

1. Coordinate delivery of such items to project site.

3.02 INSTALLATION

A. Locate and place louver units plumb, level, and in proper alignment with adjacent work.

B. Use concealed anchors where possible.

1. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.

E. Repair finishes damaged by cutting, welding, soldering, and grinding operations required for fitting and jointing.

1. Restore finishes so there is no evidence of corrective work.

2. Return to shop items which cannot be refinished in field, make required alterations and refinish entire unit, or provide new units.

F. Protect galvanized and nonferrous metal surfaces from corrosion or galvanic action on surfaces which will be in contact with concrete, masonry, or dissimilar metals.

G. Install concealed gaskets, flashings, joint fillers, and insulation, as louver installation progresses where required to make louver joints weather tight.

3.03 PROTECTION AND CLEANING

A. Provide temporary covering for remainder of construction until Substantial Completion.

B. Before final inspection, clean exposed surfaces in accordance with the manufacturer's recommendations.

END OF SECTION

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SECTION 092216 – NON-STRUCTURAL METAL FRAMING

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section specifies non-structural metal framing including the following:

1. Steel Studs and Tracks.

2. Furring Channels.

3. Anchors and Fasteners.

1.02 RELATED SECTIONS

A. Section 061000 - Rough Carpentry

B. Sections 072100 – Insulation

C. Section 092900 – Gypsum Board

1.03 REFERENCES

A. ASTM C645: Non-Load (Axial) Bearing Steel Studs, Runners (Tracks), and Rigid Furring Channels for Screw Application of Gypsum Board.

B. ASTM C754: Installation of Steel Framing Members to Receive Screw Attached Gypsum Board.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”.

1. List of proposed products and manufacturer’s product data for each product.

2. Fire rating test designation for each fire rating required for each assembly.

3. Manufacturer's installation instructions.

4. Manufacturer’s standard size sample for each product.

1.05 QUALITY ASSURANCE

A. Thickness of steel as specified is the minimum uncoated steel thickness.

B. “Bottom of Deck” refers to the underside of structure overhead and may be either the underside of the floor or roof construction.

C. Where fire rated construction is required for walls, columns, beams, and floor-ceiling assemblies, the construction shall be identical to that used in fire rating test assemblies.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and provide storage for products in accordance with the manufacturer’s recommendations and the requirements of ASTM C 754.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Dietrich Industries – Denver, CO; 303.289.4092
2. Phillips Manufacturing Company – Phoenix, AZ; 602.253.9320
3. Scafco Corporation – Boise, ID; 208.323.4901
4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 FRAMING MATERIALS

A. Protect steel studs, tracks, and rigid furring channels with not less than G60 galvanizing per ASTM A 525.

2.03 STEEL STUDS AND TRACKS

A. Use ASTM A 525 steel and comply with the requirements of ASTM C 645 for rolled formed, channel type, galvanized sheet steel studs and tracks.

1. Studs shall be 1-5/8”, 2-1/2”, 3-5/8”, 6” or other size as indicated on drawings.
2. Interior, non load bearing metal stud gauge shall be as follows unless otherwise recommended by the manufacturer for length and application:
    a. Partitions less than 15 feet in height: 22 gauge.
    b. Partitions 15 feet or more in height: 20 gauge.
    c. Double jambs at door and other openings: 20 gauge.
    d. Partition corners: 20 gauge.
    e. End of free standing partition: 20 gauge.
3. Studs shall be in one piece.
4. Tracks shall be same gauge and thickness as studs.

B. Provide not less than two cutouts in web of each stud, approximately 12 inches from each end, and intermediate cutouts at approximately 24 inches on center.

2.04 FURRING CHANNELS

A. Furring channels shall be rolled formed, galvanized sheet steel complying with ASTM C 645 and as follows:

1. ½ inch resilient, hat shaped channels.
2. 7/8 inch rigid, ‘Z’ shaped channels.
3. 1-1/2 inch rigid, ‘Z’ shaped channels.

2.05 ANCHORS AND FASTENERS

A. Anchors and fasteners shall comply with applicable ASTM requirements.

B. Power actuated fasteners shall be as recommended by the manufacturer of the type, class and length as required to resist twice the imposed loads; style suitable for the application:

C. Fasteners for steel studs thicker than 20 gauge shall be steel drill screws of size and type recommended by the manufacturer.

PART 3 – EXECUTION

3.01 METAL STUD INSTALLATION

A. Install studs in accordance with ASTM C754 and manufacturer's written installation instructions.

1. Space studs not more than 16 inches on center.

2. Install double studs at door frame jambs and at other openings.

   a. At door head height, Install a runner section between door jamb studs and adjacent stud.

3. Extend studs to bottom of deck for fire rated partitions, smoke partitions and shafts, sound control partitions, and other partitions as indicated on drawings.

   a. When studs are to be extended to bottom of deck, cut studs 1/4 inch to 3/8 inch less than distance from floor to underside of structure overhead.

   b. At bottom of deck, form a slip joint with double track to allow for building movement.

   c. Stop gypsum board short of deck and seal with backer rod and sealant.

4. Studs which are not required to extend to bottom of deck and terminate above suspended ceilings, provide bracing or extend studs to underside of structure overhead.

5. Form control joints with double studs spaced ½ inch apart.

B. Chase wall partitions:

1. Locate cross braces for chase wall partitions to permit the installation of pipes, conduits, carriers, and similar items.

2. Studs or tracks used as cross bracing shall be not less than 2-1/2 inches wide.

C. Fasten studs as follows:

1. Fasten studs to adjacent track flange at intersections, corners, and jambs with two screws through each end of each stud and track flange, or by use of metal lock fastener tool.

2. When studs extend to bottom of deck use slip-track and do not fasten studs to top track.

3. Fasten back to back studs together at not less than 24 inches on center, staggered along webs.

4. Studs fastened flange to flange shall have splice plates on both sides screwed to each stud.

   a. Splice plate size and spacing shall be as recommended by the manufacturer.

D. Blocking:

1. Provide for attachment and support of plumbing fixtures, electrical outlets, and other items supported by metal framed construction.

   a. Provide additional studs where required.

   b. Install metal backing plates or special metal shapes as required and securely fasten to metal studs.

2. Screw wood blocking to studs for support of handrail brackets, wall-hung casework, door stops, toilet partitions, urinal screens, wall guards, toilet accessories and other components in accordance with Section 061000 “Rough Carpentry”.

3.02 FURRING CHANNEL INSTALLATION

A. Erect furring channels vertically utilizing size as indicated on drawings.

B. Space at 16 inches on center maximum and not more than 3 inches from internal and external corners.

C. Secure flanges of furring channels at 24 inches maximum.

3.03 ERECTION TOLERANCES

A. Plumb and align vertical members within 1/8 inch.

B. Level or align ceilings within 1/8 inch.

C. Fastening surface for application of subsequent materials shall not vary more than 1/8 inch from the layout line.

END OF SECTION

SECTION 092900 - GYPSUM BOARD

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following:

1. Exterior Sheathing
2. Drywall Suspension System
3. Gypsum Board
4. Accessories
5. Texture Finish

1.02 RELATED SECTIONS

A. Section 072500 – Weather Barriers

B. Section 079200 – Joint Sealants

C. Section 092216 – Non-Structural Metal Framing

D. Section 099100 – Painting

1.03 REFERENCES

A. ASTM C36: Gypsum Wallboard.

B. ASTM C79: Gypsum Sheathing Board.

C. ASTM C475: Joint Treatment Materials for Gypsum Wallboard Construction.

D. ASTM C630: Water Resistant Gypsum Backing Board.

E. ASTM E84: Test Method for Surface Burning Characteristics of Building Materials.

F. GA-201: Gypsum Board for Walls and Ceilings.

G. GA-216: Recommended Specifications for the Application and Finishing of Gypsum Board.

H. GA-505: Gypsum Board Terminology Standard.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”.

1. List of proposed products and manufacturer’s product data for each product.
2. Manufacturer's installation instructions.
3. Manufacturer’s standard size sample for each product.

1.05 QUALITY ASSURANCE

A. Where gypsum drywall systems with fire resistance ratings are indicated, provide materials and installations which are identical to assemblies tested per ASTM E 119 by fire testing laboratories acceptable to authorities having jurisdiction.

1. Provide fire resistance rated assemblies identical to those indicated by reference as follows:

    a. File numbers in Gypsum Association “Fire Resistance Design Manual”.

    b. Design designations in UL “Fire Resistance Directory”.

    c. Listing of other testing agencies acceptable to authorities having jurisdiction.

B. Obtain gypsum board products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum board products.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside, under cover, and in a manner to keep materials dry and protected from weather, direct sunlight, surface contamination, and damage from construction traffic and other causes.

C. Handle gypsum boards to prevent damage to edges, ends or surfaces.

D. Protect metal corner beads and trim from being bent or damaged.

1.07 PROJECT CONDITIONS

A. Comply with requirements of referenced gypsum board application standards and recommendations of gypsum board manufacturer for environmental conditions before, during, and after application of gypsum board.

B. When ambient outdoor temperatures are below 55 degrees F maintain continuous, uniform, comfortable building working temperatures of not less than 55 degrees F for a minimum period of 48 hours prior to, during, and following application of gypsum board and joint treatment materials or bonding of adhesives.

C. Ventilate building spaces as required to remove water in excess of that required for drying of joint treatment material prior to its application.

1. Avoid drafts during dry, hot weather to prevent too rapid drying.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. American Gypsum - Albuquerque, New Mexico; 505.823.2022.

2. Georgia Pacific Gypsum Corporation - Atlanta, Georgia; 800.284.5347.

3. Gold Bond Building Products, National Gypsum Company - Charlotte, North Carolina; 704.365.7300.

4. Louisiana-Pacific - Portland, Oregon; 800.547.6331.

5. United States Gypsum Company - Chicago, Illinois; 312.606.5756.

6. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 EXTERIOR SHEATHING

A. Exterior sheathing shall be Dens-Glass Gold by “Georgia Pacific”.

1. Thickness: ½ inch, unless otherwise indicated.

    a. Use 5/8 inch thick firestop type 'X' sheathing for fire-rated assemblies.

2.03 DRYWALL SUSPENSION SYSTEM

A. Provide commercial quality, cold rolled steel, hot dipped galvanized finish, drywall suspension system complying with the requirements of ASTM C 635.

1. Suspension members shall be fire rated, heavy duty classification, 1-1/2 inch high, with 1-1/2 inch wide knurled face.

    a. Main tees shall be 144 inches long with integral reversible splice.

    b. Cross tees shall be 48 inches long with quick release ends which provide positive locking.

    c. Provide accessory cross tees, transition clips, and splice clips.

2.04 GYPSUM BOARD

A. Gypsum board materials:

1. Regular Gypsum Board per ASTM C 36.

2. Fire Rated Gypsum Board: Type 'X', UL rated, fire resistive type wallboard per ASTM C 36.

3. Moisture Resistant Gypsum Board: M-Bloc with added fungicides as manufactured by American Gypsum.

    a. Regular and Type 'X' fire resistive type.

4. Thickness: 5/8 inch, unless otherwise indicated.

    a. For curved partitions provide multiple layers of ¼ inch and 3/8 inch thick gypsum board to equal thickness of adjacent flat panels.

5. Board Size: 4 feet wide in maximum permissible length to minimize end-to-end butt joints.

6. Ends: Square cut, tapered with beveled edges.

2.05 ACCESSORIES

A. Anchors and Fasteners: Provide anchors, fasteners, and screws as recommended by the manufacturer for applicable installations.

1. Provide adhesive specifically recommended for laminating gypsum board when conditions require.

B. Trim materials shall be formed of galvanized steel and beaded for concealment of flanges in joint compound.

1. Corner beads shall be galvanized steel with 1-1/4 inch knurled flanges.

2. Edge trim beads shall be type recommended for the application.

3. Control joints shall be one-piece continuous length.

C. Joint Treatment Materials: Provide joint treatment materials as recommended by the manufacturer for applicable installations, and complying with ASTM C 475 including reinforcing tape, joint compound, adhesive, water, and fasteners.

D. Textured Finish: Latex based texturing material.

PART 3 – EXECUTION

3.01 EXTERIOR SHEATHING INSTALLATION

A. Install exterior sheathing at exterior locations indicated on drawings in accordance with the manufacturer's written installation instructions suitable to receive exterior finishes.

1. Apply joint tape over joints and ensure joint tape is in place prior to application of additional work.

B. Refer to Section 072500 "Weather Barriers" for application of weather barrier over exterior sheathing.

3.02 DRYWALL SUSPENSION SYSTEM INSTALLATION

A. Install drywall suspension system in accordance with ASTM C 636, CISCA installation standards, and manufacturer's written installation instructions.

1. Space main tees, cross tees, and hanger wires at intervals recommended by the manufacturer.

2. Do not support hanger wires from mechanical, plumbing, fire protection, electrical or similar equipment and piping occurring above ceiling.

3. Provide bracing of the drywall suspension system to insure stability and structural performance during and after drywall attachment.

3.03 GYPSUM BOARD INSTALLATION

A. Install gypsum board at the following locations:

1. Regular gypsum board at partition and ceiling locations unless otherwise indicated.

2. Fire rated gypsum board at fire rated partitions and ceilings.

3. Moisture resistant gypsum board at Toilets and other wet areas.

a. Moisture Resistant Type 'X' at moisture resistant fire rated partitions and ceilings.

B. Install gypsum board in accordance with GA-201, GA-216, and manufacturer's written installation instructions.

1. Do not install imperfect, damaged, or damp boards.

2. Do not force boards into place.

3. Install exposed gypsum board with face side out.

C. Located exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 1'-0" in alternate courses of board.

1. Install wall boards vertically to avoid end-butt joints wherever possible.

2. At high walls, install boards horizontally with end joints staggered over studs.

D. Locate either edge or end joints over framing.

1. Butt boards together for a light contact at edges and ends with not more than 1/16 inch open space between boards.

2. Position boards so that like edges abut; tapered edges against tapered edges, and mill-cut or field-cut ends against mill-cut or field-cut ends.

3. Do not place tapered edges against cut edges or ends.

4. Stagger vertical joints over different studs on opposite sides of partitions.

E. Form control joints and expansion joints with space between edges of boards, prepared to receive trim accessories.

F. Fasten gypsum board to framing spacing fasteners as recommended by the manufacturer.

1. Attach gypsum board to supplementary framing and blocking provided for additional support at openings and cutouts.

G. Isolate perimeter of non load bearing gypsum board partitions at structural abutments.

1. Provide ¼ inch to ½ inch space, trim edge, and seal joint with acoustical sealant.

H. Where sound insulation is installed, seal the perimeter, control and expansion joints, and openings and penetrations with a continuous bead of acoustical sealant at each face.

1. Comply with ASTM C 919 and manufacturer's recommendations for location of beads and close off sound-flanking paths around or through the work, including sealing of partitions above acoustical ceilings.

I. Treat cut edges and holes in moisture resistant gypsum board with sealant.

J. Curved Partitions: Install multiple layers of gypsum board to match thickness of adjacent flat panels.

1. Moisten tension side of panel in accordance with the manufacturer's recommendations.

2. Place panels horizontally and securely attach to studs.

3. Minimize cutouts in curved panels and do not make cutouts until panels are thoroughly dry.

3.04 TRIM INSTALLATION

A. Install metal corner beads at external corners, edges of decorative ceiling and wall reveals, and other locations as detailed on drawings.

B. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed or where gypsum board abuts dissimilar materials.

C. Use longest practical lengths for corner beads and edge trim.

3.05 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C 840:

1. Level 0: Temporary partitions and surfaces.

2. Level 1: Wall areas above finished ceilings, whether accessible or not in the completed construction.

3. Level 2: Backing board to receive tile finish.

4. Level 4: Walls in utility spaces and ceilings to receive paint finish; walls exposed to public view to receive texture finish.

5. Level 5: Walls exposed to public view to receive paint finish.

B. Tape, fill, and sand exposed joints, edges, and corners to produce a smooth surface ready to receive finishes.

C. Apply joint compound and sand trim flanges, penetrations, fastener heads, and other surface defects to produce a smooth surface ready to receive finishes.

D. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.

E. All surfaces shall be dry mopped or cleaned with clean rags after sanding and prior to the application of the primer.

F. Where Level 5 finish is indicated, spray apply high build drywall surface over entire surface after joints have been properly treated and achieve a flat and tool-mark free finish.

3.07 TEXTURE FINISH

A. Finish: All interior gypsum board walls shall receive a texture finish.

1. For textured walls exposed to public view, walls shall receive a Level 4 Finish with Texture.

B. Priming: Prior to texturing, all gypsum board interior walls shall have spray-applied primer as recommended by the gypsum board manufacturer and backrolled.

C. Application: Spray apply texture coating in accordance with the manufacturer's written installation instructions.

D. Texture: To match and approved sample.

3.08 TOLERANCES

A. Maximum variation from true flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 093000 - TILE

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. The extent of tile is shown on drawings and includes the following:

1. Ceramic Tile.

2. Setting Materials and Grout.

3. Accessories.

1.02 RELAED SECTIONS

A. Cast-In-Place Concrete.

B. Section 092900 – Gypsum Board.

1.03 REFERENCES

A. ANSI A118.3: Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive.

B. ANSI A118.4: Latex-Portland Cement Mortar.

C. ANSI A118.6: Ceramic Tile Grouts.

D. ANSI A137.1: Standard Specification for Ceramic Tile.

E. TCA (Tile Council of America): Handbook for Ceramic Tile Installation.

1.04 SUBMITTALS

A. Provide the following in accordance with Section 013300 “Submittal Procedures”.

1. Submit manufacturer’s product data and installation instructions for each type of tile product indicated.

2. Furnish grade certificate signed by tile manufacturer and subcontractor confirming compliance with specified requirements.

3. Provide manufacturer’s standard size samples indicating full range of colors for tile and grout color selections by Architect.

a. Prior to ordering tile materials submit full size samples for each tile, color, and pattern selected by the Architect for final approval.

B. Field Sample: Using same materials and techniques for tile installations, provide tile field samples as follows:

1. Install tile to one floor area and one wall area each 4 square feet minimum.

2. Grout joints and clean.

3. Approved samples may remain as part of work and will be used as a basis for acceptance of remaining tile installation.

a. Unacceptable samples shall be removed.

1.05 QUALITY ASSURANCE

A. Obtain each variety of tile from a single source, providing products of consistent quality in appearance and physical properties, meeting the specified requirements.

B. Comply with ANSI A 137.1 “American National Standard Specifications for Ceramic Tile” for types, compositions, and grades of ceramic tile indicated.

C. Installation shall comply with the requirements of the TCA Handbook for Ceramic Tile Installation.

D. Installer shall be a company specializing in tile installations with a minimum of 5 years successful experience.

E. Low Emitting Materials: The volatile organic compound (VOC) content of sealants shall not exceed the limits defined in Rule #1168, “Adhesive and Sealant Applications” of SCAQMD.

1.06 PROJECT CONDITIONS

A. Protect adhesives from freezing or overheating in accordance with the manufacturer's instructions.

B. Do not install adhesives in closed, unventilated rooms.

C. Maintain temperature above 50 degrees F in tiled areas during installation and for 7 days after completion.

1. Increase minimum temperature as required by referenced installation standard or manufacturer’s recommendations.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. American Olean Tile Company – Dallas, TX; 888.268.8453

2. Crossville, Inc. – Crossville, TN; 931.484.2110

3. Daltile Corporation - Dallas, Texas; 800.933.8453

4. Laticrete International, Inc. - Grand Prairie, TX; 800.243.4788.

   a. Setting materials and grout.

   b. Anti-fracture membrane.

   c. Sealants and grout sealer.

5. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

   a. Architect reserves the right to reject proposed substitutions on basis of color and pattern compatibility even when fabrication and materials are equivalent.

2.02 CERAMIC TILE

A. Ceramic Floor Tile: Volume 1.0 Glazed Porcelain as manufactured by Daltile Corporation.

1. Floor Tile: 12 inch x 24 inch.

2. Thickness: 5/16 inch.

3. Color: As selected by the Architect from the manufacturer’s full range of colors.

4. Edge: Cushioned, provide bullnose where exposed.

5. Grout Joint: 3/16 inch.

6. Water Absorption: Less than 0.5 percent in accordance with ASTM C373.

7. Breaking Strength: Greater than 350 pounds in accordance with ASTM C648.

8. Scratch Hardness: 8.0 minimum in accordance with MOHS.

9. Chemical Resistance: Resistant in accordance with ASTM C650.

10. Interior Coefficient of Friction: Greater than 0.42 Wet; in accordance with ASMKI A137.1-2012, Section 9.6.

11. Abrasion Resistance: 4 minimum in accordance with ASTM C1027.

12. Base: 6 inch x 12 inch cove base.

13. Trim: Provide special shapes as project conditions require including bullnose.

B. Ceramic Wall Tile: Elevare Glazed Ceramic as manufactured by Daltile Corporation:

1. Wall Tile: 6 inch x 18 inch.

2. Thickness: 5/16 inch.

3. Color: As selected by the Architect from the manufacturer's full range of colors.

4. Grout Joint: 1/16 inch.

5. Water Absorption: Less than 20 percent in accordance with ASTM C373.

6. Breaking Strength: 120 to 230 pounds in accordance with ASTM C648.

7. Scratch Hardness: 4.0 to 6.0 in accordance with MOHS.

8. Chemical Resistance: Resistant in accordance with ASTM C650.

9. Trim: Provide special shapes as project conditions require including bullnose.

C. Ceramic Wall Tile Accent and Base: Semi-Gloss as manufactured by Daltile Corporation:

1. Wall Tile Accent: 4-inch x 4- inch.

2. Bullnose: 4-inch 16-inch.

3. Base: 6 inch x 6 inch.

4. Thickness: 5/16 inch.

5. Color: As selected by the Architect from Price Groups 1, 2, 3, and 4.

6. Grout Joint: 1/16 inch.

7. Water Absorption: Less than 20 percent in accordance with ASTM C373.

8. Breaking Strength: 100 to 230 pounds in accordance with ASTM C648.

9. Scratch Hardness: 4.0 to 6.5 in accordance with MOHS.

10. Chemical Resistance: Resistant in accordance with ASTM C650.

11. Trim: Provide special shapes as project conditions require including cove base corner.

2.03 SETTING MATERIALS

A. Epoxy Mortar Bond Coat: Chemical resistant type conforming to ANSI A118.3.

B. Thinset Mortar: Latex portland cement mortar conforming to ANSI A118.4.

2.04 GROUT

A. Latex Portland Cement Grout: Cementitious, dry cure type with latex additives and resistant to shrinking and staining, complying with ANSI A118.4.

B. Colors: As selected by Architect from manufacturer's full range.

2.05 ACCESSORIES

A. Anti-Fracture Membrane: Blue 92 Anti-Fracture by Laticrete International, Inc.

1. Two-part anti-fracture system shall be installed per the manufacturer's written installation instructions.

2. Anti-fracture membrane shall be used to cover all control and expansion joints in concrete floor slab.

3. Anti-fracture membrane shall be used to cover all hairline cracking within the concrete substrate.

B. Edge Protection/Transition Profiles:

1. Profiles by Schluter Systems.

C. Sealant: Latasil Tile and Stone Sealant by Laticrete International, Inc.

1. One-part, mildew-resistant, silicone sealant formulated with fungicide, intended for sealing interior joints at ceramic tile and other nonporous substrates which are subject to in-service exposures of high humidity and temperature extremes.

D. Grout Sealer: Manufacturer's standard product for sealing grout joints which does not change color or appearance of grout.

PART 3 – EXECUTION

3.01 PREPARATION

A. Coordinate recessed and sloping floor areas to receive tile with Section 033000 "Cast-in-Place Concrete".

B. Coordinate placement of concrete slab control joints with installation of ceramic tile expansion joints.

1. Locate concrete control joints to minimize or eliminate requirement for expansion joints in ceramic tile installations.

C. Examine substrates and areas where tile will be installed for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.

2. Verify that installation of anchors, recessed frames, mechanical, plumbing, electrical, and similar work located in or behind tile has been completed.
3. Floors to be tiled shall fall within maximum variation of ¼ inch in 10 feet.

D. Seal substrate surface cracks with filler.

E. Vacuum clean existing surfaces.

F. Do not proceed with tile installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Tile installations shall comply with the TCA Handbook for type of setting and grouting materials, installation methods, expansion control, and other applicable considerations.

B. Refer to drawings for tile patterns.

1. Layout tile work and center tile fields in both directions in each space or on each wall area.

2. Align joints when adjoining tiles on floor, base, walls, and trim are same size.

3. Adjust so as to minimize cuts and locate cuts so as to be least conspicuous.

4. Provide uniform joint widths.

a. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.

5. Form corners and bases neatly and accurately.

C. Extend tile into recesses and under or behind equipment and fixtures to form a complete covering.

1. Terminate tile neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Perform cutting and drilling of tile without marring visible surfaces.

1. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints.

2. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.

E. Install tile in accordance with the appropriate TCA Handbook installation method:

1. Use TCA Method No. F112 for cast-in-place concrete floors:

a. Verify slope to floor drains before setting tile.

b. Thinset tile to concrete subfloor with latex portland cement mortar.

c. Grout tile joints with latex portland cement grout.

2. Use TCA Method No. W243 for gypsum board walls:

a. Thinset tile to wall with latex portland cement mortar.

b. Grout tile joints with latex portland cement grout.

3. Set thresholds in same type of setting bed as abutting tile.

F. Provide and locate expansion joints in ceramic floor tile at locations over all control joints in concrete floor slabs.

1. Construct in accordance with TCA Method No. EJ171:

a. Minimum width: Width of concrete control joint.

b. Install joint in mortar bed directly over concrete control joint.

c. Keep joint clean of grout, mortar, and other debris.

d. Install compressible backer rod and urethane sealant as specified in Section 079200 “Joint Sealants”.

G. Sound tile after setting and replace hollow sounding units.

H. Allow tile to set for a minimum of 48 hours prior to grouting.

I. Grout tile joints. Make joints watertight, without voids, cracks, or excess grout.

J. Seal all grout joints with sealer applied in accordance with the manufacturer's written installation instructions.

3.03 ADJUSTING AND CLEANING

A. Leave finished tile installations clean and free of cracked, chipped, broken, unbonded, and otherwise defective work.

B. Upon completion of tile placement and grouting, thoroughly clean and polish all tile surfaces so they are free of foreign matter.

3.04 PROTECTION

A. Limit foot and wheel traffic over finished floor surface.

B. Provide protection and maintain conditions in a manner that insures tile is without damage or deterioration at time of Substantial Completion.

3.05 EXTRA MATERIALS

A. Furnish Owner with extra materials that match products installed, packaged with protective covering for storage, and identified with labels clearly describing contents.

1. 1 box for each 50 boxes or fraction thereof for each type, size, color, and pattern installed.

END OF SECTION

SECTION 095100 – ACOUSTICAL CEILINGS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following lay-in ceiling tile and accessories:

1. Suspension grid
2. Acoustical tile
3. Washable tile

1.02 RELATED SECTIONS

A. Section 092900 – Gypsum Board

1.03 REFERENCES

A. ASTM C635: Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM C636: Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

C. ASTM E580: Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.

D. ASTM E1264: Classification of Acoustical Ceiling Products,

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”.

1. Product data for each acoustical ceiling product specified.
2. Manufacturer’s installation instructions.
3. Samples:
   a. 2-inch-long section of suspension system main runner, cross tee, and edge trim.
   b. 4-inch x 4-Inch minimum of each panel.

1.05 QUALITY ASSURANCE

A. Suspension grid components and installation shall comply with applicable requirements of Project Seismic Zone.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Armstrong World Industries, Inc. - Lancaster, Pennsylvania; 800.233.3823.
2. USG Company – Chicago, IL; 800.950.3839
3. Manufacturers of equivalent products submitted and approved in accordance with Section 016200

"Product Options".

2.02 SUSPENSION GRID

A. Prelude XL as manufactured by Armstrong World Industries.

1. Type: Exposed Tee System
2. Grid Face: 15/16 inch
3. Size: 1-11/16 inch main beams and cross tees
4. Wall Molding: 7/8 inch flange x 7/8 inch high Angle Molding
5. Color: As selected by Architect from the manufacturer's full range.
6. Material: Hot dipped galvanized steel
7. Load: Intermediate duty
8. Durability: Humidity and corrosion resistant
9. Fire Resistance: Non-rated
10. Seismic Requirements: Refer to Structural Drawings for Seismic Category
11. Accessories: Manufacturer's standard accessories as field conditions require.

2.03 ACOUSTICAL AND WASHABLE TILE

A. Ultima Tegular as manufactured by Armstrong World Industries.

1. Size: 2'-0" x 2'-0" x 3/4" and 2'-0" x 4'-0" x 3/4"
2. Edge Profile: 15/16-inch beveled tegular
3. Surface: Non directional, fine texture
4. Acoustics: NRC 0.70; CAC 35
5. Material: Wet-formed mineral fiber with Durabrite acoustically transparent membrane
6. Surface Finish: Durabrite with Factory-applied latex paint
7. Color: White
8. Fire Rating: Class A
9. Light Reflectance: 0.90
10. Sag Resistance: HumiGuard Plus
11. Anti-Microbial: BioBlock Plus
12. Durability: Wash, impact, scratch, soil
13. Fire Performance: Flame Spread Index 25 or less; Smoke Developed Index 50 or less
14. ASTM E 1264 Classification: Type IV, Form 2, Pattern E, Fire Class A.
15. Suspension Grid: Prelude XL

PART 3 – EXECUTION

3.01 PREPARATION

A. Do not install acoustical ceilings until building is enclosed, minimum temperature is 60 degrees F, dust generating activities have terminated, and overhead work is completed, tested and approved.

B. Verify that layout of hangers will not interfere with other work.

3.02 SUSPENSION SYSTEM INSTALLATION

A. Locate system on room axis according to Reflected Ceiling Plan.

B. Install grid systems in accordance with ASTM C636 and ASTM E580.

C. Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by or penetrating through ceilings, including light fixtures, HVAC equipment, fire suppression system components, and partition system.

D. Hang system independent of walls, columns, ducts, pipes, and conduit.

1. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

E. Where ducts or other equipment prevent regular spacing of hangers, reinforce the nearest affected hangers and related grid members.

F. Loading:

1. Do not support other building components on main runners and cross tees if weight causes total dead load to exceed deflection capability.

2. Support light fixture loads by supplementary hangers.

3. Do not eccentrically load system or produce rotation of runners.

G. Edge molding: Install at intersection of ceiling and vertical surfaces, using longest practical lengths.

1. Miter corners.

2. Provide edge moldings at junctions with other interruptions.

3.03 PANEL INSTALLATION

A. Install ceiling panels in locations as indicated on Reflecting Ceiling Plan and as specified herein.

B. Fit acoustical panels in place, free from damaged edges or other defects. Install level, in uniform plane, and free from twist, warp, and dents.

C. Lay directional patterned units with fissures running in one direction.

D. Cut panels to fit irregular grid and perimeter edge trim.

E. Install hold-down clips to retain panels tight to grid system within 20 feet of exterior doors.

3.04 TOLERANCES

A. Variation from flat and level surface: 1/8 inch in 10 feet.

3.05 CLEANING

A. Vacuum or brush grid and panels to remove dust and loose dirt.

B. Clean grid and panels of all marks, smudges, and clinging dirt with moist cloth and mild soap.

C. Replace scratched sections of grid and soiled or stained panels.

D. Remove cut sections of grid, panel scraps, wire clippings, and all other debris from space above ceiling.

3.06 EXTRA MATERIALS

A. Provide in accordance with Section 017700 “Closeout Procedures”.

1. Three (3) boxes of each type of ceiling panel.

END OF SECTION

SECTION 096500 - RESILIENT FLOORING

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes vinyl composition floor tile (VCT) as shown on the drawings and specified herein.

1.02 RELATED SECTIONS

A. Section 096513 – Resilient Wall Base and Accessories.

1.03 REFERENCES

A. ASTM E84: Surface Burning Characteristics of Building Materials.

B. ASTM F1066: Vinyl Composition Floor Tile.

C. FS L-F-475: Floor Covering, Vinyl Surface (Tile and Roll), with Backing.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Product Data: Submit manufacturer’s product literature and installation instructions for each type of resilient flooring, accessory, and installation required.

    a. Submit written data on physical characteristics, durability, resistance to fading, and flame resistance.

    b. Include method of installation for each type of substrate.

2. Maintenance: Submit manufacturer’s printed instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated traffic and use conditions.

3. Samples: Submit manufacturer’s full set of standard size samples indicating full range of colors and patterns for selection by the Architect.

    a. Submit full size samples for each flooring selected by the Architect.

        1) Label each sample with manufacturer’s name, material description, color, pattern, and Architect’s designation indicated on drawings and in schedules.

        2) Order material only after receiving the Architect’s approval of the full-size sample.

1.05 QUALITY ASSURANCE

A. Regulatory requirements: Comply with current applicable regulations of the Environmental Protection Agency (EPA) as related to volatile organic compound content of products.

1. Provide flooring, adhesive, and other products with low or zero volatile organic compound (VOC) content and containing no hazardous or carcinogenic ingredients.

B. Conform to applicable codes for flame, fuel, and smoke rating requirements of resilient flooring in accordance with ASTM E84.

1.06 PROJECT CONDITIONS

A. Store materials for 48 hours prior to installation in area of installation to achieve temperature stability.

B. Maintain space to receive flooring at 65 degrees F minimum for 48 hours prior to, during, and 48 hours after installation, unless otherwise recommended by the floor tile manufacturer.

C. Ventilation: Do not install flooring in enclosed building spaces without adequate ventilation.

1. Provide ventilation to remove volatile organic compound (VOC) out-gasses emitting from sheet flooring and adhesive during storage, installation, and after installation as required to minimize contamination of building interior spaces.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Armstrong World Industries, Inc. - Lancaster, Pennsylvania; 800.233.3823.

2. Azrock Industries, Inc. - Florence, Alabama; 205.766.0234.

3. Mannington Commercial - Calhoun, Georgia; 800.241.2262.

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

a. The Architect reserves the right to reject proposed substitutions on the basis of color and pattern compatibility even though fabrication and materials are equivalent.

2.02 VINYL COMPOSITION FLOOR TILE (VCT)

A. Type: Armstrong “Standard Excelon” vinyl composition tile complying with ASTM F1066.

B. Size: 12 inches x 12 inches x 1/8 inch thick.

C. Colors: As selected by the Architect from the manufacturer's full range of colors and patterns.

1. Allow for accent coloring as indicated on the drawings.

2. If no pattern is indicated on the drawings allow 20 percent for accent coloring.

2.03 ACCESSORIES

A. Subfloor Filler: White premix latex type as recommended by the flooring material manufacturer.

B. Primer: Type as recommended by the flooring material manufacturer.

C. Adhesive: Waterproof type as recommended by the flooring material manufacturer.

D. Sealer and Wax: Type as recommended by the flooring material manufacturer.

PART 3 – EXECUTION

3.01 PREPARATION

A. Verify that substrate surfaces are smooth, flat, and free from irregularities.

B. Fill low spots, cracks, joints, holes, and other defects, with floor filler.

1. Apply, trowel, and float filler to leave smooth, flat, hard surface.

2. Prohibit traffic until cured.

C. Vacuum floor surfaces.

3.02 VINYL COMPOSITION FLOOR TILE INSTALLATION

A. Install VCT per the manufacturer's recommendations and written installation instructions.

B. Install tile in patterns as shown on drawings using colors as selected by the Architect.

1. Mix tile from cartons to ensure shade variations are consistent.

C. Layout tile pattern from center of room such that tiles at perimeter are wider than 6 inches, or as indicated on drawings.

1. Install tile with pattern grain alternating with adjacent tiles to produce basket weave pattern.

D. Spread only enough adhesive to permit installation of flooring materials before initial set.

E. Set flooring in place and press with heavy roller to attain full adhesion.

F. Scribe flooring to walls, columns, cabinets, and other appurtenances to produce tight joints.

G. Install edge guards at unprotected or exposed edges and transition strips at intersections with other floor finishes using maximum possible lengths.

H. Locate transitions to other floor coverings at doorways such that joint is concealed when door is closed.

3.03 CLEANING AND PROTECTION

A. Prohibit traffic on floor for 48 hours after installation.

B. Remove excess adhesive from floor, base, and wall.

C. After floors have set sufficiently to properly bond, wash with neutral cleaner, wax, and buff thoroughly.

D. Provide non-staining paper pathway taped to resilient flooring as protection from construction traffic.

3.04 EXTRA MATERIALS

A. Provide in accordance with Section 017700 "Closeout Procedures".

1. One box for each 50 boxes or fraction thereof for each type, color, pattern, and size installed.

END OF SECTION

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SECTION 096513 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This Section includes the following as specified herein and shown on the drawings:

1. Resilient wall base.

2. Resilient molding.

3. Installation materials.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”

1. Product Data: Submit manufacturer’s product data, installation instructions, and maintenance recommendations for each product specified.

2. Samples: For each type of resilient product specified provide manufacturer’s standard size samples for the full range of colors, textures, and patterns for selection by the Architect.

1.03 QUALITY ASSURANCE

A. Regulatory requirements: Comply with current applicable regulations of the Environmental Protection Agency (EPA) as related to volatile organic compound content of products.

1. Provide flooring, adhesive, and other products with low or zero volatile organic compound (VOC) content and containing no hazardous or carcinogenic ingredients.

1.04 PROJECT CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Maintain ambient temperatures in accordance with the manufacturer’s recommendations prior to, during, and after installation.

C. Provide ventilation and protection of the environment as recommended by the manufacturer.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Flexco Corporation - Tuscumbia, AL; 800.633.3151.

2. Johnsonite - Chagrin Falls, OH; 800.899.8916.

3. Roppe Corporation - Fostoria, OH; 800.537.9527.

4. Manufacturers of equivalent products submitted and approved in accordance with Section 016200 “Product Options”.

a. The Architect reserves the right to reject proposed substitutions on the basis of color and pattern compatibility even though fabrication and materials are equivalent.

2.02 RESILIENT WALL BASE

A. Wall Base: Rubber.

B. Style: Cove with top-set toe.

C. Minimum Thickness: 0.125 inch.

D. Height: 4 inches unless noted otherwise.

E. Length: Coils in manufacturer's standard length.

F. Outside Corners: Premolded (Job formed when approved by the Architect).

G. Inside Corners: Job formed.

H. Surface: Smooth.

I. Color: As selected by the Architect from the Manufacturer's full range of colors.

2.03 RESILIENT MOLDING

A. Molding: Edge guards, transition strips, and other moldings as project conditions require.

B. Length: Manufacturer’s standard lengths for continuous length at each application.

C. Color: As selected by the Architect from the manufacturer’s full range of colors.

2.04 INSTALLATION MATERIALS

A. Trowleable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic cement-based formulation provided or approved by resilient product manufacturers for applications indicated.

B. Adhesives: Water-resistant type recommended by the manufacturer to suit resilient products and substrate conditions.

PART 3 – EXECUTION

3.01 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer.

1. Do not use solvents.

C. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

D. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install resilient products until they are the same temperature as the space where they are to be installed.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

1. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust.

2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 RESILIENT WALL BASE INSTALLATION

A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

C. Tightly adhere wall base to substrate throughout length of each piece with base in continuous contact with horizontal and vertical substrates.

D. Do not stretch wall base during installation.

E. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.

F. Premolded Comers: Install pre-molded comers before installing straight pieces.

G. Job-Formed Comers:

1. Outside Corners: Use straight pieces of maximum lengths possible.

a. Form without producing discoloration (whitening) at bends.

b. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.

2. Inside Corners: Use straight pieces of maximum lengths possible.

a. Form by cutting an inverted V-shaped notch in toe of wall base at the point where comer is formed.

b. Shave back of base where necessary to produce a snug fit to substrate.

3.03 RESILIENT MOLDING INSTALLATION

A. Install edge guards at edges of floor coverings that would otherwise be exposed.

B. Install reducer strips between dissimilar flooring materials.

C. Butt to adjacent materials and tightly adhere to substrates throughout the length of each piece.

3.04 CLEANING

A. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.

2. Sweep and vacuum surfaces thoroughly.

3. Damp-mop surfaces to remove marks and soil.

a. Do not wash surfaces until after time period recommended by manufacturer.

3.05 PROTECTION

A. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

1. Use protection methods recommended in writing by manufacturer.

3.06 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

END OF SECTION

SECTION 097700 - SANITARY WALL PANELS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes fiberglass reinforced wall panels as shown on the drawings and specified herein.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Manufacturer's technical data and installation instructions for each type of panel specified.

2. Manufacturer's maintenance instructions, including precautions for use of cleaning materials which could damage panels.

3. Manufacturer’s standard size samples for the full range of product colors and textures for the Architect’s selection.

4. Manufacturer’s standard size samples for molding and fasteners.

1.03 QUALITY ASSURANCE

A. Provide panels, moldings, and fastening devices from a single manufacturer.

B. Low Emitting Materials: The volatile organic compound (VOC) content of adhesives and sealants shall not exceed the limits defined in Rule #1168, “Adhesive and Sealant Applications” of SCAQMD.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the project site in original sealed packaging and containers, clearly labeled for identification.

B. Store materials in a protected and dry location at the project site.

1. When moving more than a single sheet, place sheets face-to-face and back-to-back.

1.05 PROJECT CONDITIONS

A. Installation shall not begin until the building is enclosed, permanent heating and cooling equipment is in operation, and residual moisture has dissipated.

B. Prior to, during and after installation, maintain temperature and relative humidity recommended by the manufacturer for type of adhesive used.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Crane Composites – Channahon, IL; 800.435.0080

2. Marlite – Dover, OH; 800.377.1221

3. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 MATERIALS

A. Fiberglass reinforced wall panels shall be Glasbord-P with 'Surfaseal' as manufactured by "Kemlite" as follows:

1. Thickness: 3/32 inches for general purpose wall applications.

2. Finish: Class III finish, color and texture as selected by the Architect from the manufacturer's full range of colors and textures.

3. Flame Spread: 200 or lower in accordance with ASTM E 84.

4. Smoke Developed: 450 or lower in accordance with ASTM E 84.

5. Barcol Hardness: 50 in accordance with ASTM D-2583.

6. Impact Strength: 11 ft.lbs./inch in accordance with ASTM D-256.

7. Panels will exhibit no more than a 0.038% weight loss after a 25 cycle Taber test.

B. Moldings shall be PVC face mounted moldings to match panel color.

1. Trim for outside corners shall be OSC angle molding.

C. Adhesive shall be "Kemlite 265", non-flammable adhesive.

1. Plastic pin rivets shall be field applied at the direction of the Architect as required for additional securement.

D. Seal joints with "Kemlite 255" silicone sealant in food preparation or service areas, storage rooms, wet areas, and other areas of high moisture.

PART 3 – EXECUTION

3.01 PREPARATION

A. Examine backup surfaces to determine that corners are plumb and straight; surfaces are smooth, uniform, clean and free from foreign matter; nails countersunk; and joints and cracks are filled flush with the adjoining surface.

B. Do not begin installation until backup surfaces are put into satisfactory condition.

3.02 INSTALLATION

A. Install panels and moldings in accordance with the manufacturer's instructions.

B. Do all cutting with carbide tipped saw blades or drill bits; or cut with snips.

C. Apply adhesive to panel back for 100 percent coverage.

D. Install panels with manufacturer's recommended size field and corner joints.

3.03 CLEANING

A. Remove foreign matter from panel by use of a soft bristle brush, avoiding abrasive action.

B. Remove any adhesive or excessive sealant from panel using solvent or cleaner recommended by panel manufacturer.

END OF SECTION

SECTION 099100 - PAINTING AND COATING

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes surface preparation and field application of painting and coatings.

1.02 RELATED SECTIONS

A. Section 055000 – Metal Fabrications

B. Section 081100 – Steel Doors and Frames

C. Section 083113 – Access Doors

D. Section 092900 – Gypsum Board

1.03 REFERENCES

A. ASTM D 16: Standard Terminology for Paint, Related Coatings, Materials, and Applications.

1. Refer to ASTM D 16 for definition of terms used in this section.

B. ASTM D 4442: Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.

C. 40 CFR 59, Subpart D: National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

D. GreenSeal GS-11: Paints.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013000 “Submittal Procedures”.

1. Product Data: Provide manufacturer’s product information, application instructions, and maintenance recommendations for all paints and coatings used on this project.

a. Include any special surface preparation procedures.

b. Include information on cleaning, touch-up, and repair.

2. Samples: For each paint and coating specified provide manufacturer's color charts indicating the full range of colors for selection by the Architect.

a. Upon selection by the Architect, submit two painted samples for each color, illustrating selected color and sheen.

b. Submit on tempered hardboard, 8 inch x 8 inch in size.

1.05 QUALITY ASSURANCE

A. Provide all paint and coating products used in any individual system from the same manufacturer.

B. Low Emitting Materials:

1. Paints: The volatile organic compound (VOC) content of paints shall not exceed the limits defined in “Green Seal Standard for Architectural Coatings” GS-11.

2. Anti-Corrosive Paints: The volatile organic compound (VOC) content of anti-corrosive paints shall not exceed the limits defined in “Green Seal Standard for Anti-Corrosive Paints” GS-03.

3. Stains and Sealers: The volatile organic compound (VOC) content of clear wood finishes, stains, sealers, and shellacs shall not exceed the limits defined in Rule #1113, “Architectural Coatings” of SCAQMD.

C. Applicator Qualifications: Painting company specializing in performing the type of work specified in this section with a minimum 3 years experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the site in manufacturer’s sealed and labeled containers.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at temperature range recommended by the manufacturer, in a ventilated area, and as otherwise required by the manufacturer's instructions.

1.07 PROJECT CONDITIONS

A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

B. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

1. Minimum Application Temperatures for Latex Paints: 45 degrees F for interior; 50 degrees F for exterior; unless otherwise recommended by the manufacturer.

C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface during application.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Dunn Edwards Paints – Los Angeles, CA; 888.337.2468

2. Kwal Paint – USA; 855.688.0668

3. Sherwin Williams (Base Manufacturer) – USA; 800.474.3794

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 PAINTS AND COATINGS

A. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

B. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.

1. Supply each coating material in the quantity required to complete the entire project's work from a

single production run.

2. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in the manufacturer's product instructions.

C. Chemical Content: The following compounds are prohibited.

1. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

2. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.

D. Paint and Coating Color:

1. Color for paint and coatings shall be as selected by the Architect.

2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall / ceiling they are mounted on / under.

2.03 ACCESSORIES

A. Provide commercial quality cleaning cloths, cleaning agents, primers, sealers, sanding materials, clean-up materials and any other products or materials required to achieve the finishes specified.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine surfaces scheduled to be finished prior to commencement of work.

1. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

2. Do not begin application of coatings until substrates have been properly prepared.

3. Report any condition that may potentially affect proper application.

B. Test shop-applied primer for compatibility with subsequent cover materials.

C. Measure moisture content of surfaces using an electronic moisture meter and do not apply finishes unless moisture content of surfaces is below the following maximums:

1. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.

2. Interior Wood: 15 percent, measured in accordance with ASTM D 4442.

3. Exterior Wood: 15 percent, measured in accordance with ASTM D 4442.

4. Gypsum Wallboard: 12 percent.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach.

1. Rinse with clean water and allow surface to dry.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

F. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter.

1. Remove oil and grease with a solution of tri-sodium phosphate.

a. Rinse well and allow to dry.

2. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

G. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-PC 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).

H. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent.

1. Apply coat of etching primer.

I. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound.

1. Spot prime defects after repair.

J. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming.

1. Seal knots, pitch streaks, and sappy sections with sealer.

2. Fill nail holes and cracks after primer has dried; sand between coats.

3. Back prime concealed surfaces before installation.

K. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

L. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust.

1. Feather edges to make touch-up patches inconspicuous.

2. Clean surfaces with solvent.

3. Prime bare steel surfaces.

M. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust.

1. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting.

a. Clean by washing with solvent.

2. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned.

3. Prime paint entire surface.

a. Spot prime after repairs.

3.03 APPLICATION

A. Apply products in accordance with the manufacturer's written instructions.

1. Apply each coat to uniform appearance.

2. Do not apply finishes to surfaces that are not dry.

a. Allow applied coats to dry before next coat is applied.

3. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary to completely hide.

4. Sand wood and metal surfaces lightly between coats to achieve required finish.

a. Vacuum clean surfaces of loose particles.

b. Use tack cloth to remove dust and particles just prior to applying next coat.

B. Finish all interior and exterior surfaces exposed to view, unless fully factory-finished, unless otherwise indicated, and the following:

1. Exposed surfaces of steel lintels and ledge angles.

2. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.

3. Top and bottom of wood doors.

4. Mechanical and Electrical:

a. In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.

b. On the roof and outdoors, paint all piping that is exposed to weather or to view unless otherwise indicated.

c. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint.

d. Paint dampers exposed behind louvers and grilles to match face panels.

e. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

C. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

D. Do Not Paint or Finish the Following Items:

1. Items indicated to remain unfinished.

2. Items indicated to receive other finishes.

3. Items factory-finished unless specifically so indicated.

a. Materials and products having factory-applied primers are not considered factory finished.

4. Acoustical materials, unless specifically so indicated.

5. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.

6. Ceramic and other tiles.

7. Concealed pipes, ducts, and conduits.

8. Exterior insulation and finish system (EIFS).

9. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.

10. Floors, unless specifically so indicated.

11. Glass.

12. Marble, granite, slate, and other natural stones.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Upon completion remove all excess materials and debris from the project site.

C. Remove spatter, droppings, and other excess material from adjacent finishes.

3.05 PROTECTION AND REPAIRING

A. Protect finished coatings until completion of project.

B. Touch-up surfaces which become damaged just prior to Substantial Completion.

1. Re-coat or re-finish entire surfaces which cannot be touched-up to the satisfaction of the Architect.

3.06 EXTRA MATERIALS

A. Furnish the following for the Owner's use in maintenance of applied paint and coatings.

1. Extra Paint and Coatings: Minimum One (1) gallon of each color.

2. Label each container with color and paint color formula in addition to the manufacturer's label.

3. Store where directed by the Owner.

3.07 EXTERIOR PAINT SCHEDULE

A. Concrete and Masonry - Acrylic Textured Coating:

1. Primer: One coat of Loxon clear acrylic sealer / conditioner.

2. Top Coat: Two coats of Ultracrete III.

B. Ferrous Metals – Latex Enamel:

1. Primer: Touch-up with rust-inhibitive primer recommended by top coat manufacturer.

2. Top Coat: Two coats of high gloss latex enamel; Super Paint Exterior High Gloss A85 Series.

C. Galvanized Metals – Latex Enamel:

1. Primer: If unprimed, one coat Pro-Cryl Universal Metal Primer B66-310 Series.

a. If primed, touch up as required.

2. Top Coat: Two coats of high gloss latex enamel; Super Paint Exterior High Gloss A85 Series.

3.08 INTERIOR PAINT SCHEDULE

A. Concrete and Masonry – Epoxy:

1. Primer: One coat PrepRite Block Filler, B25W25.

2. Epoxy: Two coats semi-gloss Waterbased Catalyzed Epoxy, B70W211/B60V25.

B. Concrete and Masonry – Latex Enamel:

1. Primer: One coat PrepRite Block Filler, B25W25.

2. Top Coat: Two coats of semi-gloss latex enamel; Harmony Interior Latex Semi-Gloss B9W900 Series.

C. Exposed Overhead Metal – Latex-Acrylic Enamel:

1. Primer: One coat of Pro-Cryl Metal Primer B66-310 primer sealer.

2. Top Coat: One coat of eggshell latex-acrylic enamel; Waterborne Acrylic Eggshell Dryfall B42W2.

D. Ferrous Metals – Latex Enamel.

1. Primer: Touch-up with latex primer.

2. Top Coat: Two coats of semi-gloss latex enamel; Pro Green 200.

E. Galvanized Metals – Latex Enamel:

1. Primer: One coat Pro-Cryl Universal Metal Primer B66-310 Series .

2. Top Coat: Two coats of semi-gloss latex enamel; Pro Green 200.

F. Gypsum Board – Epoxy:

1. Primer: One Coat ProMar 200 Zero VOC Latex Primer, B28W2600.

2. Epoxy: Two coats semi-gloss Waterbased Catalyzed Epoxy, B70W211/B60V25.

G. Gypsum Board - Latex Enamel:

1. Primer: One Coat ProMar 200 Zero VOC Latex Primer, B28W2600.

2. Top Coat: Two coats of latex enamel; Harmony Interior Latex B9W900 series.

a. Semi-gloss, eggshell, satin, or flat as selected by the Architect for the conditions.

H. Gypsum Board - Latex-Acrylic Enamel:

1. Primer: One coat of Harmony Interior Primer B11W900 primer sealer.

2. Top Coat: Two coats of semi-gloss latex-acrylic enamel; Bath Paint Semi-gloss A59 series.

I. Wood, Opaque – Latex Enamel:

1. Primer: One coat of latex primer sealer.

2. Top Coat: Two coats of semi-gloss latex enamel; Pro Green 200.

J. Wood, Transparent – Stain, Varnish:

1. Stain: One coat of stain; Wood Classics Wood Stain A49 Series.

2. Varnish: Two coats of varnish; Wood Classics Waterborne Polyurethane Varnish.

K. Wood, Transparent - Varnish, No Stain:

1. One coat sealer.

END OF SECTION

SECTION 101400 – SIGNAGE

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following types of signage.

1. Room Signs.

2. Cast Aluminum Letters.

1.02 RELATED SECTIONS

A. Section 061000 - Rough Carpentry

1.03 REFERENCES

A. ANSI A117.7: Specifications for Making Buildings and Facilities Accessible To and Usable by Physically Handicapped People.

1.04 SUBMITTALS

A. Provide the following in accordance with 013300 “Submittal Procedures”.

1. List of proposed products and product data.

2. Shop drawings listing identifying devices, text, lettering style, dimensions, and methods and details of attachment.

3. Samples illustrating available types and colors for selection by Architect.

4. Copy of warranty as specified herein.

1.05 QUALITY ASSURANCE

A. Signs shall be designed and installed for use by handicapped persons in accordance with ANSI A117.7 and ADA 101-336 Sections 4.30 through 4.30-5.

1.06 WARRANTY

A. “Life of Building” Warranty for plastic room signs against defects in materials and workmanship.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. A.R.K. Ramos Signage Systems - Oklahoma City, OK; 800.725.7266

2. Best Sign Systems - Montrose, Colorado; 800.235.2378

3. Century Sign Builders - Albuquerque, NM; 505.888.2901

4. Manufacturers of equivalent products submitted and approved in accordance with Section 016200 “Product Options”.

2.02 ROOM SIGNS

A. Room Identification Type: “Basic” room signage as manufactured by Century Sign Builders.

1. Size: 7-3/4 inches Wide x 7-3/4 inches High with rounded corners.

2. Changeable Signage: The User shall be able to make changes and updates to room signs with the use of transparencies and any desktop printer.

B. Borders: 3/8 inch wide around perimeter of sign with 1/8 inch inside radius corners.

C. Lettering: ADA Approved San Serif font, 1/32 inch raised tactile characters.

1. Style selected by Architect from manufacturer's standard.

2. Height of lettering shall be 5/8”.

D. Text: Refer to Finish Schedule on Drawings for actual text of signs.

1. Receive Architect’s final approval of text prior to fabrication.

E. Accompanying Braille Indications: Grade 2.

F. Symbols: 1/32 inch raised graphics.

1. Restrooms: International gender and handicapped symbols.

G. Colors: Selected by Architect from manufacturer's full range and providing 70 percent contrast between text / graphics and background.

2.03 ROOM SIGN FABRICATION

A. Sign plaque, letters, and symbols shall be constructed using 0.125 inch single-ply non-glare acrylic multipolymer material with either continuous embedded pigment or a micro-surfaced color layer (Depending on color selection).

1. Signage must be constructed with materials having embedded coloration that is the final approved color for the signs.

a. Products with painted or other applied coloration are not acceptable.

2. Sign plaques, lettering, and symbols shall have a matte or eggshell finish.

3. All letters, numbers and/or symbols shall have a 70% contrast to the plaque color of the sign as required by ADA regulations.

B. Signs shall have a 3/8-inch wide raised (1/32”) border around the perimeter of plaque.

C. Tactile lettering and symbols shall be formed using rotary engraving method and bonded to sign plaque using 3M Scotch 467HP adhesive or approved equal.

1. Lettering style and size will be in accordance with design format in Century Sign Builders product line CS.

2. Tactile characters/symbols shall be raised 1/32 inch from sign plate face.

3. Lettering and symbols shall have 1/32-inch return cut.

D. Signs requiring Braille must be constructed using the Edgerton Grade 2 Braille System.

1. Text shall be accompanied by braille on signs requiring braille.

2.04 CAST ALUMINUM LETTERS

A. Exterior lettering as manufactured by A.R.K. Ramos Signage Systems.

1. Type: Cast aluminum letters.

2. Finish: Anodized.

3. Color: As selected by the Architect from the manufacturer's anodized colors.

4. Mounting: Projected.

5. Lettering:

   a. Height: As indicated on drawings.

   b. Width, Stroke, and Return: Manufacturer's standard based on height and font.

   c. Style: Helvetica.

   d. Text: As indicated on drawings.

PART 3 – EXECUTION

3.01 PREPARATION

A. Coordinate requirements for blocking and provide size, location, and height required for mounting.

3.02 INSTALLATION

A. Install identifying devices after work related to walls and doors is complete.

B. Do not permanently mark finished surfaces with chalk lines or other reference marks.

C. Mount signs and letters in accordance with the manufacturer's written installation instructions and approved shop drawings.

3.03 ROOM SIGNS

A. Signs shall be mounted using double vinyl foam tape (1/16 inch thickness) and silicon adhesive (when necessary).

B. All signs shall be mounted 60 inches from the floor to the center of the sign on the latch side of the door.

   1. The distance between the door frame and edge of the sign should be 2 inches.

   2. Alternate locations shall be approved by the Architect prior to installation.

C. For signs mounted on glass panels, mount blank panel on opposite glass surface and directly behind room sign to conceal mounting adhesive.

3.04 CAST ALUMINUM LETTERS

A. Utilize wall templates to install logos and lettering per the manufacturer's recommendations using a laser level.

B. Signs shall be mounted using studs set in adhesive and the mounting method specified for each different type of lettering.

   1. Collar anchors shall be embedded into the wall surface as required.

   2. Flush Mounted: No space between letters and mounting surface.

   3. Projected Mounting: Install pre-cut spacers (with collars and threaded studs) between letters and mounting surface to project letters 1 inch from the finished surface.

3.06 CLEANING

A. After installation is complete, clean and polish all interior and exterior signage in accordance with the manufacturer's recommendations.

END OF SECTION

SECTION 102113 – POLYMER RESIN TOILET PARTITIONS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes solid plastic toilet partitions and urinal screens as indicated on drawings and specified herein.

1.02 RELATED WORK

A. Section 061000 – Rough Carpentry.

B. Section 092900 – Gypsum Board.

C. Section 093000 – Tile.

D. Section 102813 – Commercial Toilet Accessories.

1.03 SUBMITTALS

A. Provide in accordance with Section 013300 - Submittal Procedures:

1. Manufacturer's product data for compartment type, partitions, finishes, hardware, and accessories.

2. Installation instructions and maintenance recommendations.

3. Shop drawings indicating partition plans, elevations, dimensions, door swings, details for supports, and method of anchorage.

4. Manufacturer's full range of color samples for selection by the Architect.

1.04 QUALITY ASSURANCE

A. Take field measurements prior to fabrication to ensure proper fitting of work.

1.05 COORDINATION

A. Furnish inserts and anchors which must be built into other work for installation of toilet partitions and related work.

1. Coordinate delivery and installation with other work to avoid delay.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Knickerbocker Partitions - Freeport, NY; 516-546-0550

2. Metpar Corporation - Westbury, NY; 516-333-2600

3. Accurate Partitions Corp. - Lyons, IL; 708-442-6800

4. Manufacturers of equivalent products submitted and approved in accordance with Section 016200 - Product Options.

2.02 PANELS

A. Panel Types:

1. Toilet Compartments: Panels supported by pilasters anchored to floor and braced overhead with headrail.

2. Urinal Screens: Panels mounted to wall with continuous bracket and supported by pilasters anchored to floor.

B. Panel Material: Solid polymer resin with uniform machine radius edges.

C. Panel Size:

1. Panels: 1 inch Thick x 55 inches High.

2. Doors: 1 inch Thick x 55 inches High of the same design and construction as panels.

a. Typical toilet stall doors shall be 24 inches Wide.

b. Accessible toilet stall doors shall be 36 inches Wide.

3. Pilasters: 1 inch Thick x 82 inches High of the same design and construction as panels.

4. Urinal screens: 24 inches Wide x 42 inches High.

D. Anchoring:

1. Panels shall be anchored to front pilasters with a continuous “U” channel and to the wall with a continuous double ear bracket (panel high).

2. Pilasters shall be secured to the floor by means of a 1/8 inch aluminum angle and 3/4 inch tamper proof screws and to the wall with continuous single ear brackets (panel high).

a. Top bracing shall be brite anodized aluminum channel 1-1/2 inch x 1-1/4 inch weighting no less than 0.75 pounds per liner foot.

b. Cap top of pilasters and secure on inside of compartment with 5/8 inch stainless steel tamper proof screws.

c. Floor fasteners shall be concealed by 4 inch high, 20 gauge, Type 304 stainless steel floor shoe.

2.03 FITTINGS

A. Brackets: Extruded heavy bright anodized Type 6463 TS aluminum.

B. Floor and Wall fasteners: #14 tamper proof screws with conical plastic anchors.

C. All other fasteners shall be 5/8” stainless steel tamper proof screws.

2.04 HARDWARE

A. Hinges shall be piano-type made of bright anodized extruded aluminum, weighing not less than 1.5 pounds per foot.

1. Knuckles shall have nylon separators.

2. Pivot pin shall be 1/4 inch Type 304 stainless steel.

3. Hinge shall have internal spring which is adjustable to hold door open or closed.

4. Fasteners shall be 3/4 inch tamper proof screws located 8 inches on center on door and pilaster.

a. Fasteners shall be concealed under a snap on cover.

b. Cover shall be fastened top and bottom with 5/8 inch stainless steel tamper proof screws.

B. Strike keeper and latch housing shall be heavy extruded bright anodized Type 6463 TS aluminum.

1. Slide bar and knob shall be heavy extruded bright anodized Type 6463 TS aluminum with Duracoat black finish.

C. Combination coat hook and rubber bumper shall be heavy chrome plated Zamac.

D. All hardware shall be fastened with tamper-proof fasteners.

2.05 FABRICATION

A. Material shall be homogenous solid polymer resin with uniform color throughout and mar resistant finish.

B. Provide cutouts, drilled holes, and internal reinforcement to receive hardware, accessories, anchors, fasteners, and grab bars as applicable.

C. Color shall be as selected by the Architect from the manufacturer's full range of colors, patterns, and textures.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate requirements for blocking in stud walls to ensure proper support is provided for wall attachments.

B. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

C. Verify correct spacing of plumbing fixtures.

3.02 INSTALLATION

A. Install partitions rigid, straight, plumb, and level in accordance with the manufacturer's installation instructions.

B. Maintain 1/2 inch uniform space between pilasters and panels and not more than 3/4 inch between panels and wall.

C. Attach panel brackets securely to walls using anchor devices recommended by manufacturer.

D. Brace pilasters with overhead rail.

1. Locate headrail joints at pilaster center lines.

E. Anchor pilaster to floor with 1/8 inch aluminum angle and 1-3/4 inch tamper proof screws.

1. Conceal floor fastenings with stainless steel pilaster shoes.

F. Anchor urinal screen pilaster to floor with heavy duty galvanized steel angle plate, sheet metal screws, and anchors.

1. Conceal floor fastenings with stainless steel pilaster shoes.

G. Hang doors from pilasters.

1. Equip each door with a piano hinge, door latch, door strike and keeper, and coat hook and bumper.

2. Install door pull on out-swinging doors.

3.03 TOLERANCES

A. Maximum Variation from True Position: 1/4 inch.

B. Maximum Variation from Plumb: 1/8 inch.

3.04 ADJUSTING AND CLEANING

A. Adjust and align hardware to uniform clearance at vertical edge of doors.

B. Adjust hinges to locate in-swinging doors in partial open position and out-swinging doors in closed position when unlatched.

C. Adjust and lubricate hardware for proper operation.

D. Clean surfaces and wash with mild soap.

1. Do not use abrasives.

3.05 PROTECTION AND REPAIRING

A. Provide protection as necessary to prevent damage during remainder of construction period.

B. Repair damage and refinish so it cannot be detected.

C. Replace damaged, bent, scratched, or dented panels.

END OF SECTION

SECTION 102613 – CORNER GUARDS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following types of corner guards for use at the building interior.

1. Stainless Steel Corner Guards.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Submit manufacturer’s product data and installation instructions for each type of corner guard specified.

2. Submit color charts indicating full range of colors for selection by the Architect.

3. Prior to ordering materials, submit manufacturer’s standard size sample for each type of corner guard specified in the color selected by the Architect.

1.03 QUALITY ASSURANCE

A. Provide all corner guards and attachments from a single source.

B. Fire Performance Characteristics: Provide corner guards conforming with NFPA Class B fire rating.

1. Surface burning characteristics, as determined by ASTM E-84, shall be flame spread of 55 and smoke development of 375.

C. Color Consistency: Provide corner guards matched in accordance with SAE J-1545 (Delta E) with a color difference no greater than 1.0 units using CIE Lab, CIE CMC, CIE lCH, Hunter Lab or similar color scale system.

D. Low Emitting Materials: The volatile organic compound (VOC) content of adhesives shall not exceed the limits defined in Rule #1168, “Adhesive and Sealant Applications” of SCAQMD.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in unopened factory packaging and store in original packaging in a climate controlled location away from direct sunlight.

1.05 PROJECT CONDITIONS

A. Corner guards shall be installed in an interior climate-controlled environment.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. American Specialties, Inc. – Yonkers, NY; 914.476.9000

2. IPC Door and Wall Protection Systems, InPro Corporation – Muskego, WI; 800.222.5556

3. Pawling Corporation – Wassaic, NY; 800.431.3456

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 STAINLESS STEEL CORNER GUARDS

A. Corner Guards shall be stainless steel flush mount corner guards as manufactured by IPC Door and Wall Protection systems.

1. Material: 16-gauge, Type 304 stainless steel,

2. Size: 2 inches x 2 inches x 4 feet high.

B. Attachment: Manufacturer’s screw-on installation.

C. Location: Building Interior.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Complete all finishing operations, including painting, before commencing with corner guard installation.

B. Examine areas and conditions in which corner guards will be installed.

1. Wall surfaces shall be dry and free from dirt, dust, oil, loose paint, wax, and grease.

3.02 PREPARATION

A. Prior to installation, clean substrate to remove dust, debris, and loose particles.

B. Prior to installation, allow corner guards to reach room temperature.

C. Prior to installation, allow corner guards to lie flat for 24 hours.

3.03 INSTALLATION

A. Provide corner guards at all outward angled corners at the building interior with the exception of walls which receive ceramic tile or similar finish.

B. Install corner guards in accordance with the manufacturer’s written installation instructions.

C. Install corner guards plumb and level, in full factory length starting from the top of the base.

D. Cut or reshape corner guards when the installation requires, but only after receiving the Architect’s approval.

3.04 CLEANING

A. Upon completion of the installation, clean surfaces in accordance with the manufacturer’s recommendations.

END OF SECTION

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SECTION 102813 - COMMERCIAL TOILET ACCESSORIES

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes toilet accessories and attachment hardware.

1.02 RELATED SECTIONS

A. Section 061000 – Rough Carpentry (Blocking in partitions for toilet accessories)

B. Section 092900 – Gypsum Board

1.03 QUALITY ASSURANCE

A. Provide and install accessories to comply with ANSI A117.1.

1.04 REFERENCES

A. ANSI A117.1: Specifications for Making Buildings and Facilities Accessible To and Usable by Physically Handicapped People.

B. ASTM A123: Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

C. ASTM A167: Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

D. ASTM A269: Seamless and Welded Austenitic Stainless-Steel Tubing for General Service.

E. ASTM B456: Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

1.05 SUBMITTALS

A. Submit in accordance with Section 013300- Submittal Procedures:

1. List of proposed products and product data.

2. Manufacturer's installation instructions.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Toilet accessories:

a. American Specialties Incorporated - Yonkers, New York; 914-476-9000.

b. Bobrick Washroom Equipment, Inc. - North Hollywood, California; 800-553-1600.

c. Bradley Corporation - Menomonee Falls, Wisconsin; 414-354-0100.

d. S. C. Johnson & Son – Racine, WI; 1-800-558-5252.

e. Kimberly-Clark – Irving, TX; Kimberly-Clark.com.

f. Manufacturers of equivalent products submitted and approved in accordance with Section 016200 “Product Options”.

2.02 MATERIALS

A. Toilet accessories are to be constructed of stainless-steel sheet, ASTM A167, and tubing, ASTM A269, unless noted otherwise.

B. Mirror glass shall comply with FS DD-G-451, Type 1, Class 1, Quality q1, ¼ inch thick with silver coating, copper protective coating, and nonmetallic paint coating complying with FS DD-M-411.

C. Provide with anchor plates, adapters, fasteners, and other anchoring devices required for secure installation.

D. Fasteners, screws, and bolts shall be galvanized or stainless steel, tamperproof, and size appropriate for finish surface where items are mounted.

2.03 FABRICATION

A. Form exposed surfaces from single sheet of material, free of joints.

1. Form surfaces flat without distortion.

2. Maintain surfaces without scratches and dents.

B. Weld and grind smooth joints of fabricated components.

C. Shop assemble accessories and package complete with anchors and fittings

2.04 TOILET ACCESSORIES

A. Surface Mounted Multi-Roll Toilet Tissue Dispenser: Chaves County Standard; Bobrick B-2888.

B. Surface Mounted Sanitary Napkin Disposal; Bobrick B-270 Contura Series:

1. Size: 7-1/2 inches wide x 10 inches high x 3-13/16 inches deep.

2. Designed for use with disposable paper liners.

3. One-piece cover with full length stainless steel piano hinge and integral finger depression for opening cover.

C. Grab Bars:

1. 18 gage stainless steel with peeled non-slip gripping surface.

2. 1-1/4-inch diameter, 1-1/2 inch clearance from wall.

a. Horizontal: 36 inches long; Bobrick B5806 x 36.

b. Horizontal: 42 inches long; Bobrick B5806 x 42.

c. Vertical: 18 inches long; Bobrick B5806 x 18.

3. Mounting flange welded to bar with fasteners concealed with escutcheon plate.

D. Channel Frame Mirrors; Bobrick B165

1. Surface mounted in one piece channel frame, Type 430 stainless steel with bright polished finish.

2. No. 1 Quality, 1/4 inch thick tempered select float glass: electrolytically copper-plated mirror glass.

3. Secured to concealed wall hanger with theft-resistant locking device.

4. Size: As indicated on drawings.

E. Surface Mounted Liquid Soap Dispenser: Chaves County Standard; S. C. Johnson Proline IL Dispenser (Black).

F. Surface Mounted Towel Dispenser: Chaves County Standard; Scott Essential Manual Hard Roll Towel Dispenser (Black).

G. Surface mounted Mop and Broom Holder: Provide with service sink, see plumbing.

H. Plumbing pipe safety covers: Provide at all exposed piping, See plumbing.

I. Clothes Hook and Bumper; Bobrick B212

1. Aluminum casting, matte finish, with rubber bumpers.

2. Flange is 1 ½ inches wide x 2 inches high and unit projects 3 3/4 inches.

J. Recessed Specimen Pass-Thru Cabinet; Bobrick B-505.

1. Type 304 stainless steel, satin finish.

2. Self-closing doors.

3. Interlocking mechanism prevents both doors from being open at the same time.

4.. Removable stainless-steel tray.

5. 11 1/2" wide x 10 7/8" high x 3" to 5 3/4" thick.

2.05 KEYING

A. Provide 2 keys for each accessory requiring secure access to filling or maintenance in accordance with Section 017700 "Closeout Procedures".

B. Master key accessories.

2.06 FINISHES

A. Stainless steel: No. 4 satin luster finish.

B. Chrome/nickel plating: ASTM B456, Type SC 2 satin finish.

C. Enamel: Pre-treat to clean condition, apply one coat primer and 2 coats minimum baked enamel.

D. Galvanizing: Galvanize ferrous metal and fastening devices; ASTM A123 to 1.25 oz/sq yd minimum.

PART 3 – EXECUTION

3.01 PREPARATION

A. Coordinate requirements for blocking and deliver inserts and rough-in frames to site at appropriate time for building-in.

B. Provide templates and rough-in measurements as required.

C. Verify with Architect exact locations of accessories.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Mounting heights: Refer to Drawings and references listed in Paragraph 1.4.

C. Install plumbing pipe safety covers on all exposed piping underneath lavatories and vanities.

END OF SECTION

SECTION 104400- FIRE PROTECTION SPECIALTIES

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following fire protection specialties as shown on the drawings and specified herein:

1. Fire Extinguisher Cabinets.

2. Fire Extinguisher Mounting Brackets.

3. Fire Extinguishers.

1.02 RELATED SECTIONS

A. Section 061000 – Rough Carpentry

B. Section 092900 – Gypsum Board

1.03 REFERENCES

A. ANSI / UL 299: Standard for Dry Chemical Fire Extinguishers.

B. ANSI / UL 711: Rating and Fire Testing of Fire Extinguishers.

C. ASTM E 814: Standard Test Method for Fire Tests of Penetration Firestop Systems.

D. NFPA 10: Standard for Portable Fire Extinguishers.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”.

1. Manufacturer’s product data and installation instructions including dimensions, operational features, and rough-in measurements.

2. Shop drawings indicating locations and anchorage details.

3. Maintenance data describing test, refill and recharge schedules, and re-certification requirements.

1.05 QUALITY ASSURANCE

A. Extinguishers, cabinets, and accessories shall be products of a single manufacturer.

B. Extinguishers shall conform to ANSI/NFPA and bear UL label in accordance with ANSI/UL 711 testing.

C. Fire-rated cabinets shall meet the requirements of ASTM E 814 and be certified and labeled for use in one- and two-hour wall systems.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. J. L. Industries - Los Angeles, California; 213-582-2732.

2. Larsen's Manufacturing Company - Minneapolis, Minnesota; 612-571-1181.

3. Nystrom Building Products – Brooklyn Park, MN; 800.547.2635

4. Manufacturers of other products submitted and approved in accordance with Section 016200 “Product Options”.

2.02 FIRE EXTINGUISHER CABINETS

A. Types:

1. Non-Fire-Rated, recessed, 5/16-inch flat trim: Larsen Cameo Series C2409-R complying with accessibility standards.

2. Fire-rated, recessed, 5/16-inch flat trim: Larsen Cameo FS C2409-R complying with accessibility standards.

B. Material:

1. Boxes: 18 gauge formed steel with white baked enamel finish.

a. Fire rated cabinets shall be double wall, 18 gauge cold-rolled steel with 5/8 inch core of fire barrier material.

2. Door and trim material: Stainless steel.

C. Inside Box Dimensions: 9-1/2 inches wide x 24 inches high x 3-1/2 inches deep.

D. Door: Flush with protruding, clear, vacuum-formed, acrylic bubble glazing with red vertical lettering.

1. Reinforced for flatness and rigidity.

E. Cabinet Mounting Hardware: Manufacturer’s standard appropriate for cabinet and conditions.

2.03 FIRE EXTINGUISHER CABINET FABRICATION

A. Form body of cabinet with tight inside corners and seams.

1. Mounting holes shall be pre-drilled at the factory.

B. Form perimeter trim and door stiles by welding, filling, and grinding smooth.

C. Hinge doors for 180 degree opening with continuous hinge.

1. Provide handle, latch, and nylon catch.

D. Glaze doors with resilient channel gasket.

E. Finish of Cabinet Exterior Door and Trim: Stainless steel.

F. Finish of Cabinet Interior: White baked enamel.

2.04 FIRE EXTINGUISHER MOUNTING BRACKETS

A. Provide manufacturer’s standard, formed steel, galvanized, enamel finished bracket for size and type of extinguisher.

2.05 FIRE EXTINGUISHERS

A. Multi-Purpose Dry Chemical Type: Cast steel tank with pressure gauge.

1. UL Rating: 4A-80B:C.

2. Capacity: 10 pounds.

3. Size: 5-inch diameter x 20 inches high.

4. Finish: Baked red enamel.

B. Wet Chemical Type: Stainless steel tank with pressure gauge.

1. UL Rating: 2A:K for use in Kitchens.

2. Capacity: 6 Liters

3. Size: 7-inch diameter x 25 inches high.

4. Finish: Polished.

PART 3 – EXECUTION

3.01 PREPARATION

A. Verify rough openings for cabinets are correctly sized and located prior to ordering cabinets.

B. Verify that blocking has been installed at cabinet and mounting bracket locations.

3.02 INSTALLATION

A. Install fire extinguisher cabinets, mounting brackets, and fire extinguishers in accordance with the manufacturer's installation instructions.

B. Install fire extinguisher cabinets plumb and level in wall openings.

1. Anchor rigidly in place using manufacturer's standard fasteners for the type of construction.

2. Install fire-rated cabinets in fire rated partitions.

C. Install fire extinguisher mounting brackets securely in place using manufacturer's standard fasteners for the type of construction.

D. Place fire extinguishers in cabinets and at mounting brackets.

3.03 FIRE PROTECTION SPECIALTIES SCHEDULE

A. Install fire extinguisher cabinets at locations indicated on drawings.

B. Install fire extinguisher mounting brackets at locations indicated on drawings and at all wet chemical type fire extinguishers.

C. Provide multi-purpose, dry chemical type fire extinguisher at all locations, unless otherwise indicated.

D. Provide wet chemical type fire extinguishers at kitchen.

END OF SECTION

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SECTION 122100 – WINDOW BLINDS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following types of window blinds as indicated on the drawings and specified herein:

1. Horizontal Louver Blinds.

2. Vertical Venetian Blinds.

1.02 RELATED SECTIONS

A. Section 061000 - Rough Carpentry.

1.03 REFERENCES

A. FS AA-V-00200: Venetian Blinds

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Product data and installation instructions for each blind specified.

2. Shop drawings indicating opening sizes, tolerance required, and attachment method.

3. Manufacturer’s color charts indicating full range of colors for selection by Architect.

4. 2-inch-long sample of each color selected.

1.05 PROJECT CONDITIONS

A. Verify dimensions of window openings by field measurements and indicate measurements on final shop drawings.

1. Do not commence fabrication until field measurements have been confirmed.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Hunter Douglas, Inc. – Upper Saddle River, NJ; 800.727.8953

2. Levelor Corporation – Grarden Grove, CA; 800.221.8021

3. Mariak – Rancho Dominguez, CA; 800.562.7425

4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 HORIZONTAL LOUVER BLINDS

A. Horizontal louver blinds shall be Riviera DustGuard as manufactured by Levelor Corporation.

1. Head Rail Housing: Formed steel box, prefinished to match slats, internally fitted with hardware, pulleys, and bearings for blind operation.

2. Louver Slats: 1 inch wide, 0.008-inch-thick minimum, spring tempered, prefinished aluminum horizontal slats with radius corners.

3. Slat Support: Braided polyester yarn, ladder configuration.

4. Bottom Rail: Tubular shape formed from 0.018-inch-thick steel sheet prefinished to match slats.

   a. Provide hold down brackets to secure bottom rail to jamb or sill.

5. Cord: Braided polyester yarn.

6. Control Wand: Provide wand for manual control of raising, lowering, and blade angle adjustment.

   a. 7/16-inch diameter extruded clear tubular plastic.

   b. Length shall not exceed height of window opening.

7. Finish: Head rail housing, louver slats, and bottom rail shall have a baked-on paint finish.

   a. Color shall be as selected by the Architect from the manufacturer's full range of colors.

8. Provide with mounting brackets and all other hardware for a complete installation.

B. Fabricate window blinds to completely fill openings from head to sill and jamb to jamb.

C. Provide horizontal louver blinds at window openings where indicated on drawings.

2.03 VERTICAL VENETIAN BLINDS

A. Vertical venetian blinds shall be EOS Vertical Venetian Blind by Hunter Douglas, Inc.

1. Model: Type Slide Tilt wand.

2. Width and Height: Opening size as indicated on drawings.

3. Side Stacking: Left or Right as conditions require and as approved by the Architect.

4. Head Rail: One piece extruded aluminum profile.

   a. Color: As selected by the Architect from the manufacturer's full range of colors.

5. Vane Material: Fabric.

   a. Vane width 3 1/2 inch.

   b. Fabric: Fire retardant, dust block coated, black out.

   c. Fabric vanes with bottom weight and linkage.

   d. Stacking and tilting with wand.

6. Provide clips, mounting brackets, and other accessories as required for a complete installation.

B. Fabricate window blinds to completely fill openings from head to sill and jamb to jamb.

C. Provide vertical venetian blinds at window openings where indicated on drawings.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install window blinds in accordance with the manufacturer's written installation instructions.

B. Position blinds plumb, level, and at proper height relative to adjacent construction.

C. Secure blinds in place with anchors and fasteners as recommended by the manufacturer.

D. Operate each blind through complete cycle of lowering, tilting, and raising a minimum of three times to ensure proper operation.

3.02 CLEANING

A. Upon completion, clean blinds and discard all construction debris.

END OF SECTION

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SECTION 124813 – ENTRANCE FLOOR MATS AND FRAMES

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

B. This section includes the following entrance floor mats and frames as specified herein and shown on the drawings:

1. Interior Recessed Mat and Frame.

1.02 RELATED SECTIONS

A. Section 033000 - Cast-In-Place Concrete.

B. Section 081100 - Steel Doors and Frames.

C. Section 084313 - Aluminum Framed Storefronts.

1.03 REFERENCES

A. ASTM D2047 Coefficient of Friction (James Method).

B. ASTM E648 Critical Radiant Flux.

C. ASTM B117 Product Corrosion to Salt.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 013300 “Submittal Procedures”:

1. Product Data: Submit product data including manufacturer’s specification sheet and installation instructions for specified products.

    a. Include methods of installation and substrate preparation for each type of substrate.

2. Shop Drawings: Submit shop drawings showing layout, product components and profiles, anchorage, and accessories.

3. Color Samples: Provide manufacturer’s standard size samples indicating the manufacturer’s full range of color, patterns, and textures.

4. Product Samples: After Architect’s selection, submit manufacturer’s standard size sample for each type and color of exposed entrance mat and frame for Architects’ final approval.

5. Quality Assurance: Submit certified test reports showing compliance with specified performance characteristics and physical properties; and compliance with the manufacturer’s installation instructions.

6. Closeout: Submit Cleaning and Maintenance Data and Warranty.

    a. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer’s original, unopened, undamaged packaging.

B. Store materials at temperature and in humidity conditions recommended by the manufacturer and protect from exposure to harmful weather conditions.

1.06 PROJECT CONDITIONS

A. Maintain temperature where products will be installed before, during, and after installation as recommended by the manufacturer.

B. Prior to fabrication, verify actual measurements by field measuring and include measurements on shop drawings.

1.07 SCHEDULING

A. Delay installation of materials of this section until near time of Substantial Completion for the project.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Construction Specialties – Muncy, PA; 800.233.8493
2. JL Industries – Bloomington, MN; 800.554.6077
3. Mats, Inc. – Stoughton, MA; 800.628.7462
4. Other manufacturers as submitted and approved in accordance with Section 016200 “Product Options”.

2.02 PRODUCT PROPERTIES

A. Product Description: Alternating strip of aluminum, PVC, and buffed or unbuffed rubber.

1. High tensile steel wire is used to connect scraper bars and wiper strips.
2. Units are intended for removal and cleaning.

B. Coefficient of Friction: 0.79 in accordance with ASTM D2047 (James Method).

C. Critical Radiant Flux: Class 1 in accordance with ASTM E648.

D. Product Corrosion to Salt: Able to sustain 100 hours of salt fog without any notable changes in accordance with ASTM B117.

2.03 INTERIOR RECESSED MAT AND FRAME

A. Interior recessed mat and frame shall be Nuway Tuftiguard Design as manufactured by Mats, Inc.

1. Thickness: 11/16 inch.
2. Scraper Bar: Non-reflective aluminum.
3. Wiper Strip Material: Prime rubber and polymide fiber composite.
4. Connector Material: High tensile steel wire.
5. Component Configuration: 17 mm double wiper strip with closed construction.
6. Wiper Strip Color: As selected by the Architect from the manufacturer’s full range of colors.
7. Scraper Bar Color: Aluminum.
8. Frame Type: Depth as recommended by the manufacturer for the component configuration and project conditions.

2.04 FABRICATION

A. Size: Fabricate entrance mats as single units, but do not exceed the manufacturer's size recommendation.

1. Refer to drawings for size of each entrance mat.

B. Joints: Where joints in the entrance mats are necessary, space them symmetrically and away from normal traffic ways.

C. Entrance Mats with Curved Perimeter: Manufacturer shall utilize full size templates to ensure accurate fabrication.

D. Frames: Fabricate frames in single lengths.

1. Where frame dimensions exceed the maximum available lengths, use minimum number of pieces possible with hairline joints equally spaced and spliced together with straight connecting pins.

2. Corners: Miter corners and join with corner gusset and plates to produce hairline joints.

3. Protective Coating: Coat surface of frame, which will contact cementitious material, with zinc chromate primer conforming to SAE AMS 3110F.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions where floor mats will be installed.

B. Subfloor shall be clean and dry and within acceptable tolerances.

C. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Install frame as part of new concrete slabs or demolish existing concrete slab and re-pour concrete slab as required to properly fit frame as recommended by the manufacturer.

B. Prepare a recess in the concrete slab where the entrance mat and frame will be located.

1. Prepare recess in accordance with the manufacturer's written installation instructions for the size mat and frame required.

3.03 INSTALLATION

A. Install floor mats and frames in accordance with the manufacturer's written installation instructions.

1. Use shims to raise frame to exact height of finished floor and level the frame.

2. Coordinate installation with adjacent work to ensure proper clearances and to prevent tripping hazards.

B. Pour concrete (using non-shrinking grout) around perimeter of frame.

1. Level the concrete with the lip of the frame so the grille lies flat and will not rock.

2. Ensure there will be no traffic of any kind on the grilles, frames, and intermediary supports during drying and setting.

3. Before the concrete hardens, recheck that dimensions are correct, frame is square and level, and supports are secure and supported.

C. Install plywood into the recess to fully protect the frame edges until just before mats are installed.

D. Delay installing mats until the end of construction.

1. Clean all frames and intermediary supports before installing mats.

a. Debris will not be tolerated between the frame and mat.

3.04 PROTECTION

A. Protect installed products and finish surfaces from damage during construction and until Final Acceptance.

END OF SECTION

SECTION 32 3111 – GATE OPERATORS

PART 1 - GENERAL

1.1 INCLUDED IN THIS SECTION

A. Pre-wired gate operators for swinging gates, including all selected attachments and accessory equipment.

B. For additional information see PART 2 – PRODUCTS.

1.2 SUBMITTALS

A. Shop drawings
   1. Comply with requirements of Section 01 33 00.
   2. Show connections to adjacent construction, range of travel, and all electrical and mechanical connections to the operator.
   3. Indicate all underground runs of electrical lines and inductive vehicle obstruction loop locations.
   4. Show size, including depths, and location of concrete mounting pads.

B. Installation instructions
   1. Submit two copies of manufacturer's installation instructions specific to this project.

C. Warranty Registration
   1. Submit manufacturer’s completed warranty registration for review by Architect and subsequent delivery to Owner.

D. List of product installations comparable to this project:
   1. Indicate date of product installation.
   2. Identify installer.
   3. Include owner's name and location of the product installation.

E. Test reports:
   1. Submit affidavits from manufacturer demonstrating that gate operator mechanism has been tested.
      a. Operator shall bear a label indicating that the operator mechanism has been tested.
      b. Operator shall have been tested for full power, full stress tests of all mechanical components and electrical tests of all overload devices.

F. Closeout Submittals
   1. Maintenance Data
   2. Troubleshooting and Adjusting Guides
   3. Operation Manual.

1.3 QUALITY ASSURANCE

A. Manufacturer

1. Company specializing in the manufacture of gate operators of the type specified, with a minimum of five years' experience manufacturing operators of this type and design.

B. Installer
   1. Must have a minimum of three years' experience installing similar equipment, provide proof of attending the manufacturer's product and installation training within the previous three years, or obtain other significant manufacturer endorsement of technical aptitude, if required, during the submittal process.

1.4 CODES AND REGULATORY REQUIREMENTS

A. Operators shall be built to UL 325 standards and be listed by a nationally recognized testing laboratory. Complete all electrical work according to local codes and National Electrical Code. All fieldwork shall be performed in a neat and professional manner, completed to journeyman standards.

B. Comply with current safety standards requiring the use of multiple external sensors capable of reversing gate travel direction in either direction upon sensing an obstruction.

C. Gate must have physical stops to prevent over travel in both travel directions.

D. Vehicular gates shall not be used by pedestrians; reference drawings for location of walk-thru gates.

E. Current safety standards require gate operators to be designed and labeled for specific usage classes.
   1. Listed for use in UL 325 and UL991 Usage Class I, II, III, and IV.

1.5 PRODUCT DELIVERY AND STORAGE

A. Comply with Section 01 60 00.

B. Store products upright in the original shipping containers, covered, ventilated and protected from all weather conditions.

1.6 WARRANTY

A. Provide a warranty against all defects in materials or workmanship for five years or 500,000 gate cycles (whichever occurs first) after the date of installation. Defective materials shall be replaced at manufacturer's discretion with new or reconditioned materials furnished by the manufacturer, at no cost to the Owner. Freight, labor and other incidental costs are not covered under the factory warranty, but may be covered by a separate service agreement between installing company and the Owner.
   1. Warranty validation shall be available online and shall be included in the printed materials shipped with the operator.

PART 2 – PRODUCTS

2.1 GATE OPERATORS

A. Manufacturer and Product
   1. HySecurity, Kent, WA 98032 / (253) 867-3700 / www.hysecurity.com
   2. HySecurity gate operator model SwingSmart CNX 20 with Smart CNX Controller.

B. Other manufacturer's operators and products as approved by the architect when requests for substitution have been submitted in accordance with the specifications.

2.2 OPERATION

A. Duty cycle: Continuous; single-leaf

B. Operation shall be by means of an electromechanical brushless DC meter, direct-drive gear train.

C. Operator motors shall not include belts, gears, pulleys, roller chains or sprockets to transfer power from operator to gate panel.

D. Motor: 1/2 hp (equivalent), 115/208/230V 60Hz, single phase.

E. Maximum gate weight:
   a. 1,300 lb. / 12' leaf
   b. 800 lb. / 16' leaf
   c. 600 lb. / 20' leaf

F. Open/close time:
   1. Independent set.

G. Limit switches: Fully adjustable, toggle types, with plug connection to control panel.

H. Finish: Zinc plated steel with textured TGIC polyester powder coat finish, proven to withstand 1,000 hour salt spray test.

I. Controls: Smart CNX controller with more than 70 configurable settings, programmed via keypad and display or a "Bluetooth" smart phone interface.

J. Standard battery backup, allowing 300 cycles after power loss.

K. Required external sensors to be installed such that the gate will reverse in either direction upon sensing an obstruction:
   1. Photo eyes
   2. Gate edges
   3. Or a combination thereof

L. 1/0 expansion board with additional relay outputs.

M. Control devices
   1. Remote control key fob.
   2. Remote auto-RFID

3. Free-egress vehicle detectors (in-ground loop)

N. Alert devices: Include configurable audible beacon as standard equipment.

O. Include following options:
   1. Warning signs on both sides of each gate panel.
   2. Gate edge and transmitter radio reversing device.
   3. Managed switch and web-based interface to operator.
   4. Key-operated cable manual release (secure side of gate).
   5. Lock for operator cover.

2.3 FACTORY TESTING

A. Fully assemble and test, at the factory, each gate operator to assure smooth operation, sequencing and electrical connection integrity.

B. Proof test with simulated physical and electrical loads to exceed the fully rated capacity of the operator components.

C. All testing data shall be individually logged and recorded by serial number.

D. Check all mechanical connections for tightness and alignment. Check all welds for completeness and continuity.

E. Inspect finishes for completeness. Touch up imperfections prior to shipment.

F. Check all electrical wires to assure that chafing cannot occur during shipping or operation.

PART 3 – EXECUTION

3.1 SITE EXAMINATION

A. Locate concrete mounting pad in accordance with approved shop drawings and in compliance with applicable building code.

B. Ensure that gate is operating smoothly under manual conditions before installation of gate operators. Do not proceed until gate panels are aligned and operate without binding.

3.2 INSTALLATION

A. Install gate operator in accordance with the safety regulations and the manufacturer's product literature and installation instructions, current at the time of installation. Coordinate locations of operators with drawings; other trades and shop drawings.

B. Verify operator minimum electrical requirements, including breakers, conductors and conduit. Electrical wiring to conform to NEC and manufacturer's installation instructions.

3.3 FIELD QUALITY CONTROL

A. Test operator through ten full open and close cycles and adjust for operation without binding, scraping or uneven motion. Test limit switches for proper open and close limit positions.

B. All anchor bolts shall be in place and fully tightened in the finished installation.

C. Owner and Architect shall complete substantial completion check list prior to final acceptance of the installation and submit subsequent warranty documentation to manufacturer.

3.4 CONTINUED SERVICE AND DOCUMENTATION

A. Train Owner's personnel on how to safely shut off electrical power, release and manually operate the gate.
   1. Demonstrate the general maintenance of the gate operator and accessories.
   2. Provide copies per Closeout Documentation requirements of “Programming and Operations Manual” for the Owner's use. Manuals will identify parts of the equipment and their source availability.
   3. Instruct Owner’s personnel on the technical support sections on the manufacturer’s website.

END OF SECTION

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SECTION 323119 – ORNAMENTAL FENCING

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Ornamental Fence, and accessories.

B. Excavation for post bases; concrete foundation for posts.

C. Steel gates and related hardware.

1.2 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete anchorage for posts.

1.3 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.

C. ASTM D523 - Test Method for Specular Gloss. 0020

D. ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.

E. ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.

F. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.

G. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

H. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

I. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.

J. ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets

1.4 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on posts, panels, rails, gates, accessories, fittings and hardware.

C. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.

D. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.6 PRODUCT HANDLING AND STORAGE

A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

1.7 PRODUCT WARRANTY

A. All structural fence components (i.e. rails, pickets, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 20 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.

B. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufactures warranty shall be guaranteed for five (5) years from date of original purchase.

PART 2 - MATERIALS

2.1 MANUFACTURER

A. The fence system shall conform to Remington Plus Ornamental Steel Welded Panel Fencing as manufactured by Master Halco; Welded and Rackable (ATF – All Terrain Flexibility); extended picket bottom rail treatment.

B. Other manufacturer’s products and fencing systems as approved by the Architect when submitted as a substitution request in accordance with the specifications.

2.2 MATERIAL

A. Steel material for fence panels and posts shall conform to the requirements of ASTM A653/A653M, with a minimum yield strength of 45,000 psi (310 MPa) and a minimum zinc (hot-dip galvanized) coating weight of 0.60 oz/ft2 (184 g/m2), Coating Designation G-60.

B. Material for pickets shall be 3/4” square x 14 Ga. tubing. The rails shall be steel

channel, 1.5” x 1.4375” x 14 Ga. Picket holes in the rail shall be spaced 4.675” o.c.. Fence posts and gate posts shall meet the minimum size requirements of Table 1.

2.3 FABRICATION

A. Pickets, rails and posts shall be pre-cut to specified lengths. Rails shall be pre-punched to accept pickets.

B. Pickets shall be inserted into the pre-punched holes in the rails and shall be aligned to standard spacing using a specially calibrated alignment fixture. The aligned pickets and rails shall be joined at each picket-to- rail intersection by Ameristar’s proprietary fusion welding process, thus completing the rigid panel assembly (Note: The process produces a virtually seamless, spatter-free good-neighbor appearance, equally attractive from either side of the panel).

C. The manufactured panels and posts shall be subjected to an inline electrode position coating (E-Coat) process consisting of a multi-stage pretreatment/wash (with zinc phosphate), followed by a duplex application of an epoxy primer and an acrylic topcoat. The minimum cumulative coating thickness of epoxy and acrylic shall be 2 mils (0.058 mm). The color shall be Black. The coated panels and posts shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2. The requirements in Table 2 meet or exceed the coating performance criteria of ASTM F2408.

D. The manufactured fence system shall be capable of meeting ASTM F2408 vertical load, horizontal load, and infill performance requirements for Industrial weight fences.

E. Gates shall be fabricated using fusion welded ornamental panel material and 1 3/4” sq. x 14 ga. gate ends. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding.

PART 3 - EXECUTION

3.1 PREPARATION

A. All new installation shall be laid out by the contractor in accordance with the construction plans.

3.2 INSTALLATION

A. Fence post shall be spaced according to Table 3 unless otherwise scheduled or noted in the drawings, plus or minus 1/4”. For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36”. Refer to section 033000 for concrete mix and placement requirements. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

3.3 FENCE INSTALLATION MAINTENANCE

A. When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces
   1. Remove all metal shavings from cut area.
   2. Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry.
   3. Apply 2 coats of custom finish paint matching fence color.
   4. Seal exposed surfaces per steps 1-3 above to ensure issuance and preservation of warranty.
   5. Use the fence manufacturer's paint spray cans or paint pens to prime and finish exposed surfaces; use of paint pens is recommended to prevent overspray. Use of parts or components not from the fence manufacturer shall not be allowed.

3.4 GATE INSTALLATION

A. Gate posts shall be spaced according to the manufacturers' gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacturer of the gate and shall be installed per manufacturer's recommendations.

3.5 CLEANING

A. Clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts or consolidated and hauled from site.

Note: All Fence Post sizes, heights, gauges, and spacings shall be as listed in following tables unless otherwise scheduled or noted in the drawings which will govern.

Table 1 – Minimum Sizes for Remington Plus Commercial Posts	
Fence Posts	Panel Height
2-1/2" x 14 Ga.	7' & 8' Heights
Gate Leaf	Gate Height
	7' & 8' Heights
Up to 4'	3" x 12 Ga.
4'1" to 6'	4" x 12 Ga.
6'1" to 16'	6" x 12 Ga.

Table 2 – Coating Performance Requirements		
Quality Characteristics	ASTM Test Method	Performance Requirements
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117, D714 & D1654	Corrosion Resistance over 1,500 hours (Scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625" ball).
Weathering Resistance	D822 D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

Table 3 – Remington Plus – Post Spacing By Bracket Type											
Span	For INVINCIBLE® 8' Nominal (90.445" Rail)				For CLASSIC, GENESIS, & MAJESTIC 8' Nominal (91.95" Rail)						
Post Size	2 1/2"	3"	2 1/2"	3"	2 1/2"	3"	2 1/2"	3"	2 1/2"	3"	
Bracket Type	Remington Commercial Invincible Flat Mount (BB118)		Remington Commercial Invincible Line 2 1/2" (BB119) 3" (BB120)		Remington Commercial Universal (BB112)	Remington Commercial Line Blvd. (BB114)	Remington Commercial Flat Mount (BB111)	Remington Commercial Swivel (BB113)*			
Post Settings ± 1/4" O.C.	94"	94 1/2"	94"	94 1/2"	95"	95"	95"	95 1/2"	*95"	*95 1/2"	
*Note: When using BB304 swivel brackets on either or both ends of a panel installation, care must be taken to ensure the spacing between post and adjoining pickets meets applicable codes. This will require trimming one or both ends of the panel.											

END OF SECTION

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SECTION 32 33 00 - SITE FURNISHINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Picnic table

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: Include samples of colors from manufacturer's standard range of colors and finishes.

C. Shop Drawings: Show installation details and locations for all site furniture.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with local code and regulatory requirements for site furnishings and the following:

1. 2010 ADA Standards for Accessible Design.

PART 2 - PRODUCTS

2.01 PICNIC TABLE

A. Product Data

1. Steel Litter Receptacle: Subject to compliance with requirements, provide products equal to the following:

2. Manufacturer: Victor Stanley (www.victorstanley.com)

B. Specifications

1. Type: IPR-48 from the Steelsites™ Series

2. Model: IPR-48

3. Mount: In-ground mount

4. Color: Teal

C. Installation

1. Clearance for 3/4" (19mm) square anchor bolt hole (anchor bolts not provided by Victor Stanley, Inc.). It is not recommended to locate anchor bolts until the product is in place. This Victor Stanley, Inc. product must be permanently affixed to the ground. Consult your local codes for regulations.

D. Protection

1. Protect products prior to installation by having them remain in the manufacturer's packaging and container.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners as necessary for securing in-place construction. Include threaded fasteners as necessary for securing to in-place construction. Include threaded fasteners for concrete masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.

B. Install items square, plumb, and accurately fitted together.

3.02 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after installation, clean and repair any damaged surfaces.

END OF SECTION 02870

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SECTION 32 84 00 – PLANTING IRRIGATION

PART 1 - GENERAL

1.01 SUMMARY

A. Irrigation system required for this work includes but is not limited to the furnishing of all labor, tools, materials, appliances, tests, permits, taxes, etc., necessary for the installation of a landscape irrigation system as herein specified and shown on the drawings, and the removal of all debris from the site. Landscape contractor to provide water meter and pay for hook up charges and water use during construction.

1. Locate, purchase, deliver and install piping, conduit, sleeves, 120 volt and low voltage electrical and water connections, valves, backflow preventer devices, controllers, rain sensors, spray and bubbler heads, drip irrigation lines, and associated accessories for a fully operational automatic irrigation system.

2. Trenching and water settling of backfill material.

3. Testing and startup of the irrigation system.

4. Prepare an as built record set of drawings.

5. Training of the Owner’s maintenance personnel in the operational requirements of the Irrigation system.

6. Clean up and disposal of all excess and surplus material.

7. Maintenance of the irrigation system during the prescribed maintenance period.

B. The system shall efficiently and evenly irrigate all areas and be complete in every respect and shall be left ready for operation to the satisfaction of the Owner's Representative.

C. Coordinate with other trades, as needed to complete work, including but not limited to Water Meter, Point of Connection (POC) and Backflow Preventer Device (BFPD) location and electrical hookups.

1.02 CONTRACT DOCUMENTS

A. Shall consist of specifications and its general conditions and the drawings. The intent of these documents is to include all labor, materials, and services necessary for the proper execution of the work. The documents are to be considered as one. Whatever is called for by any part shall be as binding as if called for in all parts.

1.03 RELATED DOCUMENTS AND REFERENCES

A. Related Documents:

1. Drawings and general provisions of contract, including general and supplementary conditions and Division I specifications, apply to work of this section.

2. Related Specification Sections

   a. Section - Planting
   b. Sections - Mechanical/Plumbing
   c. Sections - Electrical

B. References:

1. American Society of Testing Materials (ASTM): cited section numbers.

2. National Sanitation Foundation (NSF): rating system.
3. Irrigation Association: Turf & Landscape Irrigation Best Management Practices

1.04 VERIFICATION

A. Irrigation piping and related equipment are drawn diagrammatically. Scaled dimensions are approximate only. Before proceeding with work, carefully check and verify dimensions and immediately notify the Owner's Representative of discrepancies between the drawings or specifications and the actual conditions. Although sizes and locations of plants and or irrigation equipment are drawn to scale wherever possible, it is not within the scope of the drawings to show all necessary offsets, obstructions, or site conditions. The Contractor shall be responsible to install the work in such a manner that it will be in conformance to site conditions, complete, and in good working order.

B. Piping and equipment is to be located within the designated planting areas wherever possible unless specifically defined or dimensioned otherwise.

1.05 PERMITS AND REGULATIONS

A. The Contractor shall obtain and pay for all permits related to this section of the work unless previously excluded under provision of the contract or general conditions. The Contractor shall comply with all laws and ordinances bearing on the operation or conduct of the work as drawn and specified. If the Contractor observes that a conflict exists between permit requirements and the work outlined in the contract documents, the Contractor shall promptly notify the Owner's Representative in writing including a description of any necessary changes and changes to the contract price resulting from changes in the work.

B. Wherever references are made to standards or codes in accordance with which work is to be performed or tested, the edition or revision of the standards and codes current on the effective date of this contract shall apply, unless otherwise expressly set forth.

C. In case of conflict among any referenced standards or codes or between any referenced standards and codes and the specifications, the more restrictive standard shall apply or Owner's Representative shall determine which shall govern.

1.06 PROTECTION OF WORK, PROPERTY AND PERSON

A. The Contractor shall adequately protect the work, adjacent property, and the public, and shall be responsible for any damages or injury due to the Contractor's actions.

1.07 CHANGES IN THE WORK

A. The Owner's Representative may order changes in the work, and the contract sum being adjusted accordingly. All such orders and adjustments plus claims by the Contractor for extra compensation must be made and approved in writing before executing the work involved.

B. All changes in the work, notifications and Contractor's request for information (RFI) shall conform to the contract general condition requirements.

1.08 CORRECTION OF WORK

A. The Contractor shall re-execute any work that fails to conform to the requirements of the contract and shall remedy defects due to faulty materials or workmanship upon written notice from the Owner's Representative, at the soonest as possible time that can be coordinated with other work, and seasonal weather demands, but not more than 90 (ninety) days after notification.

1.09 DEFINITIONS

A. Owner's Representative: The person appointed by the Owner to represent their interest in the review and approval of the work and to serve as the contracting authority with the Contractor. The Owner's Representative may appoint other persons to review and approve any aspects of the work.

B. Substantial Completion Acceptance: The date at the end of the Planting, Planting Soil (if applicable), and Irrigation installation where the Owner's Representative accepts that all work in these sections is

complete and the Warranty period has begun. This date may be different that the date of substantial completion for the other sections of the project.

C. Final Acceptance: The date when the Owner's Representative accepts that the plants and work in this section meet all the requirements of specification. It is intended that the materials and workmanship warranty for Planting, Planting Soil (if applicable), and Irrigation work run concurrently.

1.010 SUBMITTALS

A. See the contract General Conditions for policy and procedures related to submittals.

B. Product data

1. Submit a minimum of (3) complete lists of all irrigation equipment to be used, manufacturer's brochures, maintenance manuals, warrantees and operating instructions, within 15 days after the notice to proceed.

a. This submission may be done digitally and all documents shall be submitted in one PDF document.

2. The submittals shall be packaged and presented in an organized manner, in the quantity described in Division 1 of the specifications. Provide a table of contents of all submitted items.

3. Clearly identify on each submitted sheet by underlining or highlighting (on each copy) the specific product being submitted for approval. Failure to clearly identify the specific product being submitted will result in a rejection for the entire submittal. No substitutions of material or procedures shall be made concerning these documents without the written consent of an accepted equivalent by the Owner's Representative.

4. Equipment or materials installed or furnished without prior approval of the Owner's Representative, may be rejected by the Owner's Representative and the Contractor shall be required to remove such materials from the site at their own expense.

5. Approval of substitution of material and/or products, other than those specified shall not relieve the Contractor from complying with the requirements of the contract documents and specifications. The Contractor shall be responsible, at their own expense, for all changes that may result from the approved substitutions, which affect the installation or operations other items of their own work and/or the work of other Contractors.

C. Substitutions

1. If the contractor wishes to substitute any equipment or materials for the equipment or materials listed on the Drawings and Specifications, he may do so by providing the following information to the Landscape Architect/Licensed Irrigator for approval:

2. Provide a statement indicating the reason for making the substitution. Use a separate sheet of paper for each item to be submitted.

a. Provide descriptive catalog literature, performance charts and flow charts for each item to be substituted.

b. Provide the amount of cost savings if the substituted item is approved.

c. The Landscape Architect/Licensed Irrigator shall have the sole responsibility in accepting or rejecting any submittal item as an approved equal to the equipment and materials listed on the Drawings and Specifications.

D. Samples: Samples of the equipment may be required at the request of the Owner's Representative if the equipment is other than that specified.

E. Other Submittals: Submit for approval:

1. Documentation of the installer's qualifications.

2. As built record set of drawings.

3. Testing data from all required pressure testing.

1.011 OBSERVATION OF THE WORK

A. The Owner's Representative may inspect the work at any time. They may remove samples of materials for conformity to specifications. Rejected materials shall be immediately removed from the site and replaced at the Contractor's expense. The cost of testing materials not meeting specifications shall be paid by the Contractor.

B. The Owner's Representative shall be informed of the progress of the work so the work may be observed at the following key times in the construction process. The Owner's Representative shall be afforded sufficient time to schedule visit to the site. Failure of the Owner's Representative to make field observations shall not relieve the Contractor from meeting all the requirements of this specification. The Contractor shall be responsible for notifying the Owner's Representative in advance for the following observation meetings, (verify with Owner) according to the time indicated.

1. Pre-Job conference - 7 days

2. Pressure supply line installation – 24 hours

3. Lateral line and sprinkler installation (if applicable) – 24 hours

4. Automatic controller installation – 24 hours

5. Control wire installation – 24 hours

6. Pressure supply line testing – 48 hours

7. Coverage test – 48 hours

8. Final observation – 7 days

1.012 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre-construction meeting with the Owner's Representative at least seven (7) days before beginning work to review any questions the Contractor may have regarding the work, administrative procedures during construction and project work schedule.

1.013 QUALITY ASSURANCE

A. It is the intention of this specification to accomplish the work of installing an automatic irrigation system, which will operate in an efficient and satisfactory manner. The irrigation system shall be installed and made operational according to the workmanlike standards established for landscape installation and sprinkler irrigation operation as set forth by the most recent Best Management Practices (BMP) of the Irrigation Association.

B. The specification can only indicate the intent of the work to be performed rather than a detailed description of the performance of the work. It shall be the responsibility of the Contractor to install said materials and equipment in such a manner that they shall operate efficiently and evenly and support optimum plant growth and health.

C. The Owner's Representative shall be the sole judge of the true intent of the drawings and specifications and of the quality of all materials furnished in performance of the contract.

D. The Contractor shall keep one copy of all drawings and specifications on the work site, in good order. The Contractor shall make these documents available to the Owner's Representative when requested.

E. In the event of any discrepancies between the drawings and the specification, the final decision as to which shall be followed, shall be made by the Owner's Representative.

F. In the event the installation is contradictory to the direction of the Owner's Representative, the installation shall be rectified by the Contractor at no additional cost to the Owner. The Contractor shall immediately bring any such discrepancies to the attention of the Owner's Representative.

G. It shall be distinctly understood that no oral statement of any person shall be allowed in any manner to modify any of the contract provisions. Changes shall be made only on written authorization of the Owner's Representative.

H. Installer Qualifications: The installer shall be a firm having at least 5 years of successful experience of a scope similar to that required for the work.

1. Installer Field Supervision: The installer shall maintain on site an experienced full-time supervisor who can communicate in English with the Owner's Representative.

2. Submit the installer's qualifications for approval.

1.014 IRRIGATION SYSTEM WARRANTY:

A. The Contractor shall Warrantee all workmanship and materials for a period of 1 year following the acceptance of the work.

1. Any parts of the irrigation work that fails or is defective shall be replaced or reconstructed at no expense to the Owner including but not limited to: restoring grades that have settled in trenches and excavations related to the work. Reconstruction shall include any plantings, soil, mulch or other parts of the constructed landscape that may be damaged during the repair or that results from soil settlement.

B. The date of acceptance of the work and start of the Guarantee period shall be determined by the Owner's Representative, upon the finding that the entire irrigation system is installed as designed and specified, and found to be operating correctly, supplying water evenly to all planting and/or lawn areas.

C. The system controller shall be warranted by the equipment manufacturer against equipment malfunction and defects for a period of 3 years, following the acceptance of the work.

D. Neither the final acceptance nor any provision in the contract documents shall relieve the Contractor of responsibility for faulty materials or workmanship. The Contractor shall remedy any defects within a period of 7 days (s) from the date of notification of a defect.

1.015 SITE CONDITIONS

A. It is the responsibility of the Contractor to be aware of all surface and sub-surface conditions, and to notify the Owner's Representative, in writing, of any circumstances that would negatively impact the installation of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

1.016 DELIVERY, STORAGE, AND HANDLING

A. All materials and equipment shall be stored properly and protected as required by the Contractor. The Contractor shall be entirely responsible for damages or loss by weather or other cause to work under the contract. Materials shall be furnished in ample quantities and at such times as to ensure uninterrupted progress of the work.

B. Deliver the products to the job site in their original unopened container with labels intact and legible at time of use.

C. Store in accordance with the manufacturers' recommendations.

1.017 PROTECTION

A. The Contractor shall continuously maintain adequate protection of all their work from damage, destruction, or loss, and shall protect the owner's property from damage arising in connection with this contract. Contractor shall make good any such damage, destruction, loss or injury. Contractor shall adequately protect adjacent property as provided by law and the contract documents.

B. The Contractor shall maintain sufficient safeguards, such as railings, temporary walks, lights, etc., against the occurrence of accidents, injuries or damage to any person or property resulting from their work, and shall alone be responsible for the same if such occurs.

C. All existing paving, structures, equipment or plant material shall be protected at all times, including the irrigation system related to plants, from damage by workers and equipment. The Contractor shall follow all protection requirements including plant protection provision of the general contract documents. All damages shall be repaired or replaced at the Contractor's expense. Repairs and or replacement shall be to the satisfaction of the Owner's Representative, including the selection of a Contractor to undertake the repair or maintenance. Repairs shall be at no cost to the owner.

    1. For trees damaged to the point where they will not be expected to survive or which are severely disfigured and that are too large to replace, the cost of damages shall be as determined by the Owner's arborist using accepted tree value evaluation methods.

D. The Contractor shall refrain from trenching within the drip line of any existing tree to remain. The Owner’s Representative may require the Contractor to relocate proposed irrigation work, bore lines beneath roots or use air spade technology to dig trenches through and under the root system to avoid damage to existing tree root areas.

1.018 EXCAVATING AROUND UTILITIES

A. Contractor shall carefully examine the civil, record, and survey drawings to become familiar with the existing underground conditions before digging.

    1. Do not begin any excavation until all underground utilities have been located and marked. Determine location of underground utilities and perform work in a manner that will avoid possible damage. Hand excavate, as required. Maintain stakes and or markings set by others until parties concerned mutually agree to their removal

B. Notification of Texas 811, 1-800-DIG-TESS (1-800-344-8377), is required for all excavation around utilities. The Contractor is responsible for knowing the location and avoiding utilities that are not covered by the Local Utility Locator Service.

1.019 POINT OF CONNECTION

A. The point of connection of the irrigation system to its electrical power sources shall be provided by the irrigation contractor per governing codes at the location shown on the drawings. The irrigation contractor will connect the power to provided junction box or grounded plug receptacle.

B. The point of connection of the irrigation system to its potable and or non-potable water sources, including the main shutoff valve and backflow preventer shall be provided by the irrigation contractor per governing codes at the location shown on the drawings. The minimum size and water pressure of the pressurized line will be as noted on the irrigation drawing.

1.020 TEMPORARY UTILITIES

A. All temporary piping, wiring, meters, panels and other related appurtenances required between source of supply and point of use shall be provided by the Contractor and coordinated with the Owner’s Representative. Existing utilities may be used with the written permission of the owner.

1.021 CUTTING, PATCHING, TRENCHING AND DIGGING

A. The Contractor shall do all cutting, fitting, trenching or patching of their work that may be required to make its several parts come together as shown upon, or implied by, the drawings and specifications for the completed project.

B. Digging and trenching operations shall be suspended when the soil moisture is above field capacity.

1.022 USE OF PREMISES

A. The Contractor shall confine their apparatus; the storage of materials, and the operations of their workers to limits indicated by the law, ordinances, or permits and shall not unreasonably encumber the premises with their materials.

B. Contractor parking, and material and equipment storage shall be in areas approved by the Owner's Representative.

1.023 AS BUILT RECORD SET OF DRAWINGS

A. Immediately upon the installation of any buried pipe or equipment, the Contractor shall indicate on the progress record drawings the locations of said pipe or equipment. The progress record drawings shall be made available at any time for review by the Owner's Representative.

B. Before final acceptance of work, the Contractor shall provide an as built record set of drawings showing the irrigation system work as built. The drawings shall be transmitted to the Owner's Representative in paper format and as a pdf file of each document on compact disk or flash drive. The drawings shall include all information shown on the original contract document and revised to reflect all changes in the work. The drawings shall include the following additional information

1. All valves shall be numbered by station and corresponding numbers shall be shown on the as built record set of drawings.

2. All main line pipe or irrigation equipment including sleeves, valves, controllers, irrigation wire runs which deviate from the mainline location, backflow preventers, remote control valves, grounding rods, shut-off valves, rain sensors, wire splice locations, and quick coupling valves shall be located by two (2) measured dimensions, to the nearest one-half foot. Dimensions shall be given from permanent objects such as buildings, sidewalks, curbs, walls, structures and driveways. All changes in direction and depth of main line pipe shall be noted exactly as installed. Dimensions for pipes shall be shown at no greater than a 50 ft. maximum interval.

3. As built record set of drawings shall be signed and dated by the Contractor attesting to and certifying the accuracy of the as built record set of drawings. As built record set of drawings shall have "As Built Record Set of Drawings", company name, address, phone number and the name of the person who created the drawing and the contact name (if different).

C. The Owner shall make the original contract drawing files available to the Contractor.

1.024 CONTROLLER CHARTS:

A. Provide one controller chart for each automatic controller installed.

1. On the inside surface of the cover of each automatic controller, prepare and mount a color-coded chart showing the valves, main line, and systems serviced by that particular controller. All valves shall be numbered to match the operation schedule and the drawings. Only those areas controlled by that controller shall be shown. This chart shall be a plot plan, entire or partial, showing building, walks, roads and walls. The plan, reduced as necessary and legible in all details, shall be made to a size that will fit into the controller cover. This print shall be approved by the Owner's Representative and shall be protected in a laminated or a plastic cover and be secured to the inside back of the controller cabinet door.

2. The controller chart shall be completed and approved prior to acceptance of the work.

1.025 TESTING

A. Provide all required system testing with written reports as described in part 3.

1.026 OPERATION AND MAINTENANCE MANUALS AND GUARANTEES

A. Prepare and deliver to the Owner's Representative within ten calendar days prior to completion of construction, two 3-ring hard cover binders containing the following information:

1. Index sheet stating Contractor's address and telephone number, list of equipment with name and addresses of local manufacturers' representatives.

2. Catalog and parts sheets on all material and equipment.

3. Guarantee statement. The start of the guarantee period shall be the date the irrigation system is accepted by the Owner.

   a. The guarantee for the irrigation system shall be made in accordance with the attached form. The General Conditions and Supplementary Conditions of these Specifications shall be filed with the Owner prior to acceptance of the irrigation system.

   b. A copy of the Guarantee form shall be included in the operations and maintenance manual.

   c. The guarantee form shall be re-typed onto the Contractor's letterhead and shall contain the following information:

GUARANTEE FOR IRRIGATION SYSTEM

We hereby guarantee that the irrigation system we have furnished and installed is free from defects in materials and workmanship, and the work has been completed in accordance with the Drawins and Specifications, ordinary wear and tear, unusual abuse or neglect expected. We agree to repair or replace any defects in material or workmanship which may develop during the period of one year from the date of acceptance and also to repair or replace any damage resulting from the repairing replacing of such defects at no additional costs to the Owner. We shall make such repairs or replacements within a reasonable time, as determined by the Owner, after receipt of written notice. In the event of our failure to make such repairs or replacements within a reasonable time after receipt of notice from the Owner, we authorize the Contractor to proceed to have said repair or replacements made at our expense and we will pay the costs and charges therefore upon demand.

PROJECT:_____

LOCATION:_____

SIGNED:_____

ADDRESSED:_____

PHONE:_____ DATE OF ACCEPTANCE:_____

4. Complete operating and maintenance instruction for all major equipment.

5. Irrigation product manufacturers warrantees.

B. In addition to the above-mentioned maintenance manuals, provide the Owner's maintenance personnel with instructions for maintaining major equipment and show evidence in writing to the Owner's Representative at the conclusion of the project that this has been rendered.

PART 2 - PRODUCTS

2.01 MATERIALS GENERAL

A. All materials shall be of standard, approved and first grade quality and shall be new and in perfect condition when installed and accepted.

B. See the parts schedule on the drawings for specific components and manufacturers.

C. Approval of any items or substitutions indicates only that the product(s) apparently meet the requirements of the drawings and specifications on the basis of the information or samples submitted. The Contractor shall be responsible for the performance of substituted items. If the substitution proves to be unsatisfactory or not compatible with other parts of the system, the Contractor shall replace said items with the originally specified items, including all necessary work and modifications to replace the items, at no cost to the owner.

2.02 PIPING MATERIAL

A. Individual types of pipe and fittings supplied are to be of compatible manufacturer unless otherwise approved. Pipe sizes shown are nominal inside diameter unless otherwise noted.

B. Plastic pipe:

1. All pipe shall be free of blisters, internal striations, cracks, or any other defects or imperfections. The pipe shall be continuously and permanently marked with the following information: manufacturer's name or trade mark, size, class and type of pipe pressure rating, quality control identifications, date of extrusion, and National Sanitation Foundation (NSF) rating.

2. Pressure main line for piping upstream of remote control valves and quick coupling valves:

   a. Pipe smaller than 2 inch diameter shall be plastic pipe for use with solvent weld or threaded fittings. Shall be manufactured rigid virgin polyvinyl chloride (PVC) 1220, Type 1, Grade 2 conforming to ASTM D 1785, designated as Schedule 40.

   b. Pipe 2 inch diameter and larger shall be manufactured rigid virgin polyvinyl chloride (PVC), Type 1, Grade 2 conforming to ASTM D 1785, designated as bell gasket Class 200 PVC.

3. Non-pressure lateral line for piping downstream of remote control valves: plastic pipe for use with solvent weld or threaded fittings. Shall be manufactured rigid virgin polyvinyl chloride PVC 1220 (type 1, grade 2) conforming to ASTM d 1785, designated as Class 200, 3/4″ minimum size.

C. Galvanized pipe shall be used for above ground connections to, backflow prevention device assemblies, hose bibs, and booster pumps and as shown on the plans and details.

1. Pipe shall be hot dip galvanized continuous welded, seamless, Schedule 40 conforming to applicable current ASTM standards.

2.03 FITTINGS AND CONNECTIONS:

A. Polyvinyl chloride pipe fittings and connections: Type II, Grade 1, Schedule 40, high impact molded fittings, manufactured from virgin compounds as specified for piping tapered socket or molded thread type, suitable for either solvent weld or screwed connections. Machine threaded fittings and plastic saddle and flange fittings are not acceptable. Furnish fittings permanently marked with following information: nominal pipe size, type and schedule of material, and National Sanitation Foundation (NSF) seal of approval. PVC fittings shall conform to ASTM D2464 and D2466.

B. Brass pipe fittings, unions and connections: standard 125 pound class 85% red brass fittings and connections, IPS threaded.

C. PVC Schedule 80 threaded risers and nipples: Type I, grade 1, Schedule 80, high impact molded, manufactured from virgin compounds as specified for piping and conforming to ASTM D-2464. Threaded ends shall be molded threads only. Machined threads are not acceptable.

D. Galvanized pipe fittings shall be galvanized malleable iron ground joint Schedule 40 conforming to applicable current ASTM standards.

2.04 SOLVENT CEMENTS AND THREAD LUBRICANT

A. Solvent cements shall comply with ASTM D2564. Socket joints shall be made per recommended procedures for joining PVC plastic pipe and fittings with PVC solvent cement and primer by the pipe and fitting manufacturer and procedures outlined in the appendix of ASTM D2564.

B. Thread lubricant shall be Teflon ribbon-type, or approved equal, suitable for threaded installations as per manufacturer's recommendations.

C. Pipe Joint Compound (Pipe dope) shall be used on all galvanized threaded connections. Pipe Joint Compound is a white colored, non-separating thread sealant compound designed to seal threaded connections against leakage due to internal pressure. It shall contain PTFE (Polytetrafluoroethylene) to permit a tighter assembly with lower torque, secure permanent sealing of all threaded connections and allow for easy disassembly without stripping or damaging threads.

2.05 BACKFLOW PREVENTION DEVICES

A. The backflow prevention device shall be certified to NSF/ANSI 372 shall be ASSE Listed 1013, rated to 180 degree F, and supplied with full port ball valves.

B. The main body and access covers shall be low lead bronze (ASTM B 584)

C. The seat ring and all internal polymers shall be NSF Listed Noryl and the seat disc elastomers shall be silicone.

D. Backflow Preventer shall be as indicated on the drawings.

2.06 PRESSURE REGULATOR

A. Pressure regulator shall certified to NSF/ANSI 372, consisting of low lead bronze body bell housing, a separate access cap shall be threaded to the body and shall not require the use of ferrous screws.

B. The main valve body shall be cast bronze (ASTM B 584).

C. The access covers shall be bronze (ASTM B 584 or Brass ASTM B 16)

D. The assembly shall be of the balanced piston design and shall reduce the pressure in both flow and no flow conditions.

E. Pressure regulator shall be as indicated on the drawings.

2.07 WYE STRAINER

A. Strainer shall conform to MIL –S-16293, and be ANSI 3rd party certified to comply with the states lead plumbing law 0.25% maximum weighted average lead content.

B. The main body shall be low lead bronze (ASTM B 584)

C. The access covers shall be yellow brass or cast bronze (ASTM B 16 or ASTM B 584)

D. Strainer screen shall be 300 series stainless steel available in 20, 40, 60, 80, or 100 mesh.

E. Wye strainer shall be as indicated on the plans.

2.08 BACKFLOW PREVENTER CAGE

A. A heavy-duty box with rust proof finish. The caging shall be sized to allow space for the entire piping assembly associated with the Backflow Preventer unit, and all associated equipment.

B. The cage shall include the manufacturers' standard tamper proof locking mechanism.

C. Provide a concrete base as detailed on the drawings.

D. Backflow Preventer Cage type, manufacturer and color shall be as indicated on the plans.

2.09 BALL VALVES

A. Ball valves for 3/4 inch through 2-1/2 inch shall be of PVC, block, tru-union design with EDPDM seals and o-ring.

B. Ball valves for 3 inch and larger shall be gate design and shall be iron body, brass or bronze mounted AWWA gate valves, and shall have a clear waterway equal to the full nominal diameter of the valve, and shall be rubber gasket, flanged or mechanical joint only, and shall be able to withstand a continuous working pressure of 150 PSI. Valve shall be equipped with a square-operating nut.

C. All ball valves located in a valve manifold shall be the same size as the main line (1-1/2 inch size minimum). Provide pipe-reducing adapters down stream of valves, as required. All ball valves in line shall be the same size as the pipe.

D. Ball valves shall be as indicated on the drawings.

2.010 CHECK VALVES

A. Swing check valves 2 inch and smaller shall be 200 lbs., W.O.G., bronze construction with replaceable composition, neoprene or rubber disc and shall meet or exceed federal specification WW-V- 5ld, class a, type iv.

B. Anti-drain valves shall be of heavy-duty virgin PVC construction with female iron pipe thread inlet and outlet. Internal parts shall be stainless steel and neoprene. Anti-drain valves shall be field adjustable against draw out from 5 to 40 feet of head.

C. Check valves shall be as indicated on the drawings.

2.011 REMOTE CONTROL VALVES

A. Remote control valves shall be electrically operated, single seat, normally closed configuration, equipped with flow control adjustment and capability for manual operation.

B. Valves shall be actuated by a normally closed low wattage solenoid using 24 volts, 50/60 cycle solenoid power requirement. Solenoid shall be epoxy encased. A union shall be installed on the discharge end.

C. Remote control valves shall be wired to controller in same numerical sequence as indicated on drawings.

D. Remote control valves shall be as indicated on the drawings.

2.012 MASTER CONTROL VALVES

A. Master Control Valve shall be compatible with the irrigation controller.

B. Master control valves shall be as indicated on the drawings.

2.013 QUICK COUPLER VALVES

A. Quick coupler valves shall be a one or two piece, heavy-duty brass construction with a working pressure of 150 PSI with a built in flow control and a self-closing valve.

B. Quick coupler shall be equipped with locking red brass cap covered with durable yellow thermo-plastic rubber cover. Key size shall be compatible with quick coupler and of same manufacturer.

C. Quick coupler valves shall be as indicated on the drawings.

2.014 AUTOMATIC CONTROLLER

A. Controller shall be housed in a sturdy, locking, weather-resistant case, furnished for maximum exterior protection.

B. Controller shall be equipped with evapo-transpiration (ET) sensor, which adjusts the controller programming based on local climatic conditions. The sensor shall also have a rain sensing shut-off switch, wind sensing shut off switch, and freeze sensing shut-off of switch.

1. If a moisture sensor is used in lieu of an evapo-transpiration sensor an additional sensor, which has a rain-sensing shut-off switch, wind sensing shut-off switch, and freeze sensing shut-off switch shall be provided.

C. Automatic controller shall be as indicated on the drawings.

2.015 CONTROLLER DECODERS

A. All decoders shall be per the controller manufacturer's specifications.

B. Decoder model number shall be as shown on the drawings.

2.016 ELECTRICAL CONTROL WIRING

A. Low voltage

1. The electrical control wire shall be direct burial type UF, no. 14 AWG, solid, single conductor, copper wire UL approved or larger, if required to operate system as designed.

2. For 2-Wire controllers all irrigation wire for the controller, flow sensor, master valve, hydrometer, remote control valves and moisture sensors shall be per the controller manufacturer's specifications and recommendations.

3. Color code wires to each valve. Common wire shall be white.

4. If multiple controllers are being utilized, and wire paths of different controllers cross each other, both common and control wires from each controller to be of different colors.

5. Control wire splices: Splices when required shall be placed in splice boxes.

6. Wire connections shall be per the controller manufacturer's specifications and recommendations.

B. High voltage

1. Shall be of type as required by local codes and ordinances.

2. Shall be of proper size to accommodate needs of equipment it is to serve.

2.017 VALVE BOXES AND MATERIALS

A. Valve boxes: valve boxes shall be constructed of ABS (acrylonitrile butadiene styrene) plastic, tan in color, with rigid base and sides and shall be supplied with bolt lock cover secured with stainless steel bolts. Cover shall be identified as shown on drawings. Provide box extensions as required.

1. Master valves, flow sensors, remote control irrigation valves, gate valves, and ball valves 3 inch or less in size shall use a 14 inch x 19 inch x 12 inch rectangular box.

2. Quick coupler valves, wire splices, and grounding rods shall use a 10 inch circular box.

2.018 VALVE IDENTIFICATION TAGS

A. Valve Identification Tags shall be 2.25 inch x 2.65 inch polyurethane. Color: potable water; yellow / Non-potable water; purple. Tags shall be permanently attached to each remote control valve with tamper proof seals as indicated on the drawings.

2.019 EQUIPMENT TO BE FURNISHED TO OWNER

A. Two (2) sets of keys for each automatic controller.

B. Two (2) 48 inch tee wrenches for operating the gate valves.

C. Three (3) sets of special tools required for removing, disassembling and adjusting each type of sprinkler and valve supplied on this project.

D. Five (5) Extra sprinkler heads, nozzles, shrub adapters, nozzle filter screens, for each type used on the project.

E. Two (2) quick coupler keys to match manufacturer type of quick coupler.

2.020 INCIDENTAL MATERIALS AND EQUIPMENT

A. Furnish all materials and equipment not specified above, but which are necessary for completion of the work as intended.

2.021 MAIN LINE LOCATOR TAPE

A. 3 - inch wide plastic detectable locator tape.

2.022 MAIN LINE AND LATERAL LINE BEDDING SAND

A. Sand shall consist of natural or manufactured granular material, free of organic material, mica, loam, clay or other substances not suitable for the intended purpose.

B. Sand shall be masonry sand ASTM C 144 or coarse concrete sand, ASTM C 33.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Code requirements shall be those of state and municipal codes and regulations locally governing this work, providing that any requirements of the drawings and specifications, not conflicting therewith, but exceeding the code requirements, shall govern unless written permission to the contrary is granted by the Owner's Representative.

B. Extreme care shall be exercised at all times by the Contractor in excavating and working in the project area due to existing utilities and irrigation systems to remain. Contractor shall be fully responsible for expenses incurred in the repair of damages caused by their operation.

1. The Contractor is responsible for identifying and maintaining existing irrigation main lines that supply water to areas on the site as noted on the drawings and outside of the proposed limit of work. The Contractor shall relocate or replace existing irrigation main line piping as required to provide a continuous supply of water to all areas of existing irrigation on site.

a. Providing continuous water supply shall include hand watering and or the use of watering trucks to provide adequate water.

C. Plan locations of backflow preventers, valves, controllers, irrigation lines, sleeves, spray heads and other equipment are diagrammatic and indicate the spacing and relative locations of all installations. Final site conditions and existing and proposed plantings shall determine final locations and adjusted as necessary and as directed to meet existing and proposed conditions and obtain complete water coverage. Minor changes in locations of the above from locations shown shall be made as necessary to avoid existing and proposed trees, piping, utilities, structures, etc. at the Contractor's expense or when directed by the Owner's Representative.

1. The Contractor shall be held responsible for relocation of any items without first obtaining the Owner's Representative's approval. The Contractor shall remove and relocate such items at their expense if so directed by the Owner's Representative.

D. Prior to any work the Contractor shall stake out locations of all pipe, valves, equipment and irrigation heads and emitters using an approved staking method and maintain the staking of the approved layout in accordance with the drawings and any required modifications. Verify all horizontal and vertical site dimensions prior to staking of heads. Do not exceed spacing shown on drawings for any given area. If such modified spacing demand additional or less material than shown on the drawings, notify the Owner's Representative before beginning any work in the adjacent area.

E. Stub out main line at all end runs and as shown on drawings. Stub out wires for future connection where indicated on plan and as directed.

F. Point of connection shall be approximately as shown on drawings. Connect new underground piping and valves and provide all flanges, adapters or other necessary fittings for connection.

G. Permission to shut off any existing in-use water line must be obtained 48 hours in advance, in writing from the Owner. The Contractor shall receive instructions from the Owner's Representative as to the exact length of time of each shut-off.

H. No fittings shall be installed on pipe underneath pavement or walls.

I. Prior to starting any work, Contractor shall obtain a reading of existing static water pressure (no flow condition) at the designated point of connection and immediately submit written verification of pressure with date and time of recording to Owner's Representative.

3.02 TRENCHING, DIRECTIONAL BORING AND SLEEVING

A. Perform all trenching, directional boring, sleeving and excavations as required for the installation of the work included under this section, including shoring of earth banks to prevent cave-ins.

B. The Contractor may directional bore lines where it is practical or where required on the plans.

1. Extend the bore 1' past the edge of pavement unless noted differently on the plans

2. Cap ends of each bore and locate ends at finished grade using metal stakes.

3. All boring and sleeving shall have detectable locator tape placed at the ends of the pipe.

C. Make trenches for mains, laterals and control wiring straight and true to grade and free of protruding stones, roots or other material that would prevent proper bedding of pipe or wire.

D. Excavate trenches wide enough to allow a minimum of 4 - inch between parallel pipelines and 8 inch from lines of other trades. Maintain 3 - inch vertical clearance between irrigation lines. Minimum transverse angle is 45 degrees. All pipes shall be able to be serviced or replaced without disturbing the other pipes.

E. Trenches for pipelines shall be made of sufficient depth to provide the minimum cover from finished grade as follows:

1. Pressure main line: 18 inches below finish grade and 24-30 inches below paved areas in Schedule 40 PVC sleeves.

2. Reclaimed water constant pressure main lines shall cross at least twelve (12) inches below potable water lines.

a. If a constant pressure reclaimed water main line must be installed above a potable water line or less than twelve (12) inches below a potable water line, then reclaimed water line shall be installed within an approved protective sleeve. The sleeve shall extend ten (10) feet from each side of the center of the potable line, for a total of twenty (20) feet. The sleeve shall be color-coded (purple) for use with reclaimed water.

3. Lateral lines: 12 inches below finish grade and 18 inches below paved areas in Schedule 40 PVC sleeves.

4. Control wiring: to the side of pressure main line and 24 inches below paved areas in Schedule 40 PVC sleeves.

F. On new on-site systems (post-meter), the required horizontal separation between potable water lines, reclaimed water constant pressure main lines and sewer lines shall be a minimum of four (4) feet apart as directed by the project engineer and/or regulatory agency. Measurements shall be between facing surfaces, not pipe centerlines.

G. When trenching through areas of imported or modified soil, deposit imported or modified soils on one side of trench and subsoil on opposite side.

H. Backfill the trench per the requirements in paragraphs “Backfilling and Compacting” below.

3.03 PIPE INSTALLATION

A. General Pipe Installation

1. Exercise caution in handling, loading and storing, of plastic pipe and fittings to avoid damage.

a. The pipe and fittings shall be stored under cover until using, and shall be transported in a vehicle with a bed long enough to allow the length of pipe to lay flat so as not to be subjected to undue bending or concentrated external load at any point.

b. All pipe that has been dented or damaged shall be discarded unless such dent or damaged section is cut out and pipe rejoined with a coupling.

2. Trench depth shall be as specified above from the finish grade to the top of the pipe.

3. Install a detectable pipe locator tape 6 to 8 inches above all main line pipes.

B. Polyvinyl Chloride Pipe (PVC) Installation

1. Under no circumstance is pipe to rest on concrete, rock, wood blocks, construction debris or similar items.

2. No water shall be permitted in the pipe until a period of at least 24 hours has elapsed for solvent weld setting and curing.

3. Install assemblies and pipe to conform to respective details and where shown diagrammatically on drawings, using first class workmanship and best standard practices as approved. All fittings that are necessary for proper connections such as swing joints, offsets, and reducing bushings that are not shown on details shall be installed as necessary and directed as part of the work.

4. Dielectric bushings shall be used in any connections of dissimilar metals.

5. Gasketed plastic pipe: pipe-to-pipe joints or pipe to fittings shall be made in accordance with manufacturer's specifications.

6. Solvent weld or threaded plastic pipe:

   a. Installation of all pipe and fittings shall be in strict accordance with manufacturer's specifications.

   b. Pipe shall be cut using approved PVC pipe cutters only. Sawed joints are disallowed. All field cuts shall be beveled to remove burrs and excess before gluing.

   c. Welded joints shall be given a minimum of 15 minutes to set before moving or handling. Excess solvent on the exterior of the joint shall be wiped clean immediately after assembly.

   d. Plastic to metal connections shall be made with plastic adapters and if necessary, short (not close) brass threaded-nipples. Connection shall be made with two (2) wraps of Teflon tape and hand tightened plus one turn with a strap wrench.

   e. Snake pipe horizontally in trench to allow one (1) foot of expansion and contraction per 100 feet of straight run.

   f. Threaded pipe joints shall be made using Teflon tape. Solvent shall not be used with threaded joints. Pipe shall be protected from tool damage during assembly. All damaged pipe shall be removed and replaced. Take up threaded joints with light wrench pressure.

   g. No close nipples or risers are allowed. Cross connections in piping is disallowed.

   h. Center load pipe at 10 feet on center intervals with small amount of backfill to prevent arching and slipping under pressure. Other than this preliminary backfill all pipe joints, fittings and connections are to remain uncovered until successful completion of hydrostatic testing and written approval of the testing report.

   i. Concrete thrust blocks shall be constructed behind all pipe fittings 1-1/2 inch diameter and larger at all changes of direction of 45 degrees or more.

C. Galvanized Pipe Installation

1. All joints shall be threaded with pipe joint compound used on all threads.

2. Dielectric bushings shall be used in any connections of dissimilar metals.

3.04 TRENCHING, DIRECTIONAL BORING, AND SLEEVING REVIEW:

A. Upon completion and installation of all trenching, directional boring, and sleeving, all installed irrigation control wiring, lines and fittings shall be visually observed by the Owner's Representative unless otherwise authorized. Do not cover any wires, lines or fittings until they have been tested and observed by the Owner's Representative.

3.05 FLUSHING

A. Openings in piping system during installation are to be capped or plugged to prevent dirt and debris from entering pipe and equipment. Remove plugs when necessary to flush or complete system.

B. After completion and prior to the installation of any terminal fittings, the entire pipeline system shall be thoroughly flushed to remove dirt, debris or other material.

3.06 HYDROSTATIC PRESSURE TESTING

A. After flushing, and the installation of valves the following tests shall be conducted in the sequence listed below. The Contractor shall furnish all equipment; materials and labor necessary to perform the tests and all tests shall be conducted in the presence of the Owner's Representative.

B. Water pressure tests shall be performed on all pressure main lines before any couplings, fittings, valves and the like are concealed.

C. Immediately prior to testing, all irrigation lines shall be purged of all entrapped air or debris by adjusting control valves and installing temporary caps forcing water and debris to be discharged from a single outlet.

D. Test all pressure main line at 150 PSI. For a minimum of four (4) hours with an allowable loss of 5 PSI. Pressure and gauges shall be read in PSI, and calibrated such that accurate determination of potential pressure loss can be ascertained.

E. Re-test as required until the system meets the requirements. Any leaks, which occur during test period, will be repaired immediately following the test. All pipe shall be re-tested until final written acceptance.

F. The Contractor is responsible for proving documentation stating the weather conditions, date, the start time and initial water pressure readings, the finish time and final water pressure readings and the type of equipment used to perform the test. The documentation must be signed by a witness acceptable to the Owner, verifying all of the above-mentioned conditions.

G. Submit a written report of the pressure testing results with the other above required information to the Owner's Representative for approval.

3.07 BACKFLOW PREVENTER TESTING

A. The backflow preventer shall be tested according to procedures and results per the requirements of the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California or American Water Works Association whichever is more stringent.

B. Testing shall be performed by a Backflow Prevention Assembly Tester with a current certification from the American Backflow Preventer Association.

3.08 BACKFILLING AND COMPACTING

A. Irrigation trenches shall be carefully backfilled with material approved for backfilling and free of rocks and debris one (1) inch in diameter and larger. When back filling trenches in areas of imported or modified planting soil, replace any excavated subsoil at the bottom and the imported soil or modified planting soil at the top of the trench.

B. Backfill shall be compacted with approved equipment to the following densities

1. Backfill under pavement and within 2 feet of the edge of pavement: Compact to 95% or greater of maximum dry density standard proctor.

2. Backfill of subsoil under imported planting mixes or modified existing planting soil: Between

85 and 90% of maximum dry density standard proctor.

3. Backfill of imported planting mixes or modified existing planting soil: Compact to the requirements of the adjacent planting mix or planting soil as specified in section “Planting Soil”.

C. Finish grade of all trenches shall conform to adjacent grades without dips or other irregularities. Dispose of excess soil or debris off site at Contractor's expense.

D. Any settling of backfill material during the maintenance or warranty period shall be repaired at the Contractor’s expense, including any replacement or repair of soil, lawn, and plant material or paving surface.

3.09 RESURFACING PAVING OVER TRENCHES

A. Restore all surfaces and repair existing underground installations damaged or cut as a result of the excavation to their original condition, satisfactory to the Owner’s Representative.

B. Trenches through paved areas shall be resurfaced with same materials quality and thickness as existing material. Paving restoration shall be performed by the project paving Sub-contractor or an approved Contractor skilled in paving work.

C. The cost of all paving restoration work shall be the responsibility of the irrigation Contractor unless the trenching thru the paving was, by previous agreement, part of the general project related construction.

3.010 INSTALLATION OF EQUIPMENT

A. General:

1. All equipment shall be installed to meet all installation requirements of the product manufacturer. In the event that the manufactures requirements cannot be implemented due to particular condition at the site or with other parts of the design, obtain the Owner’s Representative’s written authorization and approval for any modifications.

2. Install all equipment approximately at the location(s) and as designated and detailed on the drawings. Verify all locations with the Owner’s Representative.

3. Install all valves within a valve box of sufficient size to accommodate the installation and servicing of the equipment. Group valves together where practical and locate in shrub planting areas.

4. All sprinkler irrigation systems that are using water from potable water systems shall require backflow prevention. All backflow prevention devices shall meet and be installed in accordance with requirements set forth by local codes and the health department.

B. Pressure regulator:

1. Set regulator for required PSI per manufacturer's specifications.

C. Check Valve:

1. Install check valves approximately at the locations necessary to prevent low head run off.

D. Remote control valves:

1. Install one remote control valve per valve box.

2. Remote control valve manifolds and quick coupler valves shall be separate allowing use of a quick coupler with all remote control valves shut off.

3. Install boxes no farther than 12 inches from edge of paving and perpendicular to edge of paving and parallel to each other. Allow 12 inches clearance between adjacent valve

boxes.

E. Quick coupler valve:

1. Install each quick coupler valve in its own valve box.

2. Install thrust blocks on quick couplers.

3. Place no closer than 12 inches to adjacent paving.

4. Install 18 inches off set from main line.

F. Sprinkler heads:

1. All main lines and lateral lines, including risers, shall be flushed and pressure tested before installing sprinkler heads.

2. Install specified sprinkler heads as shown in details at locations shown on the drawings. Adjust layout for full coverage, spacing of heads shall not exceed the maximum spacing recommended by the manufacturer.

3. All sprinkler heads shall be set perpendicular to finish grade unless otherwise designated on the drawings or details.

G. Irrigation controllers:

1. Remote control valves shall be connected to controller in numerical sequence as shown on the drawings.

2. Controller shall be tested with complete electrical connections. The Contractor shall be responsible for temporary power to the controller for operation and testing purposes.

3. Connections to control wiring shall be made within the pedestal of the controller. All wire shall follow the pressure main insofar as possible.

4. Electrical wiring shall be in a rigid gray PVC plastic conduit from controller to electrical outlet. The electrical Contractor shall be responsible for installing all wiring to the controller, in order to complete this installation. A disconnect switch shall be included.

H. Wiring:

1. Low Voltage

a. Control wiring between controller and electrical valves shall be installed in the same trench as the main line where practical. The wire shall be bundled and secured to the lower quadrant of the trench at 10 foot intervals with plastic electrical tape.

b. When the control wiring cannot be installed in the same main line trench it shall be installed a minimum of 18 inches below finish grade and a bright colored plastic ribbon with suitable markings shall be installed in the trench 6 inches below grade directly over the wire.

c. An expansion loop shall be provided every 500 feet in a box and inside each valve box. Expansion loop shall be formed by wrapping wire at least eight (8) times around a ¾ inch pipe and withdrawing pipe.

d. Provide one control wire to service each valve in system.

e. Provide sufficient common wire(s) per controller.

f. Run two (2) spare #14-1 wires from controller along entire main line to last electric remote control valve on each and every leg of main line. Label spare wires at

controller and wire stub to be located in a box.

g. All control wire splices not occurring at control valve shall be installed in a separate splice valve box.

h. Wire markers (sealed, 1 inch to 3 inch square) are to identify control wires at valves and at terminal strips of controller. At the terminal strip mark each wire clearly indicting valve circuit number.

2. High Voltage

a. All electrical work shall conform to local codes, ordinances and any authorities having jurisdiction. All high voltage electrical work to be performed by licensed electrician.

b. The Contractor shall provide 120-volt power connection to the automatic controller unless noted otherwise on drawings.

I. Valve boxes:

1. Install one valve box for each type of valve installed as per the details.

2. Gravel sump shall be installed after compaction of all trenches. Final portion of gravel shall be placed inside valve box after valve is backfilled and compacted.

3. Permanently label valve number and or controller letter on top of valve box lid using a method approved by the Owners Representative.

J. Tracer wire:

1. Tracer wire shall be installed with non-metallic plastic irrigation main lines where controller wires are not buried in the same trench as the main line.

2. The tracer wire shall be placed on the bottom of the trench under the vertical projection of the pipe with spliced joints soldered and covered with insulation type tape.

3. Tracer wire shall be of a color not used for valve wiring. Terminate wire in a valve box. Provide enough length of wire to make a loop and attach wire marker with the designation "tracer wire".

K. Drip Installation:

1. Clamp fittings with Oetiker clamps or approved equal when operating pressure exceeds specific drip tubing fitting requirements.

2. When installing drip tubing, install soil staples as listed below:

a. Sandy Soil - One staple every three (3') feet and two (2) staples on each change of direction (tee, elbow, or cross).

b. Loam Soil - One staple every four (4') feet and two (2) staples on each change of direction (tee, elbow, or cross).

c. Clay Soil - One staple every five (5') feet and two (2) staples on each change of direction (tee, elbow, or cross).

3. Cap or plug all openings as soon as lines have been installed to prevent the intrusion of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.

4. Thoroughly flush all water lines before installing valves and other hydrants.

3.011 ADJUSTMENT AND COVERAGE TEST

A. Adjustment:

1. The Contractor shall flush and adjust all sprinkler heads, valves and all other equipment to ascertain that they function according to the manufacturer's data.

2. Adjust all sprinkler heads not to overspray onto walks, roadways and buildings when under maximum operating pressure and during times of normal prevailing winds.

B. Coverage test:

1. The Contractor shall perform the coverage test in the presence of the Owner's Representative after all sprinkler heads have been installed, flushed and adjusted. Each section is tested to demonstrate uniform and adequate coverage of the planting areas serviced.

2. Any systems that require adjustments for full and even coverage shall be done by the Contractor prior to final acceptance at the direction of the Owner's Representative at no additional cost. Adjustments may also include realignment of pipes, addition of extra heads, and changes in nozzle type or size.

3. The Contractor at no additional cost shall immediately correct all unauthorized changes or improper installation practices.

4. The entire irrigation system shall be operating properly with written approval of the installation by the Owner's representative prior to beginning any planting operations.

3.012 REPAIR OF PLANTING SOIL

A. Any areas of planting soil including imported or existing soils or modified planting soil which become compacted or disturbed or degraded as a result of the installation of the irrigation system shall be restored to the specified quality and compaction prior to beginning planting operations at no additional expense to the Owner. Restoration methods and depth of compaction remediation shall be approved by the Owner's Representative.

3.013 CLEAN-UP

A. During installation, keep the site free of trash, pavements reasonably clean and work area in an orderly condition at the end of each day. Remove trash and debris in containers from the site no less than once a week.

1. Immediately clean up any spilled or tracked soil, fuel, oil, trash or debris deposited by the Contractor from all surfaces within the project or on public right of ways and neighboring property.

B. Once installation is complete, wash all soil from pavements and other structures.

1. Make all repairs to grade ruts, and damage to the work or other work at the site.

2. Remove and dispose of all excess soil, packaging, and other material brought to the site by the Contractor.

3.014 PROTECTION

A. The Contractor shall protect installed irrigation work from damage due to operations by other Contractors or trespassers.

1. Maintain protection during installation until Acceptance. Treat, repair or replace damaged work immediately. The Owner's Representative shall determine when such treatment, replacement or repair is satisfactory.

3.015 PRE-MAINTENANCE OBSERVATION:

A. Once the entire system shall be completely installed and operational and all planting is installed, the Owner's Representative shall observe the system and prepare a written punch list indicating all items to be corrected and the beginning date of the maintenance period.

B. This is not final acceptance and does not relieve the Contractor from any of the responsibilities in the contract documents.

3.016 GENERAL MAINTENANCE AND THE MAINTENANCE PERIOD

A. General maintenance shall begin immediately after installation of irrigation system. The general maintenance and the maintenance period shall include the following:

1. On a weekly basis the Contractor shall keep the irrigation system in good running order and make observations on the entire system for proper operation and coverage. Repair and cleaning shall be done to keep the system in full operation.

2. Records of all timing changes to control valves from initial installation to time of final acceptance shall be kept and turned over to the Owner's Representative at the time of final acceptance.

3. During the last week of the maintenance period, provide equipment familiarization and instruction on the total operations of the system to the personnel who will assume responsibility for running the irrigation system.

4. At the end of the maintenance period, turn over all operations logs, manuals, instructions, schedules, keys and any other equipment necessary for operation of the irrigation system to the Owner's Representative who will assume responsibility for the operations and maintenance of the irrigation system.

B. The maintenance period for the irrigation system shall coincide with the maintenance period for the Planting. (See specification section "Planting")

3.017 SUBSTANTIAL COMPLETION ACCEPTANCE

A. Upon written notice from the Contractor, the Owners Representative shall review the work and make a determination if the work is substantially complete.

B. The date of substantial completion of the irrigation shall be the date when the Owner's Representative accepts that all work in Planting, Planting Soil (if applicable), and Irrigation installation sections is complete.

3.018 FINAL ACCEPTANCE / SYSTEM MALFUNCTION CORRECTIONS

A. At the end of the Plant Warrantee and Maintenance period, (See specification section "Planting") the Owner's Representative shall inspect the irrigation work and establish that all provisions of the irrigation system are complete and the system is working correctly.

B. Restore any soil settlement over trenches and other parts of the irrigation system.

1. Replace, repair or reset any malfunctioning parts of the irrigation system.

2. The Contractor shall show all corrections made from punch list. Any items deemed not acceptable shall be reworked and the maintenance period will be extended.

C. The Contractor shall show evidence that the Owner's Representative has received all charts, records, drawings, and extra equipment as required before final acceptance.

D. Failure to pass review: If the work fails to pass final review, any subsequent observations must be rescheduled as per above. The cost to the Owner for additional observations will be charged to the Contractor at the prevailing hourly rate of the reviewer.

END OF SECTION 32 84 00

SECTION 32 93 00 – PLANTING

PART 1 - GENERAL

1.01 SUMMARY

A. The scope of work includes all labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with furnishing, delivery, and installation of plant (also known as "landscaping") complete as shown on the drawings and as specified herein.

B. The scope of work in this section includes, but is not limited to, the following:

1. Locate, purchase, deliver and install all specified plants.
2. Water all specified plants.
3. Mulch, fertilize, stake, and prune all specified plants.
4. Maintenance of all specified plants until the beginning of the warranty period.
5. Plant warranty.
6. Clean up and disposal of all excess and surplus material.
7. Maintenance of all specified plants during the warranty period.

1.02 CONTRACT DOCUMENTS

A. Shall consist of specifications and general conditions and the construction drawings. The intent of these documents is to include all labor, materials, and services necessary for the proper execution of the work. The documents are to be considered as one. Whatever is called for by any parts shall be as binding as if called for in all parts.

1.03 RELATED DOCUMENTS AND REFERENCES

A. Related Documents:

Drawings and general provisions of contract including general and supplementary conditions and Division I specifications apply to work of this section

1. Related Specification Sections
    a. Section – Irrigation

B. References: The following specifications and standards of the organizations and documents listed in this paragraph form a part of the specification to the extent required by the references thereto. In the event that the requirements of any of the following referenced standards and specifications conflict with each other the more stringent requirement shall prevail or as determined by the Owners Representative.

C. ANSI Z60.1 American Standard for Nursery Stock, most current edition.

D. ANSI A 300 – Standard Practices for Tree, Shrub and other Woody Plant Maintenance, most current edition and parts.

E. Florida Grades and Standards for Nursery Stock, current edition (Florida Department of Agriculture, Tallahassee FL).

F. Interpretation of plant names and descriptions shall reference the following documents. Where the names or plant descriptions disagree between the several documents, the most current document shall prevail.

1. USDA - The Germplasm Resources Information Network (GRIN) http://www.ars-grin.gov/npgs/searchgrin.html

2. Manual of Woody Landscape Plants; Michael Dirr; Stipes Publishing, Champaign, Illinois; Most Current Edition.

3. The New Sunset Western Garden Book, Oxmoor House, most current edition.

G. Pruning practices shall conform to recommendations “Structural Pruning: A Guide For The Green Industry” most current edition; published by Urban Tree Foundation, Visalia, California.

H. Glossary of Arboricultural Terms, International Society of Arboriculture, Champaign IL, most current edition.

1.04 VERIFICATION

A. All scaled dimensions on the drawings are approximate. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and quantities, and shall immediately inform the Owner’s Representative of any discrepancies between the information on the drawings and the actual conditions, refraining from doing any work in said areas until given approval to do so by the Owner’s Representative.

B. In the case of a discrepancy in the plant quantities between the plan drawings and the plant call outs, list or plant schedule, the number of plants or square footage of the planting bed actually drawn on the plan drawings shall be deemed correct and prevail.

1.05 PERMITS AND REGULATIONS

A. The Contractor shall obtain and pay for all permits related to this section of the work unless previously excluded under provision of the contract or general conditions. The Contractor shall comply with all laws and ordinances bearing on the operation or conduct of the work as drawn and specified. If the Contractor observes that a conflict exists between permit requirements and the work outlined in the contract documents, the Contractor shall promptly notify the Owner’s Representative in writing including a description of any necessary changes and changes to the contract price resulting from changes in the work.

B. Wherever references are made to standards or codes in accordance with which work is to be performed or tested, the edition or revision of the standards and codes current on the effective date of this contract shall apply, unless otherwise expressly set forth.

C. In case of conflict among any referenced standards or codes or between any referenced standards and codes and the specifications, the more restrictive standard shall apply or Owner’s Representative shall determine which shall govern.

1.06 PROTECTION OF WORK, PROPERTY AND PERSON

A. The Contractor shall adequately protect the work, adjacent property, and the public, and shall be responsible for any damages or injury due to his/her actions.

1.07 CHANGES IN THE WORK

A. The Owner’s Representative may order changes in the work, and the contract sum should be adjusted accordingly. All such orders and adjustments plus claims by the Contractor for extra compensation must be made and approved in writing before executing the work involved.

B. All changes in the work, notifications and contractor’s request for information (RFI) shall conform to the contract general condition requirements.

1.08 CORRECTION OF WORK

A. The Contractor, at their own cost, shall re-execute any work that fails to conform to the requirements of the contract and shall remedy defects due to faulty materials or workmanship upon written notice from the Owner’s Representative, at the soonest as possible time that can be coordinated with other work and seasonal weather demands.

1.09 DEFINITIONS

All terms in this specification, if used, shall be as defined in the “Glossary of Arboricultural Terms” or as modified below.

A. Boxed trees: A container root ball package made of wood in the shape of a four-sided box.

B. Container plant: Plants that are grown in and/or are currently in a container including boxed trees.

C. Defective plant: Any plant that fails to meet the plant quality requirement of this specification.

D. End of Warranty Final Acceptance: The date when the Owner’s Representative accepts that the plants and work in this section meet all the requirements of the warranty. It is intended that the materials and workmanship warranty for Planting, Planting Soil, and Irrigation work run concurrent with each other.

E. Field grown trees (B&B): Trees growing in field soil for at least 12 months prior to harvest.

F. Healthy: Plants that are growing in a condition that expresses leaf size, crown density, color; and with annual growth rates typical of the species and cultivar’s horticultural description, adjusted for the planting site soil, drainage and weather conditions.

G. Kinked root: A root within the root package that bends more than 90 degrees
.

H. Maintenance: Actions that preserve the health of plants after installation and as defined in this specification.

I. Maintenance period: The time period, as defined in this specification, which the Contractor is to provide maintenance.

J. Normal: the prevailing protocol of industry standard(s).

K. Owner’s Representative: The person appointed by the Owner to represent their interest in the review and approval of the work and to serve as the contracting authority with the Contractor. The Owner’s Representative may appoint other persons to review and approve any aspects of the work.

L. Reasonable and reasonably: When used in this specification relative to plant quality, it is intended to mean that the conditions cited will not affect the establishment or long term stability, health or growth of the plant. This specification recognizes that it is not possible to produce plants free of all defects, but that some accepted industry protocols and standards result in plants unacceptable to this project. When reasonable or reasonably is used in relation to other issues such as weeds, diseased, insects, it shall mean at levels low enough that no treatment would be required when applying recognized Integrated Plant Management practices.
This specification recognizes that some decisions cannot be totally based on measured findings and that professional judgment is required. In cases of differing opinion, the Owner’s Representative’s expert shall determine when conditions are judged as reasonable.

M. Root ball: The mass of roots including any soil or substrate that is shipped with the tree within the root ball package.

N. Root ball package. The material that surrounds the root ball during shipping. The root package may include the material in which the plant was grown, or new packaging placed around the root ball for shipping.

O. Root collar (root crown, root flare, trunk flare, flare): The region at the base of the trunk where the majority of the structural roots join the plant stem, usually at or near ground level.

P. Shrub: Woody plants with mature height approximately less than 15 feet.

Q. Spade harvested and transplanted: Field grown trees that are mechanically harvested and immediately transplanted to the final growing site without being removed from the digging machine.

R. Stem: The trunk of the tree.

S. Substantial Completion Acceptance: The date at the end of the Planting, Planting Soil (if required), and Irrigation installation where the Owner’s Representative accepts that all work in these sections is

complete and the Warranty period has begun. This date may be different than the date of substantial completion for the other sections of the project.

T. Stem girdling root: Any root more than ¼ inch diameter currently touching the trunk, or with the potential to touch the trunk, above the root collar approximately tangent to the trunk circumference or circling the trunk. Roots shall be considered as Stem Girdling that have, or are likely to have in the future, root to trunk bark contact.

U. Structural root: One of the largest roots emerging from the root collar.

V. Tree: Single and multi-stemmed plants with mature height approximately greater than 15 feet.

1.10 SUBMITTALS

A. See contract general conditions for policy and procedure related to submittals.

B. Submit all product submittals 4 weeks prior to installation of plantings.

C. Product data: Submit manufacturer product data and literature describing all products required by this section to the Owner's Representative for approval. Provide submittal eight weeks before the installation of plants.

D. Plant growers' certificates: Submit plant growers' certificates for all plants indicating that each meets the requirements of the specification, including the requirements of tree quality, to the Owner's Representative for approval. Provide submittal four weeks before the installation of plants.

E. Samples: Submit samples of each product and material where required by the specification to the Owner's Representative for approval. Label samples to indicate product, characteristics, and locations in the work. Samples will be reviewed for appearance only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

F. Plant sources: Submit sources of all plants as required by Article – "Selection of Plants" to the Owner's Representative for approval.

G. Close out submittals: Submit to the Owner's Representative for approval.

1. Plant maintenance data and requirements.

H. Warranty period site visit record: If there is no maintenance during the warranty period, after each site visit during the warranty period, by the Contractor, as required by this specification, submit a written record of the visit, including any problems, potential problems, and any recommended corrective action to the Owner's Representative for approval.

1.11 OBSERVATION OF THE WORK

A. The Owner's Representative may observe the work at any time. They may remove samples of materials for conformity to specifications. Rejected materials shall be immediately removed from the site and replaced at the Contractor's expense. The cost of testing materials not meeting specifications shall be paid by the Contractor.

B. The Owner's Representative shall be informed of the progress of the work so the work may be observed at the following key times in the construction process. The Owner's Representative shall be afforded sufficient time to schedule visit to the site. Failure of the Owner's Representative to make field observations shall not relieve the Contractor from meeting all the requirements of this specification.

1. SITE CONDITIONS PRIOR TO THE START OF PLANTING: review the soil and drainage conditions.

2. COMPLETION OF THE PLANT LAYOUT STAKING: Review of the plant layout.

3. PLANT QUALITY: Review of plant quality at the nursery, or if explicitly approved by the Owner's Representative, at the time of delivery and prior to installation. If reviewed on site, review tree quality prior to unloading where possible, but in all cases prior to planting.

4. COMPLETION OF THE PLANTING: Review the completed planting.

1.12 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre-construction meeting with the Owner's Representative at least seven (7) days before beginning work to review any questions the Contractor may have regarding the work, administrative procedures during construction and project work schedule.

1.13 QUALITY ASSURANCE

A. Substantial Completion Acceptance - Acceptance of the work prior to the start of the warranty period:

1. Once the Contractor completes the installation of all items in this section, the Owner's Representative will observe all work for Substantial Completion Acceptance upon written request of the Contractor. The request shall be received at least ten calendar days before the anticipated date of the observation.

2. Substantial Completion Acceptance by the Owner's Representative shall be for general conformance to specified size, character and quality and not relieve the Contractor of responsibility for full conformance to the contract documents, including correct species.

3. Any plants that are deemed defective as defined under the provisions below shall not be accepted.

B. The Owner's Representative will provide the Contractor with written acknowledgment of the date of Substantial Completion Acceptance and the beginning of the warranty period and plant maintenance period (if plant maintenance is included).

C. Contractor's Quality Assurance Responsibilities: The Contractor is solely responsible for quality control of the work.

D. Installer Qualifications: The installer shall be a firm having at least 5 years of successful experience of a scope similar to that required for the work, including the handling and planting of large specimen trees in urban areas (if project is in an urban area). The same firm shall install planting soil (where applicable) and plant material.

1. The bidders list for work under this section shall be approved by the Owner's Representative.

2. Installer Field Supervision: When any planting work is in progress, installer shall maintain, on site, a full-time supervisor who can communicate in English with the Owner's Representative.

3. Installer's field supervisor shall have a minimum of five years experience as a field supervisor installing plants and trees of the quality and scale of the proposed project, and can communicate in English with the Owner's Representative.

4. The installer's crew shall have a minimum of 3 years experienced in the installation of Planting Soil, Plantings, and Irrigation (where applicable) and interpretation of soil plans, planting plans and irrigation plans.

5. Submit references of past projects, employee training certifications that support that the Contractors meets all of the above installer qualifications and applicable licensures.

1.14 PLANT WARRANTY

A. Plant Warranty:

1. The Contractor agrees to replace defective work and defective plants. The Owner's Representative shall make the final determination if plants meet these specifications or that plants are defective.

   Plants warranty shall begin on the date of Substantial Completion Acceptance and continue for the following periods, classed by plant type:

   a. Trees – 1 Year.
   b. Shrubs, Cactus and Vines– 1 Year.
   c. Ground cover and perennial flower plants (if included in the project) – 1 Year.
   d. Bulbs, annual flower and seasonal color plants (if included in the project) – for the period of expected bloom or primary display.

2. When the work is accepted in parts, the warranty periods shall extend from each of the partial Substantial Completion Acceptances to the terminal date of the last warranty period. Thus, all warranty periods for each class of plant warranty, shall terminate at one time.

3. All plants shall be warrantied to meet all the requirements for plant quality at installation in this specification. Defective plants shall be defined as plants not meeting these requirements. The Owner's representative shall make the final determination that plants are defective.

4. Plants determined to be defective shall be removed immediately upon notification by the Owner's Representative and replaced without cost to the Owner, as soon as weather conditions permit and within the specified planting period.

5. Any work required by this specification or the Owner's Representative during the progress of the work, to correct plant defects including the removal of roots or branches, or planting plants that have been bare rooted during installation to observe for or correct root defects shall not be considered as grounds to void any conditions of the warranty. In the event that the Contractor decides that such remediation work may compromise the future health of the plant, the plant or plants in question shall be rejected and replaced with plants that do not contain defects that require remediation or correction.

6. The Contractor is exempt from replacing plants, after Substantial Completion Acceptance and during the warranty period, that are removed by others, lost or damaged due to occupancy of project, lost or damaged by a third party, vandalism, or any natural disaster.

7. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this specification. Make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Owner.

8. The warranty of all replacement plants shall extend for an additional one-year period from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of the said extended warranty period, the Owner's Representative may elect one more replacement items or credit for each item. These tertiary replacement items are not protected under a warranty period.

9. During and by the end of the warranty period, remove all tree wrap, ties, and guying unless agreed to by the Owner's Representative to remain in place. All trees that do not have sufficient caliper to remain upright, or those requiring additional anchorage in windy locations, shall be staked or remain staked, if required by the Owner's Representative.

B. End of Warranty Final Acceptance - Acceptance of plants at the end of the warranty period.

1. At the end of the warranty period, the Owner's Representative shall observe all warranted work, upon written request of the Contractor. The request shall be received at least ten calendar days before the anticipated date for final observation.

2. End of Warranty Final Acceptance will be given only when all the requirements of the work under this specification and in specification sections Planting Soil and Irrigation have been met.

1.15 SELECTION AND OBSERVATION OF PLANTS

A. The Owner's Representative may review all plants subject to approval of size, health, quality, character, etc. Review or approval of any plant during the process of selection, delivery, installation and establishment period shall not prevent that plant from later rejection in the event that the plant quality changes or previously existing defects become apparent that were not observed.

B. Plant Selection: The Owner's Representative reserves the right to select and observe all plants at the nursery prior to delivery and to reject plants that do not meet specifications as set forth in this specification. If a particular defect or substandard element can be corrected at the nursery, as determined by the Owner's Representative, the agreed upon remedy may be applied by the nursery or the Contractor provided that the correction allows the plant to meet the requirements set forth in this specification. Any work to correct plant defects shall be at the contractor's expense.

1. The Owner's Representative may make invasive observation of the plant's root system in the area of the root collar and the top of the root ball in general in order to determine that the plant meets the quality requirements for depth of the root collar and presence of roots above the root collar. Such observations will not harm the plant.

2. Corrections are to be undertaken at the nursery prior to shipping.

C. The Contractor shall bear all cost related to plant corrections.

D. All plants that are rejected shall be immediately removed from the site and acceptable replacement plants provided at no cost to the Owner.

E. Submit to the Owner's Representative, for approval, plant sources including the names and locations of nurseries proposed as sources of acceptable plants, and a list of the plants they will provide. The plant list shall include the botanical and common name and the size at the time of selection. Observe all nursery materials to determine that the materials meet the requirements of this section.

F. Trees shall be purchased from the growing nursery. Re-wholesale plant suppliers shall not be used as sources unless the Contractor can certify that the required trees are not directly available from a growing nursery. When Re-wholesale suppliers are utilized, the Contractor shall submit the name and location of the growing nursery from where the trees were obtained by the re-wholesale seller. The re-wholesale nursery shall be responsible for any required plant quality certifications.

G. The Contractor shall require the grower or re-wholesale supplier to permit the Owner's Representative to observe the root system of all plants at the nursery or job site prior to planting including random removal of soil or substrate around the base of the plant. Observation may be as frequent and as extensive as needed to verify that the plants meet the requirements of the specifications and conform to requirements.

H. Where requested by the Owner's Representative, submit photographs of plants or representative samples of plants. Photographs shall be legible and clearly depict the plant specimen. Each submitted image shall contain a height reference, such as a measuring stick. The approval of plants by the Owner's Representative via photograph does not preclude the Owner's Representative's right to reject material while on site.

1.16 PLANT SUBSTITUTIONS FOR PLANTS NOT AVAILABLE

A. Submit all requests for substitutions of plant species, or size to the Owner's Representative, for approval, prior to purchasing the proposed substitution. Request for substitution shall be accompanied with a list of nurseries contacted in the search for the required plant and a record of other attempts to locate the required material. Requests shall also include sources of plants found that may be of a smaller or larger size, or a different shape or habit than specified, or plants of the same genus and species but different cultivar origin, or which may otherwise not meet the requirements of the specifications, but which may be available for substitution. No substitutions shall be allowed without the written approval of the Owner's Representative.

1.17 SITE CONDITIONS

A. It is the responsibility of the Contractor to be aware of all surface and sub-surface conditions, and to notify the Owner's Representative, in writing, of any circumstances that would negatively impact the health of plantings. Do not proceed with work until unsatisfactory conditions have been corrected.
   1. Should subsurface drainage or soil conditions be encountered which would be detrimental to growth or survival of plant material, the Contractor shall notify the Owner's Representative in writing, stating the conditions and submit a proposal covering cost of corrections. If the Contractor fails to notify the Owner's Representative of such conditions, he/she shall remain responsible for plant material under the warranty clause of the specifications.

B. It is the responsibility of the Contractor to be familiar with the local growing conditions, and if any specified plants will be in conflict with these conditions. Report any potential conflicts, in writing, to the Owner's Representative.

C. This specification requires that all Planting Soil and Irrigation (if applicable) work be completed and accepted prior to the installation of any plants.

   1. Planting operations shall not begin until such time that the irrigation system is completely operational for the area(s) to be planted, and the irrigation system for that area has been

preliminarily observed and approved by the Owner's Representative.

D. Actual planting shall be performed during those periods when weather and soil conditions are suitable in accordance with locally accepted horticultural practices.

1. Do not install plants into saturated or frozen soils. Do not install plants during inclement weather, such as rain or snow or during extremely hot, cold or windy conditions.

1.18 PLANTING AROUND UTILITIES

A. Contractor shall carefully examine the civil, record, and survey drawings to become familiar with the existing underground conditions before digging.

B. Determine location of underground utilities and perform work in a manner that will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until parties concerned mutually agree upon removal.

C. Notification of Texas 811, 1-800-DIG-TESS, 1-800-344-8377, is required for all planting areas: The Contractor is responsible for knowing the location and avoiding utilities that are not covered by Texas 811.

PART 2 - PRODUCTS

2.01 PLANTS: GENERAL

A. Standards and measurement: Provide plants of quantity, size, genus, species, and variety or cultivars as shown and scheduled in contract documents.

1. All plants including the root ball dimensions or container size to trunk caliper ratio shall conform to ANSI Z60.1 "American Standard for Nursery Stock" latest edition, unless modified by provisions in this specification. When there is a conflict between this specification and ANSI Z60.1, this specification section shall be considered correct.

2. Plants larger than specified may be used if acceptable to the Owner's Representative. Use of such plants shall not increase the contract price. If larger plants are accepted the root ball size shall be in accordance with ANSI Z-60.1. Larger plants may not be acceptable if the resulting root ball cannot be fit into the required planting space.

3. If a range of size is given, no plant shall be less than the minimum size and not less than 50 percent of the plants shall be as large as the maximum size specified. The measurements specified are the minimum and maximum size acceptable and are the measurements after pruning, where pruning is required.

B. Proper Identification: All trees shall be true to name as ordered or shown on planting plans and shall be labeled individually or in groups by genus, species, variety and cultivar.

C. Compliance: All trees shall comply with federal and state laws and regulations requiring observation for plant disease, pests, and weeds. Observation certificates required by law shall accompany each shipment of plants.

D. Plant Quality:

1. General: Provide healthy stock, grown in a nursery and reasonably free of die-back, disease, insects, eggs, bores, and larvae. At the time of planting all plants shall have a root system, stem, and branch form that will not restrict normal growth, stability and health for the expected life of the plant.

2. Plant quality above the soil line:

a. Plants shall be healthy with the color, shape, size and distribution of trunk, stems, branches, buds and leaves normal to the plant type specified. Tree quality above the soil line shall comply with the project Crown Acceptance details (or Florida Grades and Standards, tree grade Florida Fancy or Florida #1) and the following:

1.) Crown: The form and density of the crown shall be typical for a young specimen of the species or cultivar pruned to a central and dominant leader.

a.) Crown specifications do not apply to plants that have been specifically trained in the nursery as topiary, espalier, multi-stem, clump, or unique selections such as contorted or weeping cultivars.

2.) Leaves: The size, color, and appearance of leaves shall be typical for the time of year and stage of growth of the species or cultivar. Trees shall not show signs of prolonged moisture stress or over watering as indicated by wilted, shriveled, or dead leaves.

3.) Branches: Shoot growth (length and diameter) throughout the crown should be appropriate for the age and size of the species or cultivar. Trees shall not have dead, diseased, broken, distorted, or otherwise injured branches.

a.) Main branches shall be distributed along the central leader not clustered together. They shall form a balanced crown appropriate for the cultivar/species.
b.) Branch diameter shall be no larger than two-thirds (one-half is preferred) the diameter of the central leader measured 1 inch above the branch union.
c.) The attachment of the largest branches (scaffold branches) shall be free of included bark.

4.) Trunk: The tree trunk shall be relatively straight, vertical, and free of wounds that penetrate to the wood (properly made pruning cuts, closed or not, are acceptable and are not considered wounds), sunburned areas, conks (fungal fruiting bodies), wood cracks, sap leakage, signs of boring insects, galls, cankers, girdling ties, or lesions (mechanical injury).

5.) Temporary branches, unless otherwise specified, can be present along the lower trunk below the lowest main (scaffold) branch, particularly for trees less than 1 inch in caliper. These branches should be no greater than 3/8-inch diameter. Clear trunk should be no more than 40% of the total height of the tree.

b. Trees shall have one central leader. If the leader was headed, a new leader (with a live terminal bud) at least one-half the diameter of the pruning cut shall be present.

1.) All trees are assumed to have one central leader trees unless a different form is specified in the plant list or drawings.

c. All graft unions, where applicable, shall be completely closed without visible sign of graft rejection. All grafts shall be visible above the soil line.

d. Trunk caliper and taper shall be sufficient so that the lower five feet of the trunk remains vertical without a stake. Auxiliary stake may be used to maintain a straight leader in the upper half of the tree.

3. Plant quality at or below the soil line:

a. Plant roots shall be normal to the plant type specified. Root observations shall take place without impacting tree health. Root quality at or below the soil line shall comply with the project Root Acceptance details and the following:

1.) The roots shall be reasonably free of scrapes, broken or split wood.

2.) The root system shall be reasonably free of injury from biotic (e.g., insects and pathogens) and abiotic (e.g., herbicide toxicity and salt injury) agents. Wounds resulting from root pruning used to produce a high quality root system are not considered injuries.

3.) A minimum of three structural roots reasonably distributed around the trunk (not clustered on one side) shall be found in each plant. Root distribution shall be uniform throughout the root ball, and growth shall be appropriate for the species.

a.) Plants with structural roots on only one side of the trunk (J roots) shall be rejected.

4.) The root collar shall be within the upper 2 inches of the substrate/soil. Two structural roots shall reach the side of the root ball near the top surface of the root ball. The grower may request a modification to this requirement for species with roots that rapidly descend, provided that the grower removes all stem girdling roots above the structural roots across the top of the root ball.

5.) The root system shall be reasonably free of stem girdling roots over the root collar or kinked roots from nursery production practices.

a.) Plant Grower Certification: The final plant grower shall be responsible to have determined that the plants have been root pruned at each step in the plant production process to remove stem girdling roots and kinked roots, or that the previous production system used practices that produce a root system throughout the root ball that meets these specifications. Regardless of the work of previous growers, the plant's root system shall be modified at the final production stage, if needed, to produce the required plant root quality. The final grower shall certify in writing that all plants are reasonably free of stem girdling and kinked roots as defined in this specification, and that the tree has been grown and harvested to produce a plant that meets these specifications.

6.) At time of observations and delivery, the root ball shall be moist throughout. Roots shall not show signs of excess soil moisture conditions as indicated by stunted, discolored, distorted, or dead roots.

E. Submittals: Submit for approval the required plant quality certifications from the grower where plants are to be purchased, for each plant type. The certification must state that each plant meets all the above plant quality requirements.

1. The grower's certification of plant quality does not prohibit the Owner's Representative from observing any plant or rejecting the plant if it is found to not meet the specification requirements.

2.02 ROOT BALL PACKAGE OPTIONS:

The following root ball packages are permitted. Specific root ball packages shall be required where indicated on the plant list or in this specification. Any type of root ball packages that is not specifically defined in this specification shall not be permitted.

A. BALLED AND BURLAPPED PLANTS

1. All Balled and Burlapped Plants shall be field grown, and the root ball packaged in a burlap and twine and/or burlap and wire basket package.

2. Plants shall be harvested with the following modifications to standard nursery practices.

a. Prior to digging any tree that fails to meet the requirement for maximum soil and roots above the root collar, carefully removed the soil from the top of the root ball of each plant, using hand tools, water or an air spade, to locate the root collar and attain the soil depth over the structural roots requirements. Remove all stem girdling roots above the root collar. Care must be exercised not to damage the surface of the root collar and the top of the structural roots.

b. Trees shall be dug for a minimum of 4 weeks and a maximum of 52 weeks prior to shipping. Trees dug 4 to 52 weeks prior to shipping are defined as hardened-off. Digging is defined as cutting all roots and lifting the tree out of the ground and either moving it to a new location in the nursery or placing it back into the same hole. Tress that are stored out of the ground shall be placed in a holding area protected from extremes of wind and sun with the root ball protected by covering with mulch or straw and irrigated sufficiently to keep moisture in the root ball above wilt point and below saturation

c. If wire baskets are used to support the root ball, a "low profile" basket shall be used. A low profile basket is defined as having the top of the highest loops on the basket no less than 4 inches and no greater than 8 inches below the shoulder of the root ball package. Entire wire basket shall be removed at the time of planting.

d. At nurseries where sandy soils prevent the use of "low profile baskets", baskets that support the entire root ball, including the top, are allowable.

e. Twine and burlap used for wrapping the root ball package shall be natural, biodegradable material. If the burlap decomposes after digging the tree then the root ball shall be re-wrapped prior to shipping if roots have not yet grown to keep root ball intact during shipping.

B. CONTAINER (INCLUDING ABOVE-GROUND FABRIC CONTAINERS AND BOXES) PLANTS

1. Container plants may be permitted only when indicated on the drawing, in this specification, or approved by the Owner's Representative.

2. Provided plants shall be established and well rooted in removable containers.

3. Container class size shall conform to ANSI Z60.1 for container plants for each size and type of plant.

C. BARE ROOT PLANTS

1. Harvest bare root plants while the plant is dormant and a minimum of 4 weeks prior to leaf out (bud break).

2. The root spread dimensions of the harvested plants shall conform to ANSI Z60.1 for nursery grown bare root plants for each size and type of plant. Just prior to shipping to the job site, dip the root system into a slurry of hydrogel (cross linked polyacrylamide) and water mixed at a rate of 15 oz. of hydrogel in 25 gallons of water. Do not shake off the excess hydrogel. Place the root system in a pleated black plastic bag and tie the bag snugly around the trunk. Bundle and tie the upper branches together.

3. Keep the trees in a cool dark space for storage and delivery. If daytime outside temperatures exceeds 70 degrees F, utilize a refrigerated storage area with temperature between 35 and 50 degrees.

4. Where possible, plan time of planting to be before bud break. For trees to be planted after bud break, place the trees before bud break in an irrigated bed of pea gravel.

a. The pea gravel bed shall be 18 inches deep over a sheet of plastic.

b. Space trees to allow the unbundled branches to grow without shading each other.

c. Once stored in pea gravel, allow the trees sufficient time for the new root system to flush and spring growth of leaves to fully develop before planting.

d. Pea gravel stored trees may be kept for up to one growing season.

e. Pea gravel stored trees shall be dipped, packaged and shipped similar to the requirements for freshly dug bare root trees above.

D. IN-GROUND FABRIC BAG-GROWN

1. In-ground fabric container plants may be permitted only when indicated on the drawing, in this specification, or approved by the Owner's Representative.

2. Provide plants established and well rooted.

2.03 PLANTING SOIL

A. Planting Soil as used in this specification means the soil at the planting site, or imported as modified and defined in specification Section Planting Soil. If there is no Planting Soil specification, the term Planting Soil shall mean the soil at the planting site within the planting hole.

2.04 MULCH

A. Mulch shall be "Walk on" grade, coarse, ground, from tree and woody brush sources. The size range shall be a minimum (less than 25% or less of volume) fine particles 3/8 inch or less in size, and a maximum size of individual pieces (largest 20% or less of volume) shall be approximately 1 to 1-1/2 inch in diameter and maximum length approximately 4 to 8". Pieces larger than 8 inch long that are visible on the surface of the mulch after installation shall be removed.

1. It is understood that mulch quality will vary significantly from supplier to supplier and region to region. The above requirements may be modified to conform to the source material from locally reliable suppliers as approved by the Owner's Representative.

B. Submit supplier's product specification data sheet and a one gallon sample for approval.

2.05 TREE STAKING AND GUYING MATERIAL

A. Tree guying to be flat woven polypropylene material, 3/4 inch wide, and 900 lb. break strength. Color to be Green. Product to be ArborTie manufactured by Deep Root Partners, L.P. or approved equal.

B. Stakes shall be lodge pole stakes free of knots and of diameters and lengths appropriate to the size of plant as required to adequately support the plant.

C. Below ground anchorage systems to be constructed of 2 x 2 dimensional untreated wood securing (using 3 inch long screws) horizontal portions to 4 feet long vertical stakes driven straight into the ground outside the root ball.

D. Submit manufacturer's product data for approval.

2.06 TREE BARK PROTECTOR

A. Tree Bark Protectors shall be black extruded resin mesh, 4 inches in diameter, 5 feet long. As manufactured by Industrial Netting, Minneapolis, MN, USA or approved equal.

B. Fasten the split side of the Tree Bark Protector together in three places with black plastic tape.

C. Submit manufacturers' product data for approval.

PART 3 - EXECUTION

3. 01 SITE EXAMINATION

A. Examine the surface grades and soil conditions to confirm that the requirements of the Specification Section – Planting Soil - and the soil and drainage modifications indicated on the Planting Soil Plan and Details (if applicable) have been completed. Notify the Owner's Representative in writing of any unsatisfactory conditions.

3. 02 DELIVERY, STORAGE AND HANDLING

A. Protect materials from deterioration during delivery and storage. Adequately protect plants from drying out, exposure of roots to sun, wind or extremes of heat and cold temperatures. If planting is delayed more than 24 hours after delivery, set plants in a location protected from sun and wind. Provide adequate water to the root ball package during the shipping and storage period.

1. All plant materials must be available for observation prior to planting.

2. Using a soil moisture meter, periodically check the soil moisture in the root balls of all plants to assure that the plants are being adequately watered. Volumetric soil moisture shall be maintained above wilting point and below field capacity for the root ball substrate or soil.

B. Do not deliver more plants to the site than there is space with adequate storage conditions. Provide a suitable remote staging area for plants and other supplies.

1. The Owner's Representative or Contractor shall approve the duration, method and location of storage of plants.

C. Provide protective covering over all plants during transporting.

3. 03 PLANTING SEASON

A. Planting shall only be performed when weather and soil conditions are suitable for planting the materials specified in accordance with locally accepted practice.

3. 04 ADVERSE WEATHER CONDITIONS

A. No planting shall take place during extremely hot, dry, windy or freezing weather.

3. 05 COORDINATION WITH PROJECT WORK

A. The Contractor shall coordinate with all other work that may impact the completion of the work.

B. Prior to the start of work, prepare a detailed schedule of the work for coordination with other trades.

C. Coordinate the relocation of any irrigation lines, heads or the conduits of other utility lines that are in conflict with tree locations. Root balls shall not be altered to fit around lines. Notify the Owner's Representative of any conflicts encountered.

3. 06 LAYOUT AND PLANTING SEQUENCE

A. Relative positions of all plants and trees are subject to approval of the Owner's Representative.

B. Notify the Owner's Representative, one (1) week prior to layout. Layout all individual tree and shrub locations. Place plants above surface at planting location or place a labeled stake at planting location. Layout bed lines with paint for the Owner's Representative's approval. Secure the Owner's Representative's acceptance before digging and start of planting work.

C. When applicable, plant trees before other plants are installed.

D. It is understood that plants are not precise objects and that minor adjustments in the layout will be required as the planting plan is constructed. These adjustments may not be apparent until some or all of the plants are installed. Make adjustments as required by the Owner's Representative including relocating previously installed plants.

3. 07 SOIL PROTECTION DURING PLANT DELIVERY AND INSTALLATION

A. Protect soil from compaction during the delivery of plants to the planting locations, digging of planting holes and installing plants.

1. Where possible deliver and plant trees that require the use of heavy mechanized equipment prior to final soil preparation and tilling. Where possible, restrict the driving lanes to one area instead of driving over and compacting a large area of soil.

2. Till to a depth of 6 inches, all soil that has been driven over during the installation of plants.

3. 08 SOIL MOISTURE

A. Volumetric soil moisture level, in both the planting soil and the root balls of all plants, prior to, during and after planting shall be above permanent wilting point and below field capacity for each type of soil texture within the following ranges.

Soil type	*Permanent wilting point*	*Field capacity*
Sand, Loamy sand, Sandy loam	*5-8%*	*12-18%*
Loam, Sandy clay, Sandy clay loam	*14-25%*	*27-36%*
Clay loam, Silt loam	*11-22%*	*31-36%*
Silty clay, Silty clay loam	*22-27%*	*38-41%*

1. Volumetric soil moisture shall be measured with a digital moisture meter. The meter shall be the Digital Soil Moisture Meter, DSMM500 by General Specialty Tools and Instruments, or approved equivalent.

B. The Contractor shall confirm the soil moisture levels with a moisture meter. If the moisture is too high, suspend planting operations until the soil moisture drains to below field capacity.

3. 09 INSTALLATION OF PLANTS: GENERAL

A. Installation plan shall be submitted a minimum of 14 days prior to the scheduled installation. Plan should describe the methods, activities, materials and schedule to achieve installation of plants.

B. Observe each plant after delivery and prior to installation for damage of other characteristics that may cause rejection of the plant. Notify the Owner's Representative of any condition observed.

C. No more plants shall be distributed about the planting bed area than can be planted and watered on the same day.

D. The root system of each plant, regardless of root ball package type, shall be observed by the Contractor, at the time of planting to confirm that the roots meet the requirements for plant root quality in Part 2 Products: Plants General: Plant Quality. The Contractor shall undertake at the time of planting, all modifications to the root system required by the Owner's Representative to meet these quality standards.

1. Modifications, at the time of planting, to meet the specifications for the depth of the root collar and removal of stem girdling roots and circling roots may make the plant unstable or stress the plant to the point that the Owner's Representative may choose to reject the plant rather than permitting the modification.

2. Any modifications required by the Owner's Representative to make the root system conform to the plant quality standards outlined in Part 2 Products: Plants General: Quality, or other requirements related to the permitted root ball package, shall not be considered as grounds to modify or void the plant warranty.

3. The resulting root ball may need additional staking and water after planting. The Owner's Representative may reject the plant if the root modification process makes the tree unstable or if the tree is not healthy at the end of the warranty period. Such plants shall still be covered under the warranty

4. The Contractor remains responsible to confirm that the grower has made all required root modifications noted during any nursery observations.

E. Container and Boxed Root Ball Shaving: The outer surfaces of ALL plants in containers and boxes, including the top, sides and bottom of the root ball shall be shaved to remove all circling, descending, and matted roots. Shaving shall be performed using saws, knives, sharp shovels or other suitable equipment that is capable of making clean cuts on the roots. Shaving shall remove a minimum of one inch of root mat or up to 2 inches as required to remove all root segments that are not growing reasonably radial to the trunk.

F. Exposed Stem Tissue after Modification: The required root ball modifications may result in stem tissue that has not formed trunk bark being exposed above the soil line. If such condition occurs, wrap the exposed portion of the stem in a protective wrapping with a white filter fabric. Secure the fabric with biodegradable masking tape. DO NOT USE string, twine, green nursery ties or any other material that may girdle the trunk if not removed.

G. Excavation of the Planting Space: Using hand tools or tracked mini-excavator, excavate the planting hole into the Planting Soil to the depth of the root ball measured after any root ball modification to correct root problems, and wide enough for working room around the root ball or to the size indicated on the drawing or as noted below.

1. For trees and shrubs planted in soil areas that are NOT tilled or otherwise modified to a depth of at least 12 inches over a distance of more than 10 feet radius from each tree, or 5 feet radius from each shrub, the soil around the root ball shall be loosened as defined below or as indicated on the drawings.

   a. The area of loosening shall be a minimum of 3 times the diameter of the root ball at the surface sloping to 2 times the diameter of the root ball at the depth of the root ball.

   b. Loosening is defined as digging into the soil and turning the soil to reduce the compaction. The soil does not have to be removed from the hole, just dug, lifted and turned. Lifting and turning may be accomplished with a tracked mini excavator, or hand shovels.

2. If an auger is used to dig the initial planting hole, the soil around the auger hole shall be loosened as defined above for trees and shrubs planted in soil areas that are NOT tilled or otherwise modified.

3. The measuring point for root ball depth shall be the average height of the outer edge of the root ball after any required root ball modification.

4. If motorized equipment is used to deliver plants to the planting area over exposed planting beds, or used to loosen the soil or dig the planting holes, all soil that has been driven over shall be tilled to a depth of 6 inches.

H. For trees to be planted in prepared Planting Soil that is deeper than the root ball depth, compact the soil under the root ball using a mechanical tamper to assure a firm bedding for the root ball. If there is more than 12 inches of planting soil under the root ball excavate and tamp the planting soil in lifts not to exceed 12 inches.

I. Set top outer edge of the root ball at the average elevation of the proposed finish. Set the plant plumb and upright in the center of the planting hole. The tree graft, if applicable, shall be visible above the grade. Do not place soil on top of the root ball.

J. The Owner's Representative may request that plants orientation be rotated when planted based on the form of the plant.

K. Backfill the space around the root ball with the same planting soil or existing soil that was excavated for the planting space. See Specification Section Planting Soil (if applicable), for requirements to modify the soil within the planting bed.

L. Brace root ball by tamping Planting Soil around the lower portion of the root ball. Place additional Planting Soil around base and sides of ball in six-inch (6") lifts. Lightly tamp each lift using foot pressure or hand tools to settle backfill, support the tree and eliminate voids. DO NOT over compact the backfill or use mechanical or pneumatic tamping equipment. Over compaction shall be defined as greater than 85% of maximum dry density, standard proctor or greater than 250 psi as measured by a cone penetrometer when the volumetric soil moisture is lower than field capacity.

1. When the planting hole has been backfilled to three quarters of its depth, water shall be poured around the root ball and allowed to soak into the soil to settle the soil. Do not flood the planting space. If the soil is above field capacity, allow the soil to drain to below field capacity before finishing the planting. Air pockets shall be eliminated and backfill continued until the planting soil is brought to grade level.

M. Where indicated on the drawings, build a 4 inch high, level berm of Planting Soil around the outside of the root ball to retain water. Tamp the berm to reduce leaking and erosion of the saucer.

N. Thoroughly water the Planting Soil and root ball immediately after planting.

O. Remove all nursery plant identification tags and ribbons.

P. Remove corrugated cardboard trunk protection after planting.

Q. Follow additional requirements for the permitted root ball packages.

3. 10 PERMITTED ROOT BALL PACKAGES AND SPECIAL PLANTING REQUIREMENTS

A. The following are permitted root ball packages and special planting requirements that shall be followed during the planting process in addition to the above General planting requirements.

B. BALLED AND BURLAPPED PLANTS

1. After the root ball has been backfilled, remove all twine and burlap from the top of the root ball. Cut the burlap away; do not fold down onto the Planting Soil.

2. If the plant is shipped with a wire basket that does not meet the requirements of a "Low Rise" basket, remove the top 6 - 8 inches of the basket wires just before the final backfilling of the tree.
3. Earth root balls shall be kept intact except for any modifications required by the Owner's Representative to make root package comply with the requirement in Part 2 Products.

C. CONTAINER (INCLUDES BOXED AND ABOVE-GROUND FABRIC CONTAINERS) PLANTS

1. This specification assumes that most container plants have significant stem girdling and circling roots, and that the root collar is too low in the root ball.

2. Remove the container.

3. Perform root ball shaving as defined in Installation of Plants: General above.

4. Remove all roots and substrate above the root collar and the main structural roots according to root correction details so root system conforms to root observations detail.

5. Remove all substrate at the bottom of the root ball that does not contain roots.

6. Using a hose, power washer or air excavation device, wash out the substrate from around the trunk and top of the remaining root ball and find and remove all stem girdling roots within the root ball above the top of the structural roots.

D. BARE ROOT PLANTS

1. Dig the planting hole to the diameter of the spread of the roots to a depth in the center that maintains the root collar at the elevation of the surrounding finished grade and slightly deeper along the edges of the hole.

2. Spread all roots out radial to the trunk in the prepared hole making the hole wider where needed to accommodate long roots. Root tips shall be directed away from the trunk. Prune any broken roots removing the least amount of tissue possible.

3. Maintain the trunk plumb while backfilling soil around the roots.

4. Lightly tamp the soil around the roots to eliminate voids and reduce settlement.

E. IN-GROUND FABRIC CONTAINERS

1. Remove the fabric container from the root ball. Cut roots at the edge of the container as needed to extract the fabric from the roots. Make clean cuts with sharp tools; do not tear roots away from the fabric.

2. Observe the root system after the container is removed to confirm that the root system meets the quality standards.

3. 11 GROUND COVER, PERENNIAL AND ANNUAL PLANTS

A. Assure that soil moisture is within the required levels prior to planting. Irrigation, if required, shall be applied at least 12 hours prior to planting to avoid planting in muddy soils.

B. Assure that soil grades in the beds are smooth and as shown on the plans.

C. Plants shall be planted in even, triangularly spaced rows, at the intervals called out for on the drawings, unless otherwise noted. The first row of Annual flower plants shall be 6 inches from the bed edge unless otherwise directed.

D. Dig planting holes sufficiently large enough to insert the root system without deforming the roots. Set the top of the root system at the grade of the soil.

E. Schedule the planting to occur prior to application of the mulch. If the bed is already mulched, pull the mulch from around the hole and plant into the soil. Do not plant the root system in the mulch. Pull mulch back so it is not on the root ball surface.

F. Press soil to bring the root system in contact with the soil.

G. Spread any excess soil around in the spaces between plants.

H. Apply mulch to the bed being sure not to cover the tops of the plants with or the tops of the root ball with mulch.

I. Water each planting area as soon as the planting is completed. Apply additional water to keep the soil moisture at the required levels. Do not over water.

3. 12 STAKING AND GUYING

A. Do not stake or guy trees unless specifically required by the Contract Documents, or in the event that the Contractor feels that staking is the only alternative way to keep particular trees plumb.

1. The Owner's Representative shall have the authority to require that trees are staked or to reject staking as an alternative way to stabilize the tree.

2. Trees that required heavily modified root balls to meet the root quality standards may become unstable. The Owner's Representative may choose to reject these trees rather than utilize staking to temporarily support the tree.

B. Trees that are guyed shall have their guys and stakes removed after one full growing season or at other times as required by the Owner's Representative.

C. Tree guying shall utilize the tree staking and guying materials specified. Guying to be tied in such a manner as to create a minimum 12-inch loop to prevent girdling. Refer to manufacturer's recommendations and the planting detail for installation.

1. Plants shall stand plumb after staking or guying.

2. Stakes shall be driven to sufficient depth to hold the tree rigid.

D. For trees planted in planting mix over waterproofed membrane, use dead men buried 24 inches to the top of the dead man, in the soil. Tie the guy to the dead man with a double wrap of line around the dead man followed by a double half hitch. When guys are removed, leave the dead men in place and cut the guy tape 12 inches above the ground, leaving the tape end covered in mulch.

3. 13 TREE BARK PROTECTION

A. For all street trees in commercial areas where indicted on the drawings, apply a Tree Bark Protector to each tree.

3. 14 STRAIGHTENING PLANTS

A. Maintain all plants in a plumb position throughout the warranty period. Straighten all trees that move out of plumb including those not staked. Plants to be straightened shall be excavated and the root ball moved to a plumb position, and then re-backfilled.

B. Do not straighten plants by pulling the trunk with guys.

3. 15 INSTALLATION OF FERTILIZER AND OTHER CHEMICAL ADDITIVES

A. Do not apply any soluble fertilizer to plantings during the first year after transplanting unless soil test determines that fertilizer or other chemical additives is required. Apply chemical additives only upon the approval of the Owner's Representative.

B. Controlled release fertilizers shall be applied according to the manufacturer's instructions and standard horticultural practices.

3. 16 PRUNING OF TREES AND SHRUBS

A. Prune plants as directed by the Owner's Representative. Pruning trees shall be limited to addressing structural defects as shown in details; follow recommendations in "Structural Pruning: A Guide For The Green Industry" published by Urban Tree Foundation, Visalia CA.

B. All pruning shall be performed by a person experienced in structural tree pruning.

C. Except for plants specified as multi-stemmed or as otherwise instructed by the Owner's Representative, preserve or create a central leader.

D. Pruning of large trees shall be done using pole pruners or if needed, from a ladder or hydraulic lift to gain access to the top of the tree. Do not climb in newly planted trees. Small trees can be structurally pruned by laying them over before planting. Pruning may also be performed at the nursery prior to shipping.

E. Remove and replace excessively pruned or malformed stock resulting from improper pruning that occurred in the nursery or after.

F. Pruning shall be done with clean, sharp tools.

G. No tree paint or sealants shall be used.

H. Final trunk and branch locations of trees and shrubs shall not encroach into vertical clearance of sidewalks required by any applicable accessibility guidelines.

3. 17 MULCHING OF PLANTS

A. Apply 4 inches of mulch before settlement (if applicable), covering the entire planting bed area. Install no more than 1 inch of mulch over the top of the root balls of all plants. Taper to 2 inches when abutting pavement.

B. For trees planted in lawn areas the mulch shall extend to a 5 foot radius around the tree or to the extent indicated on the plans.

C. Lift all leaves, low hanging stems and other green portions of small plants out of the mulch if covered.

3. 18 PLANTING BED FINISHING

A. After planting, smooth out all grades between plants before mulching.

B. Separate the edges of planting beds and lawn areas with a smooth, formed edge cut into the turf with the bed mulch level slightly lower, 1 and 2 inches, than the adjacent turf sod or as directed by the Owner’s Representative. Bed edge lines shall be a depicted on the drawings.

3. 19 WATERING

A. The Contractor shall be fully responsible to ensure that adequate water is provided to all plants from the point of installation until the date of Substantial Completion Acceptance. The Contractor shall adjust the automatic irrigation system, if available, and apply additional or adjust for less water using hoses as required.

B. Hand water root balls of all plants to assure that the root balls have moisture above wilt point and below field capacity. Test the moisture content in each root ball and the soil outside the root ball to determine the water content.

3. 20 CLEAN-UP

A. During installation, keep the site free of trash, pavements reasonably clean and work area in an orderly condition at the end of each day. Remove trash and debris in containers from the site no less than once a week.

1. Immediately clean up any spilled or tracked soil, fuel, oil, trash or debris deposited by the Contractor from all surfaces within the project or on public right of ways and neighboring property.

B. Once installation is complete, wash all soil from pavements and other structures. Ensure that mulch is confined to planting beds and that all tags and flagging tape are removed from the site.

C. Make all repairs to grades, ruts, and damage by the plant installer to the work or other work at the site.

D. Remove and dispose of all excess planting soil, subsoil, mulch, plants, packaging, and other excess material, trash or debris, which was either brought to the site by the Contractor or excavated or demolished from the site. This shall happen daily.

E. Contractor shall water the site twice daily in order to keep down dust. This shall include watering on weekends on holidays, no exceptions.

3. 21 PROTECTION DURING CONSTRUCTION

A. The Contractor shall protect planting and related work and other site work from damage due to planting operations, operations by other Contractors or trespassers. Maintain protection during installation until Substantial Completion Acceptance. Treat, repair or replace damaged work immediately.

B. Damage done by the Contractor, or any of their sub-contractors to existing or installed plants, or any other parts of the work or existing features to remain, including roots, trunk or branches of large existing trees, soil, paving, utilities, lighting, irrigation, other finished work and surfaces including those on adjacent property, shall be cleaned, repaired or replaced by the Contractor at no expense to the Owner. The Owner's Representative shall determine when such cleaning, replacement or repair is satisfactory.

3. 22 PLANT MAINTENANCE PRIOR TO SUBSTANTIAL COMPLETION ACCEPTANCE

A. During the project work period and prior to Substantial Completion Acceptance, the Contractor shall maintain all plants.

B. Maintenance during the period prior to Substantial Completion Acceptance shall consist of pruning, watering, cultivating, weeding, mulching, removal of dead material, repairing and replacing of tree stakes, tightening and repairing of guys, repairing and replacing of damaged tree wrap material, resetting plants to proper grades and upright position, and furnishing and applying such sprays as are necessary to keep plantings reasonably free of damaging insects and disease, and in healthy condition. The threshold for applying insecticides and herbicide shall follow established Integrated Pest Management (IPM) procedures. Mulch areas shall be kept reasonably free of weeds, grass.

3. 23 SUBSTANTIAL COMPLETION ACCEPTANCE

A. Upon written notice from the Contractor, the Owners Representative shall review the work and make a determination if the work is substantially complete.

B. Notification shall be at least 7 days prior to the date the contractor is requesting the review.

C. The date of substantial completion of the planting shall be the date when the Owner's Representative accepts that all work in Planting, Planting Soil, and Irrigation installation sections is complete.

D. The Plant Warranty period begins at date of written notification of substantial completion from the Owner's Representative. The date of substantial completion may be different than the date of substantial completion for the other sections of the project.

3. 24 MAINTENANCE DURING THE WARRANTY PERIOD BY OTHERS

A. After Substantial Completion Acceptance, the Contractor shall make sufficient site visits to observe the Owner's maintenance and become aware of problems with the maintenance in time to request changes, until the date of End of Warranty Final Acceptance.

1. Notify the Owner's Representative in writing if maintenance, including watering, is not sufficient to maintain plants in a healthy condition. Such notification must be made in a timely period so that the Owner's Representative may take corrective action.

    c. Notification must define the maintenance needs and describe any corrective action required.
2. In the event that the Contractor fails to visit the site and or notify, in writing, the Owner's Representative of maintenance needs, lack of maintenance shall not be used as grounds for voiding or modifying the provisions of the warranty.

3. 25 END OF WARRANTY FINAL ACCEPTANCE / MAINTENANCE OBSERVATION

A. At the end of the Warranty and Maintenance period the Owner's Representative shall observe the work and establish that all provisions of the contract are complete and the work is satisfactory.

1. If the work is satisfactory, the maintenance period will end on the date of the final observation.

2. If the work is deemed unsatisfactory, the maintenance period will continue at no additional expense to the Owner until the work has been completed, observed, and approved by the Owner's

Representative.

B. FAILURE TO PASS OBSERVATION: If the work fails to pass final observation, any subsequent observations must be rescheduled as per above. The cost to the Owner for additional observations will be charged to the Contractor at the prevailing hourly rate of the Owners Representative.

END OF SECTION 32 93 00

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