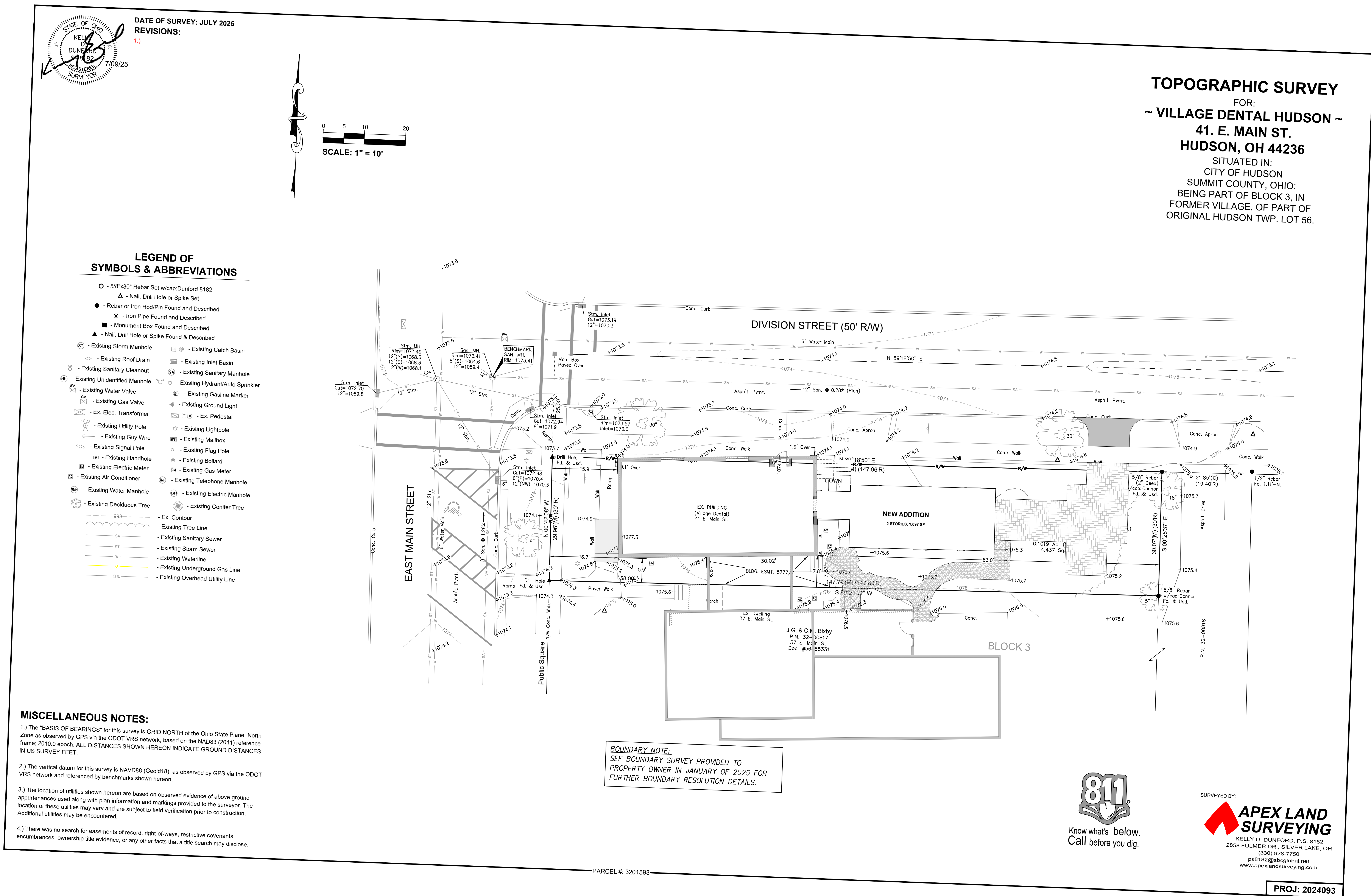
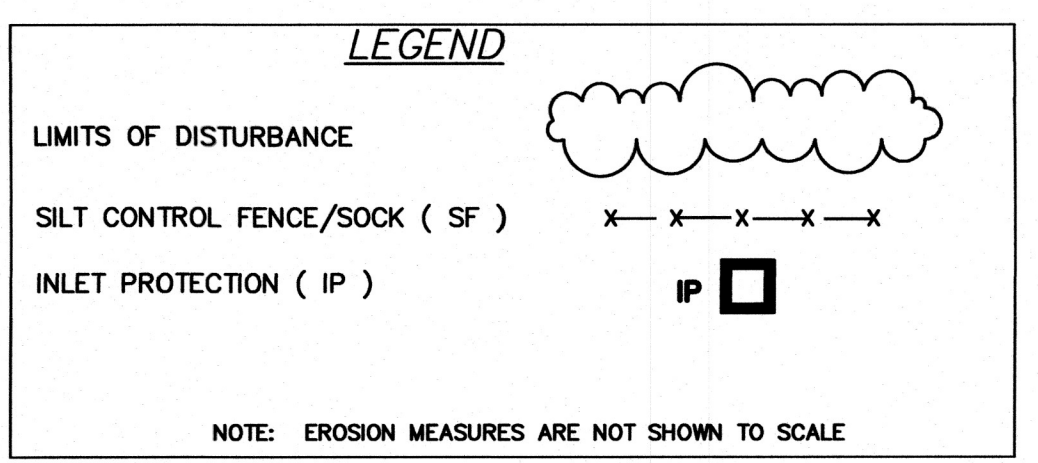
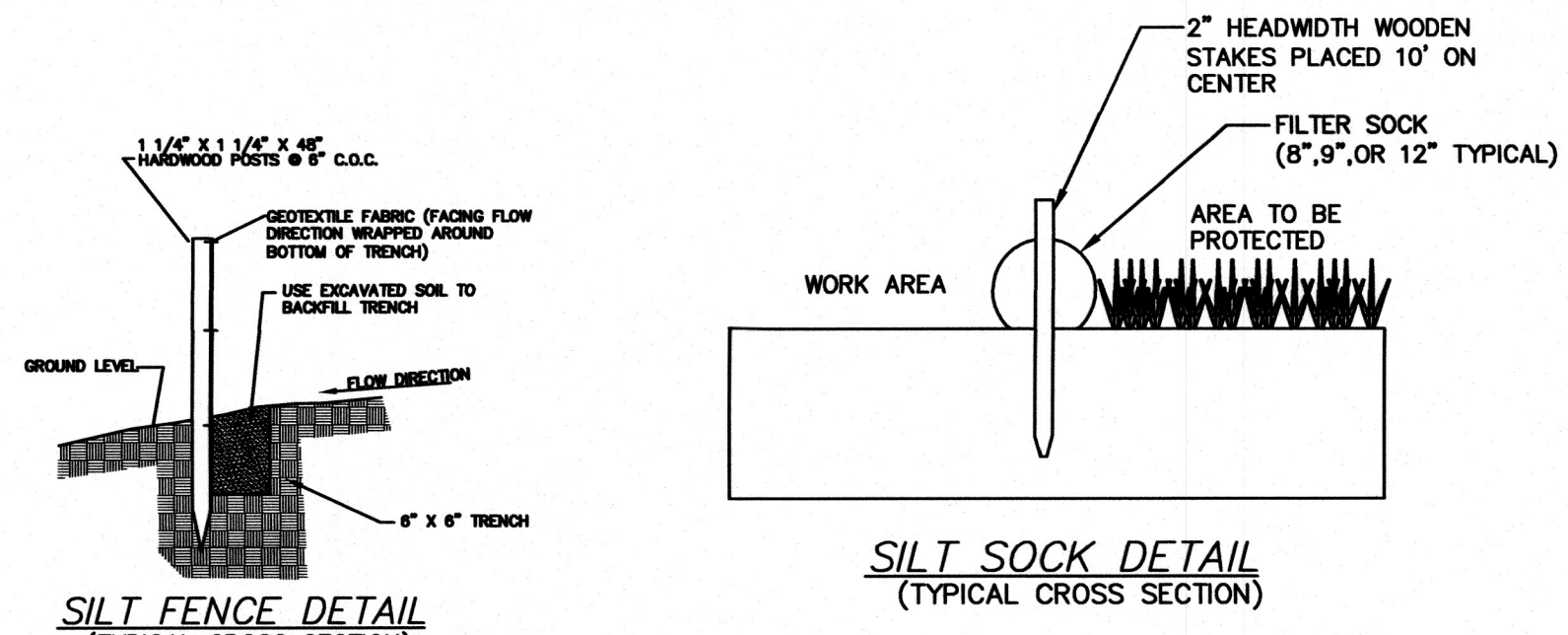
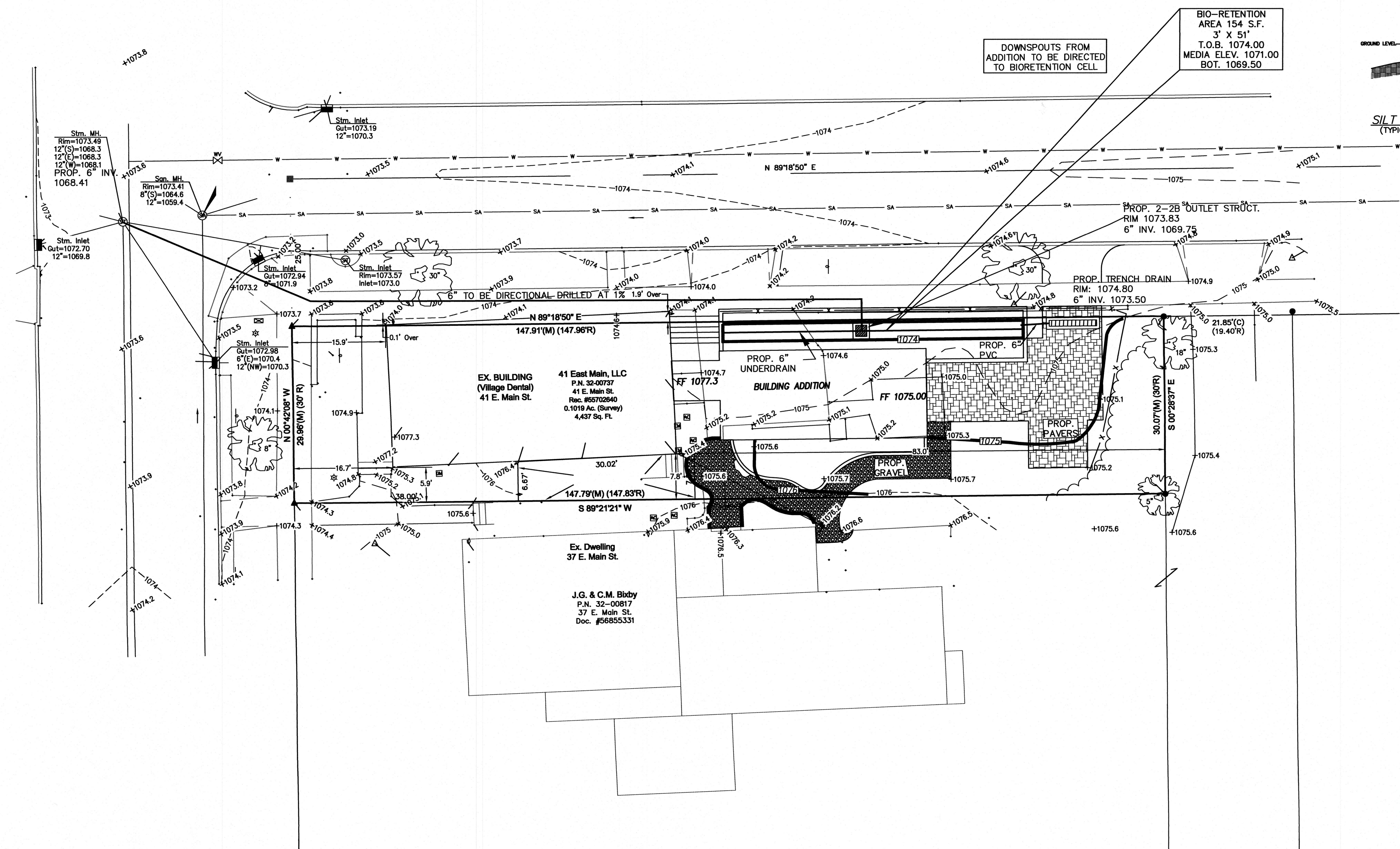


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Peninsula, Ohio 44264
T 330.657.2800



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TEMPORARY SEEDING & MULCHING (SEED MIX NO. 1):
TEMPORARY SEEDING SHALL BE APPLIED WITHIN SEVEN (7) DAYS ON ALL BARE AREAS THAT WILL NOT BE DISTURBED FOR 14 DAYS.
-PERENNIAL RYE GRASS 2 LBS./1000 S.F.
-COMMERCIAL FERTILIZER SHALL BE (12-12-12) AND CONFORM TO ORLD 10 LBS./1000 S.F.
-MULCH & STRAW 2 TONS/ACRE

ALL TEMPORARY SEEDING ITEMS & PROCEDURES SHALL CONFORM TO ORLD UNLESS OTHERWISE DIRECTED BY CITY ENGINEER.

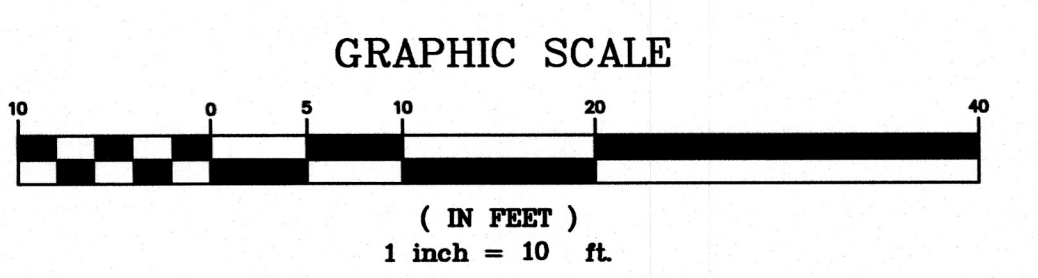
TEMPORARY STABILIZATION	
AREA REQUIRING TEMPORARY STABILIZATION	TIME FRAME TO APPLY EROSION CONTROLS
ANY DISTURBED AREA WITHIN 50 FEET OF A WATERCOURSE AND NOT AT FINAL GRADE.	WITHIN 2 DAYS OF THE MOST RECENT DISTURBANCE, IF THAT AREA WILL REMAIN IDLE FOR MORE THAN 14 DAYS.
FOR ALL CONSTRUCTION ACTIVITIES, ANY DISTURBED AREA, INCLUDING SOIL STOCKPILES, THAT WILL BE DORMANT FOR MORE THAN 14 DAYS BUT LESS THAN ONE YEAR, AND NOT WITHIN 50 FEET OF A WATERCOURSE.	WITHIN 7 DAYS OF THE MOST RECENT DISTURBANCE WITHIN THAT AREA.
DISTURBED AREAS THAT WILL BE IDLE OVER THE WINTER.	PRIOR TO NOVEMBER 1.
NOTE: WHERE VEGETATIVE STABILIZATION TECHNIQUES MAY CAUSE STRUCTURAL INSTABILITY OR OTHERWISE UNOBTAINABLE, ALTERNATIVE STABILIZATION TECHNIQUES MUST BE EMPLOYED. THESE TECHNIQUES MAY INCLUDE MULCHING, EROSION MATTING, OR PLACEMENT OF STONE.	

PERMANENT SEEDING AND MULCHING (SEED MIX NO. 2):
SEEDING CONTROL SHALL BE ACCOMPLISHED BY SEEDING AND MULCHING IMMEDIATELY UPON COMPLETION OF EXCAVATION OR FILL AND FINISHED GRADING IN ACCORDANCE WITH ORLD OR AS DIRECTED BY THE CITY ENGINEER. THE FOLLOWING MIXTURES SHALL BE USED FOR SEEDING IN ACCORDANCE WITH ORLD:

KENTUCKY BLUEGRASS-40%
CREEPING RED FESCUE-40% 3LBS./1000 S.F.
PERENNIAL RYEGRASS-20%
FERTILIZER 12 LBS./1000 S.F. (12-12-12)
MULCH/STRAW 2 TONS/ACRE

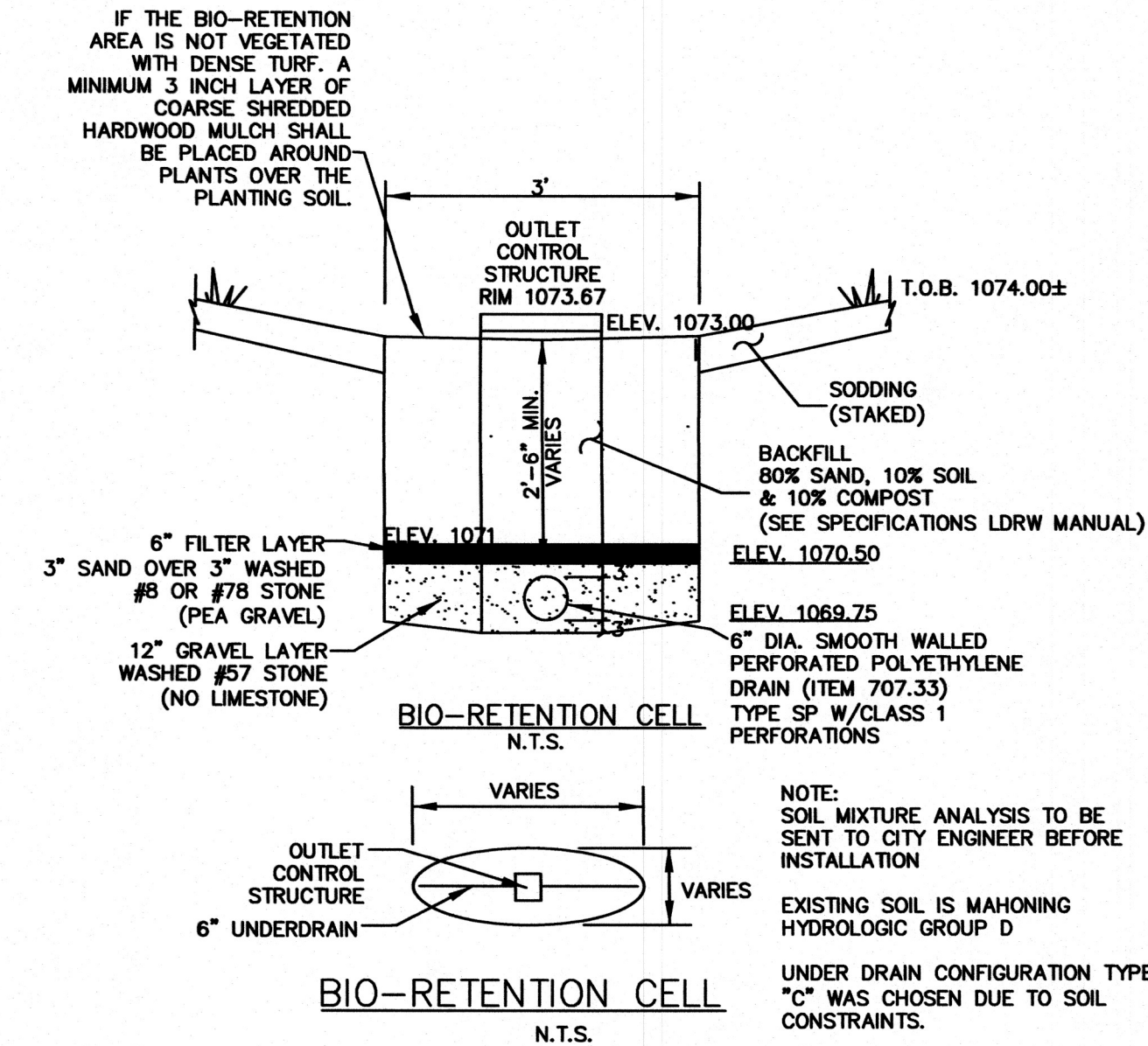
RESTORATION OF ALL DISTURBED AREAS SHALL IMMEDIATELY FOLLOW EXCAVATION AND GRADING OPERATIONS. DELAY IN RESTORATION SHALL NECESSITATE TEMPORARY EROSION CONTROL MEASURES APPROVED BY THE ENGINEER AND AT THE CONTRACTOR'S COST.

PERMANENT STABILIZATION	
AREA REQUIRING PERMANENT STABILIZATION	TIME FRAME TO APPLY EROSION CONTROLS
ANY AREA THAT WILL BE DORMANT FOR ONE YEAR OR MORE.	WITHIN 7 DAYS OF THE MOST RECENT DISTURBANCE WITHIN THAT AREA.
ANY AREA WITHIN 50 FEET OF A WATERCOURSE AND AT FINAL GRADE.	WITHIN 2 DAYS OF REACHING FINAL GRADE.
ANY AREA AT FINAL GRADE.	WITHIN 7 DAYS OF REACHING FINAL GRADE WITHIN THAT AREA.



RECOMMENDED PLANTING LIST

- 1.) VIBURNUM TRILOBUM
- 2.) ARONIA MELANOCROPA
- 3.) HOSTAS
- 4.) SPIRAEA VANHOUTTEI (RENAISSANCE)
- 5.) MATTEUCCIA STRUTHIOPTERIS (OSTRICH FERN)
- 6.) BLACK EYED SUSAN
- 7.) GAILARDIA (BLANKET FLOWER)
- 8.) KARL FOERSTER FEATHER REED GRASS



BIO-RETENTION CELL CALCULATION
TOTAL AREA = 0.10 AC.
AREA FILTER= 0.05(IMPERVIOUS AREA) = BIO-RET. S.F.
0.05(3,001)= 150 S.F. USE 154 S.F.
154 S.F. X 0.83' DEPTH = 128 ft.

NOTES:
SEE ARCHITECTURAL PLANS FOR BUILDING DIMENSIONS.
TOPOGRAPHIC & EXISTING CONDITIONS SURVEY PROVIDED BY CLIENT.
THERE SHALL BE NO STAGING OF EQUIPMENT, MATERIALS, OR EMPLOYEE VEHICLES IN THE RIGHT OF WAY.
CONTRACTOR TO VERIFY ALL UNDERGROUND UTILITIES WITHIN THE PROJECT AREA.
THIS PLAN MEETS THE REQUIREMENTS OF THE OHIO EPA GENERAL PERMIT AUTHORIZATION FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY 0H000006.

Revisions:
1 9/15/25
2
3
4
5
6
7

VILLAGE DENTAL
P.P.N.32-00737
41 EAST MAIN ST.
HUDSON - SUMMIT COUNTY - OHIO

GUTOSKEY & ASSOCIATES INC.
Civil Engineers, Surveyors and Land Planners
10195 CORTESCHAK PKWY, SUITE 4 Tel (440) 543-8990
CHAGIN FALLS, OHIO 44023 JOEGUTOSKEY@GUTOSKEY.COM

SWM PLAN

JOSEPH GUTOSKEY
51851
PROFESSIONAL ENGINEER

Date: 8/8/25
Scale: Hor. 1" = 10'
Vert.
Filename:
Checked By:
F.B. No.:
Sheet
C-1.1
CONTRACT No.
25-4246



TR 55 Worksheet 2: Runoff Curve Number and Runoff

Project: Village Dental Designed By: JG Date: 9/15/21
Location: Hudson Checked: _____ Date: _____

Check one: ☒ Present ☐ Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (Appendix A)	Cover description (Cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN ^{1/2}			Area acres mi ² %	Product of CN x area
		Table 2-2	Fig. 2-3	Fig. 2-4		
Mahoning D	Pervious	80			0.1	4.0
Mahoning D	Impervious	98			0.1	4.9
Totals =					0.1	8.9

^{1/2} Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{8.9}{0.1}$ = 89 Use CN = 89

2. Runoff

Frequency years
Rainfall, P (24 hour) in.
Runoff, Q in.
(Use P and CN with Table 2-1, Figure 2-1, or equations 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3

TR 55 Worksheet 2: Runoff Curve Number and Runoff

Project: Village Dental Designed By: JG Date: 9/15/21
Location: Hudson Checked: _____ Date: _____

Check one: ☐ Present ☒ Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (Appendix A)	Cover description (Cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN ^{1/2}			Area acres mi ² %	Product of CN x area
		Table 2-2	Fig. 2-3	Fig. 2-4		
Mahoning D	Pervious	80			0.0	2.4
Mahoning D	Impervious	98			0.1	6.9
Totals =					0.1	9.3

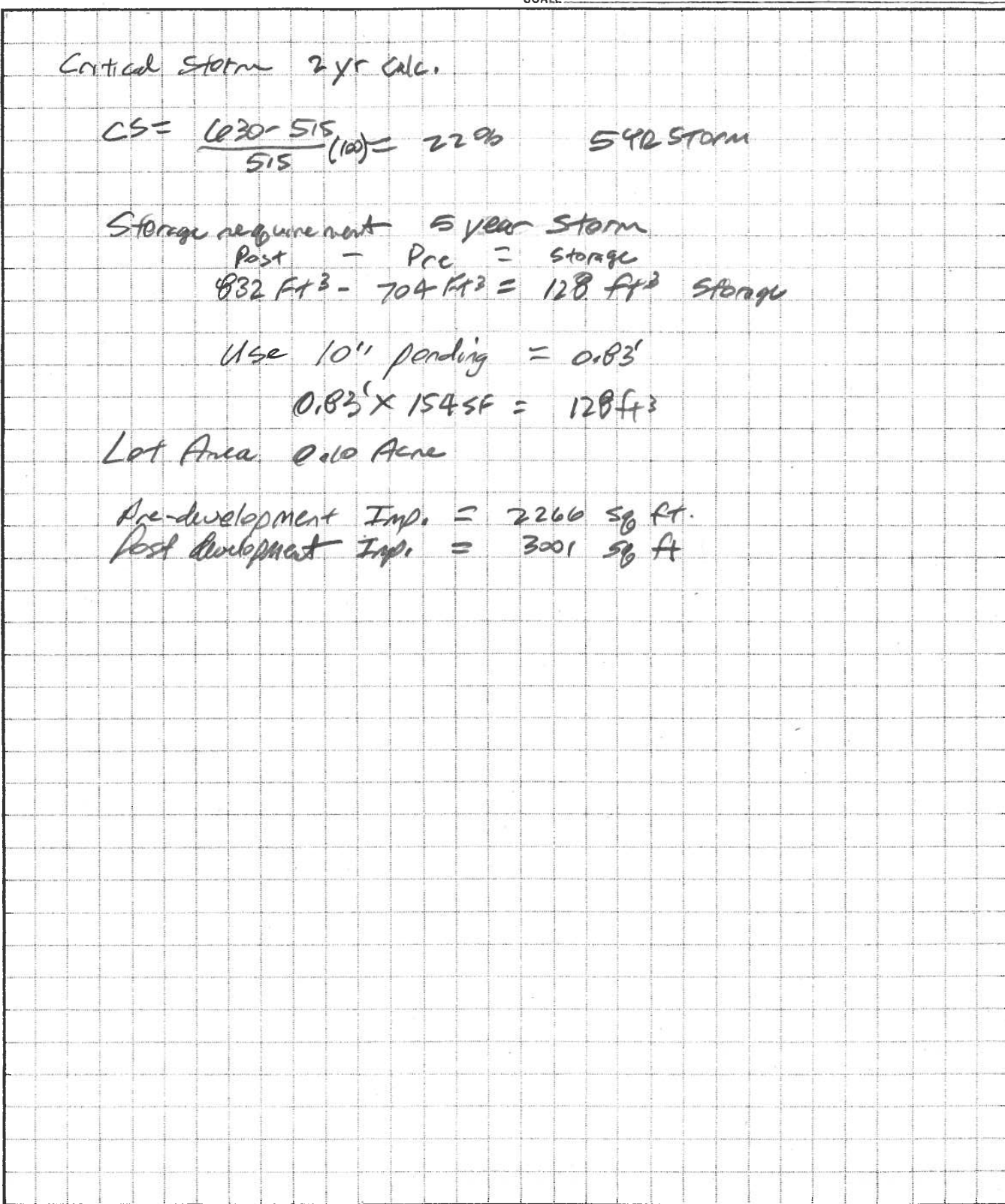
^{1/2} Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{9.3}{0.1}$ = 93 Use CN = 93

2. Runoff

Frequency years
Rainfall, P (24 hour) in.
Runoff, Q in.
(Use P and CN with Table 2-1, Figure 2-1, or equations 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3



PRINTED ON: 9/15/2025 10:00 AM

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hydro(s)	Maximum elevation (ft)	Total storage used (cuft)	Hydrograph Description
1	SCS Runoff	0.134	2	722	376	---	---	---	Pre
2	SCS Runoff	0.169	2	722	478	---	---	---	Post
New.gpw					Return Period: 1 Year		Monday, 09 / 15 / 2025		

Hydrograph Report

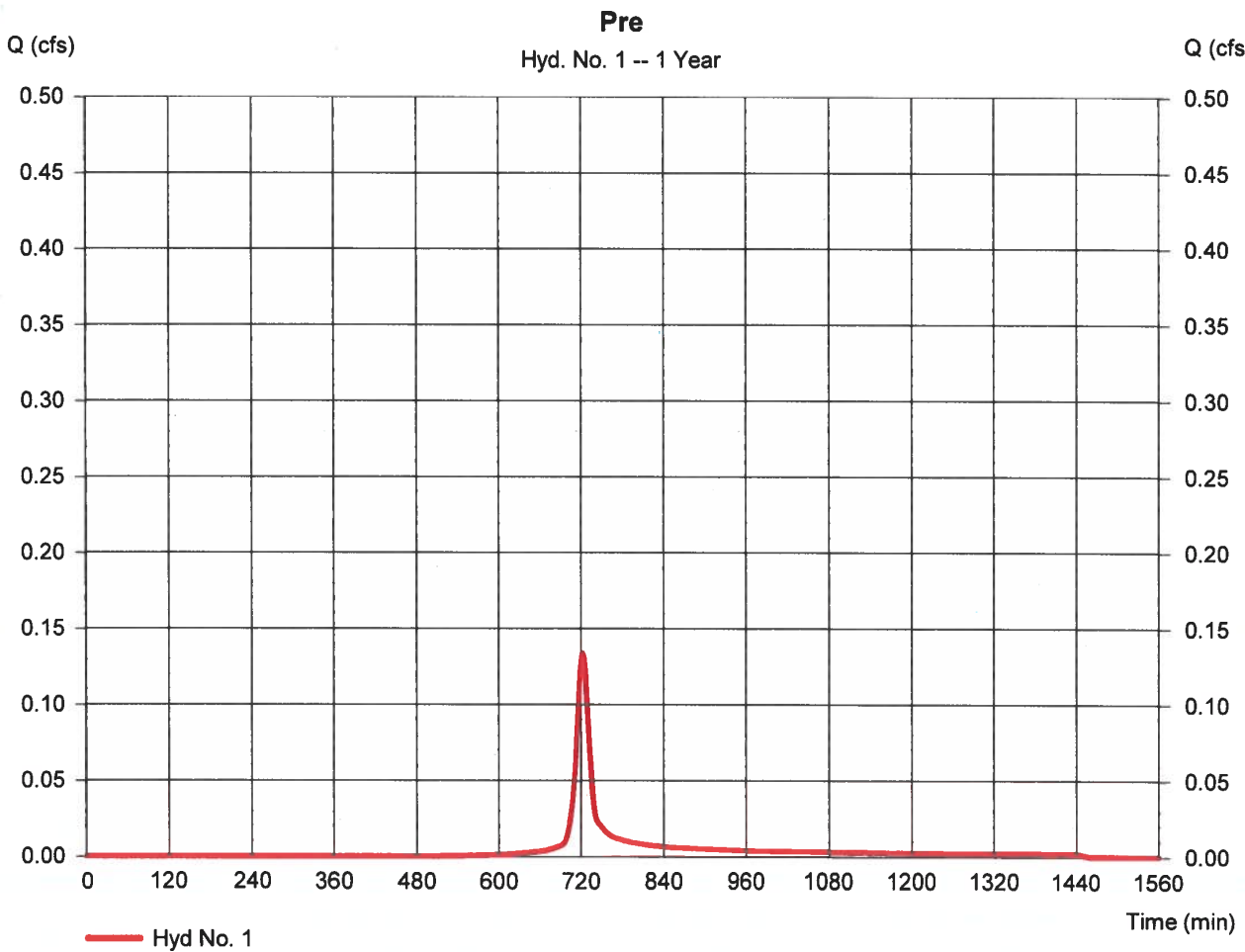
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 09 / 15 / 2025

Hyd. No. 1

Pre

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Time interval = 2 min
Drainage area = 0.100 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 2.04 in
Storm duration = 24 hrs

Peak discharge = 0.134 cfs
Time to peak = 722 min
Hyd. volume = 376 cuft
Curve number = 89
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hydro(s)	Maximum elevation (ft)	Total storage used (cuft)	Hydrograph Description
1	SCS Runoff	0.183	2	722	515	---	---	---	Pre
2	SCS Runoff	0.220	2	722	630	---	---	---	Post
New.gpw					Return Period: 2 Year		Monday, 09 / 15 / 2025		

Hydrograph Report

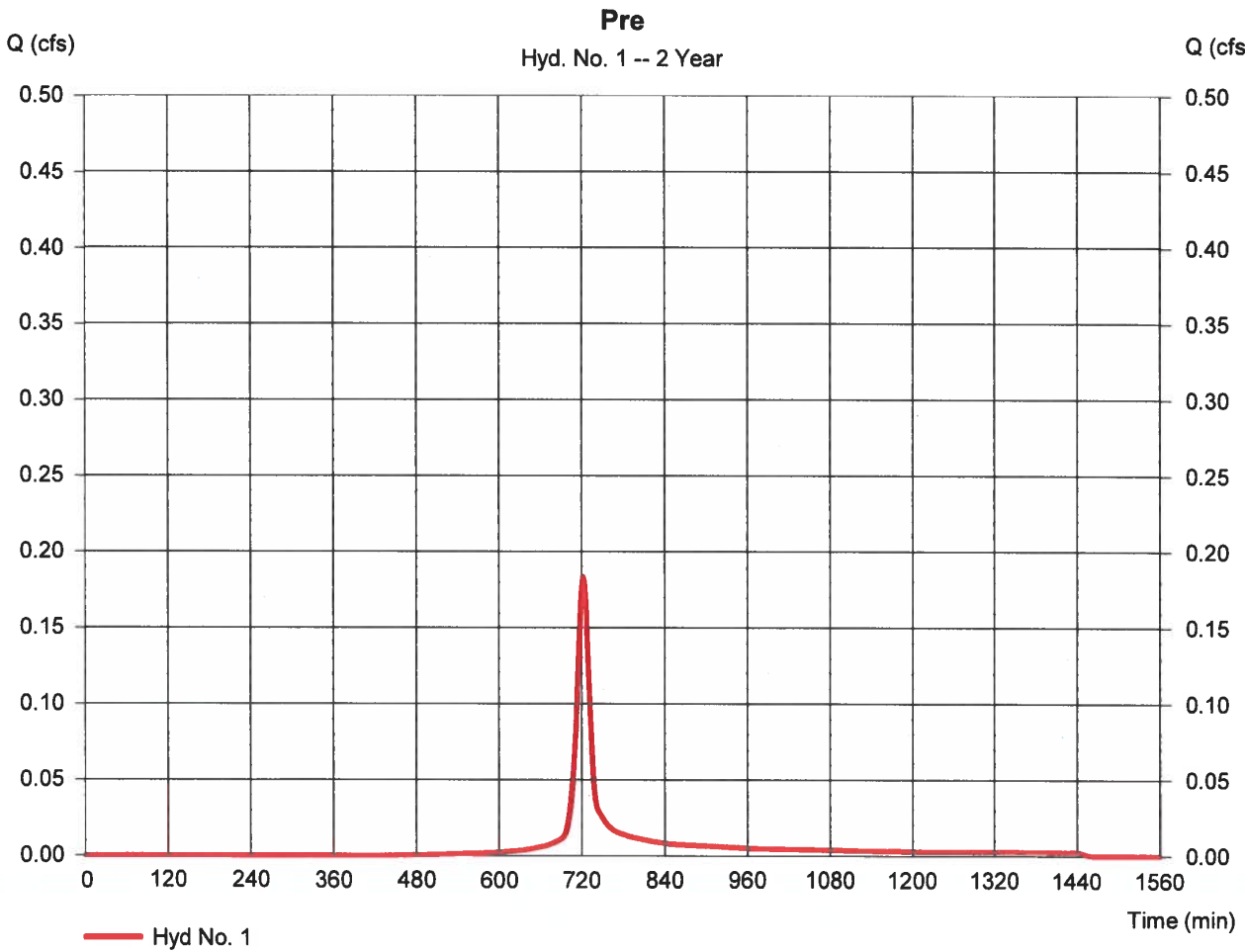
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 09 / 15 / 2025

Hyd. No. 1

Pre

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 2 min
Drainage area = 0.100 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 2.50 in
Storm duration = 24 hrs

Peak discharge = 0.183 cfs
Time to peak = 722 min
Hyd. volume = 515 cuft
Curve number = 89
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Return Period Recap

Hydrograph hydrographa extension for AutoDesk® Civil 3D® by Autodesk, Inc. 1/2025											
Hyd. No.	Hydrograph type (origin)	Inflow hydro(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	-----	0.134	0.183	-----	0.250	0.305	0.393	0.473	0.550	Pre
2	SCS Runoff	-----	0.169	0.220	-----	0.287	0.342	0.430	0.509	0.594	Post

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hydro(s)	Maximum elevation (ft)	Total storage used (cuft)	Hydrograph Description
1	SCS Runoff	0.250	2	722	704	---	---	---	Pre
2	SCS Runoff	0.287	2	722	832	---	---	---	Post
New.gpw					Return Period: 5 Year		Monday, 09 / 15 / 2025		

Hydrograph Report

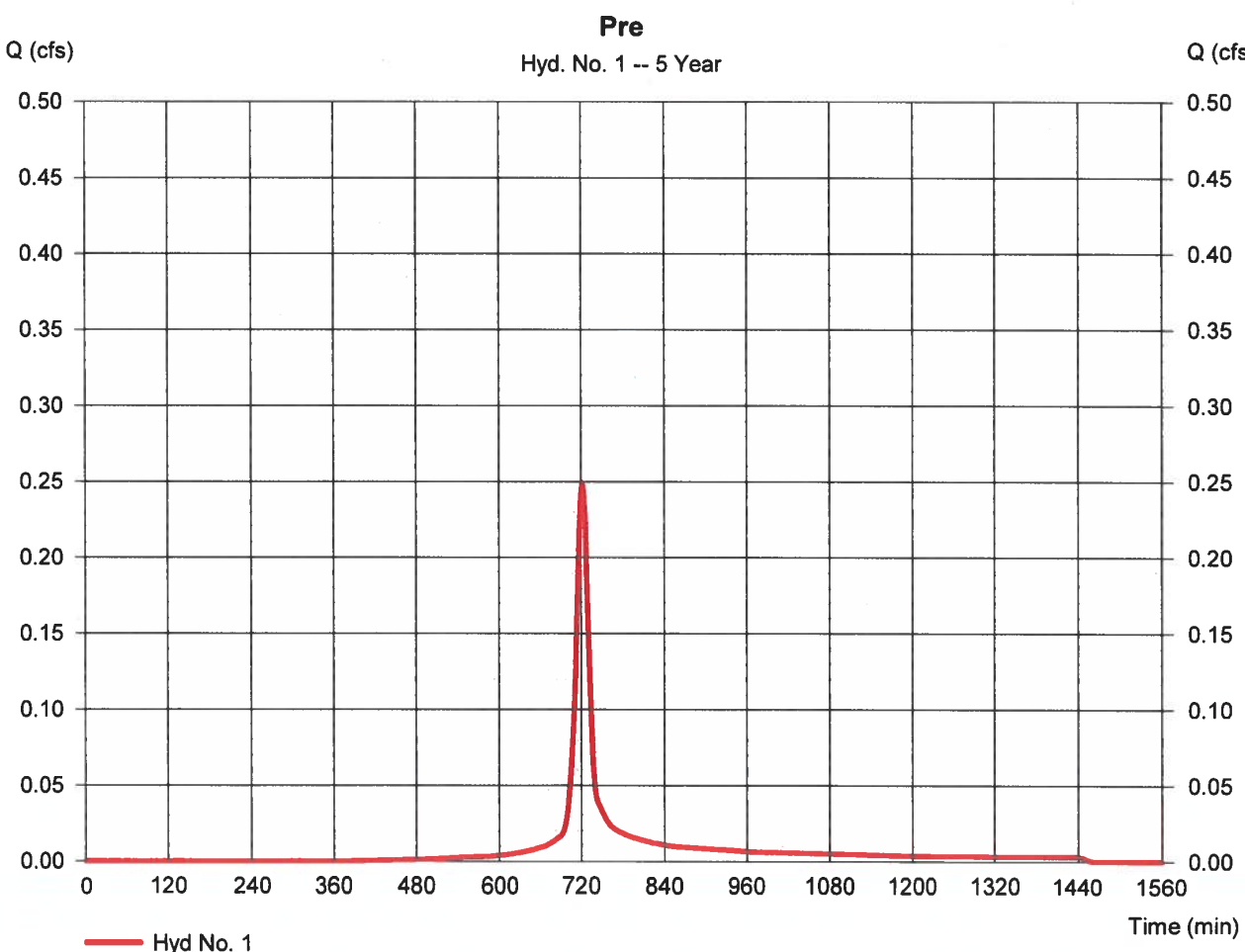
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 09 / 15 / 2025

Hyd. No. 1

Pre

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 2 min
Drainage area = 0.100 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.10 in
Storm duration = 24 hrs

Peak discharge = 0.250 cfs
Time to peak = 722 min
Hyd. volume = 704 cuft
Curve number = 89
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hydro(s)	Maximum elevation (ft)	Total storage used (cuft)	Hydrograph Description
1	SCS Runoff	0.305	2	722	867	---	---	---	Pre
2	SCS Runoff	0.342	2	722	1,002	---	---	---	Post
New.gpw					Return Period: 10 Year		Monday, 09 / 15 / 2025		

Hydrograph Report

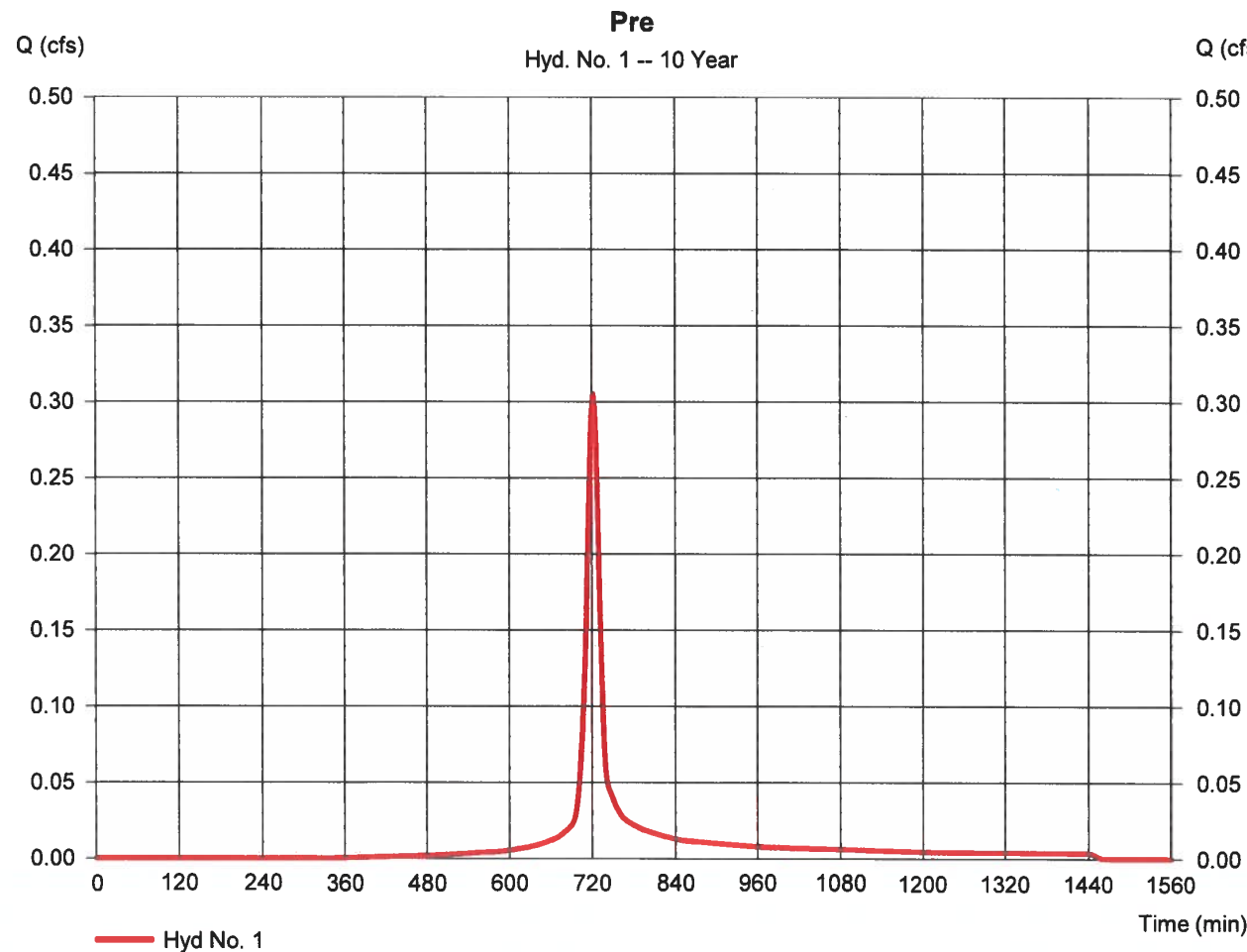
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 09 / 15 / 2025

Hyd. No. 1

Pre

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 0.100 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.60 in
Storm duration = 24 hrs

Peak discharge = 0.305 cfs
Time to peak = 722 min
Hyd. volume = 867 cuft
Curve number = 89
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hydro(s)	Maximum elevation (ft)	Total storage used (cuft)	Hydrograph Description
1	SCS Runoff	0.393	2	722	1,129	---	---	---	Pre
2	SCS Runoff	0.430	2	722	1,274	---	---	---	Post
New.gpw					Return Period: 25 Year		Monday, 09 / 15 / 2025		

Hydrograph Report

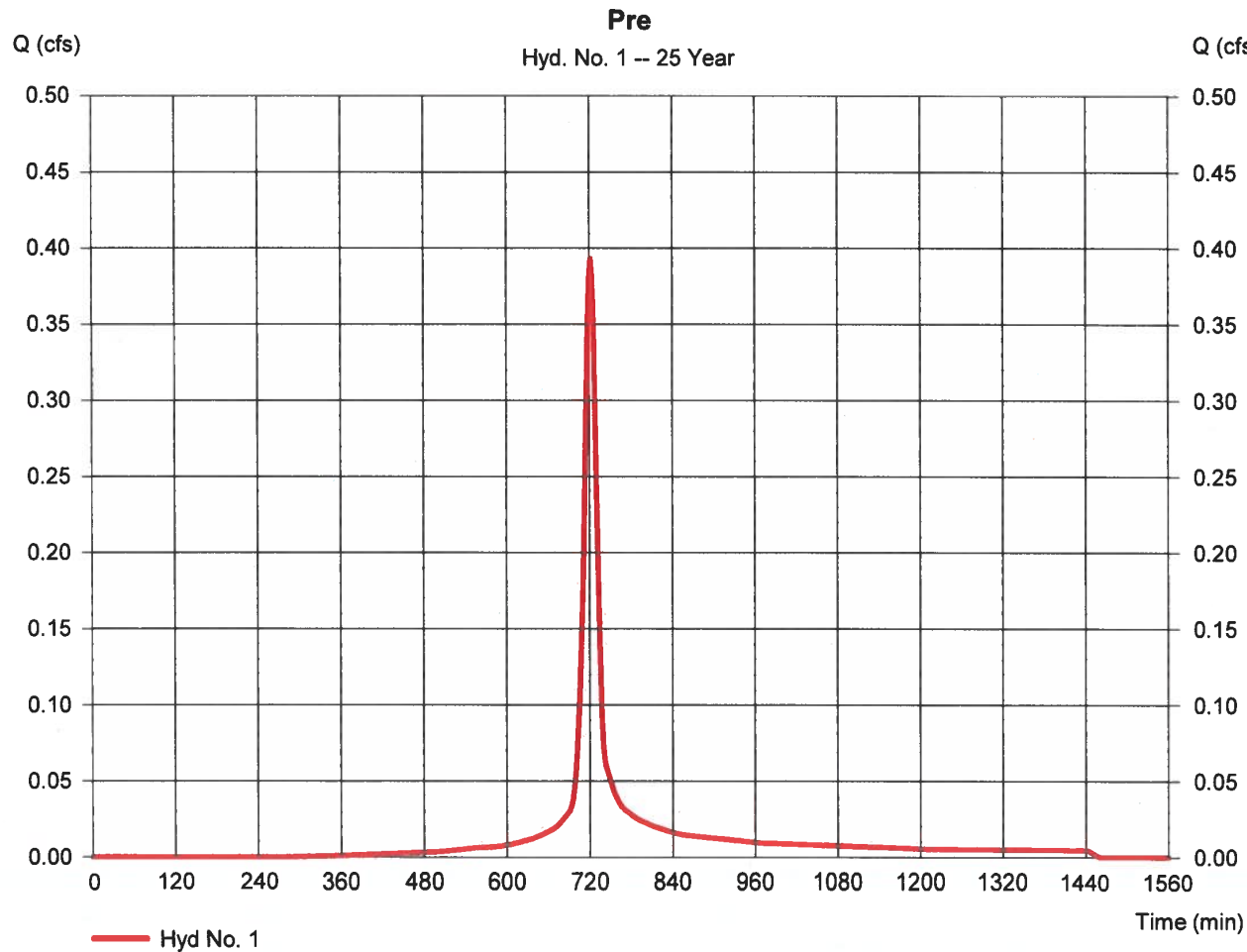
Hydroflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 09 / 15 / 2025

Hyd. No. 1

Pre

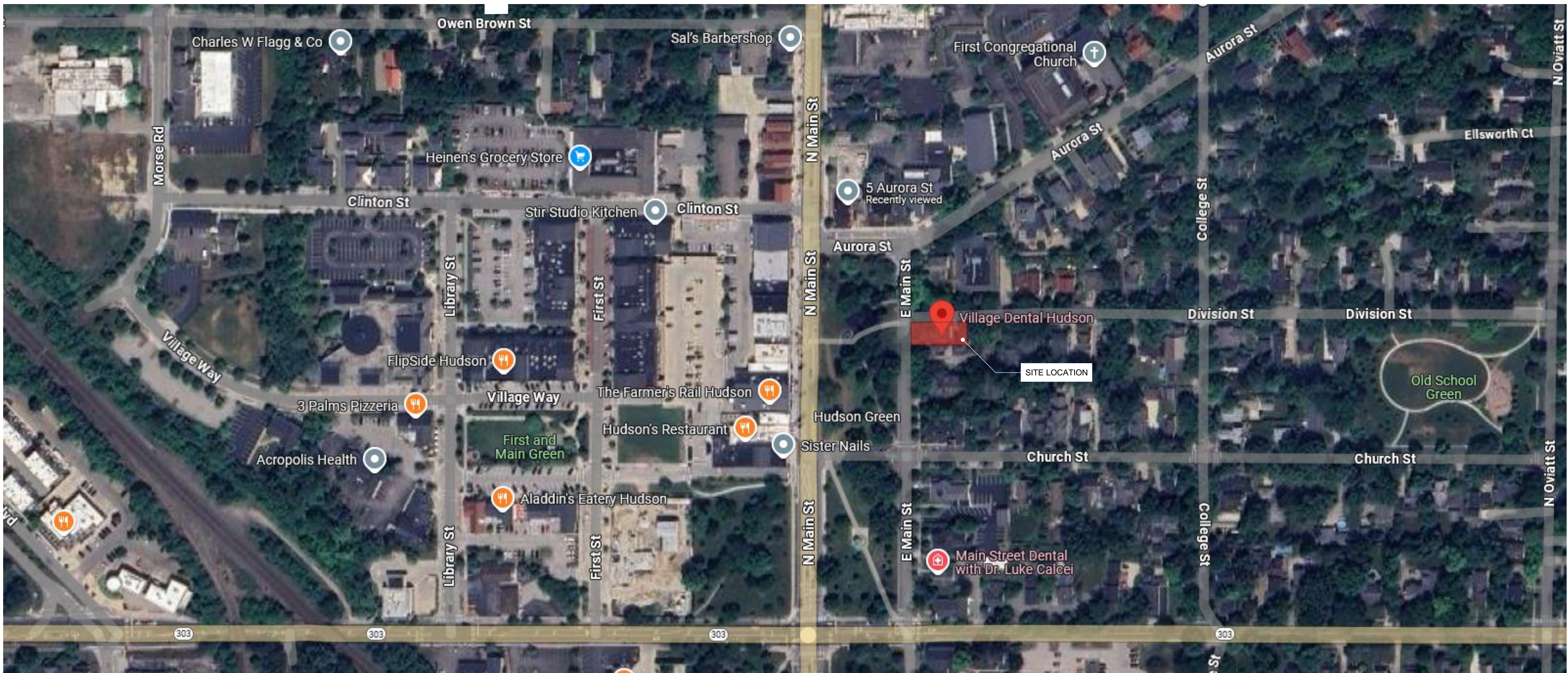
Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 2 min
Drainage area = 0.100 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 4.39 in
Storm duration = 24 hrs

Peak discharge = 0.393 cfs
Time to peak = 722 min
Hyd. volume = 1,129 cuft
Curve number = 89
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484

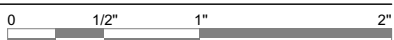


Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hydro(s)	Maximum elevation (ft)	Total storage used (cuft)	Hydrograph Description
1	SCS Runoff	0.473	2	722	1,372	---	---	---	Pre
2	SCS Runoff	0.509	2	722	1,524	---	---	---	Post
New.gpw					Return Period: 50 Year		Monday, 09 / 15 / 2025		



1 VICINITY MAP
NOT TO SCALE



Peninsula

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1775 Main Street
Peninsula, Ohio 44264
T 330.657.2800

PROGRESS
NOT FOR
CONSTRUCTION
9/16/2025

PROJECT TEAM:

PENINSULA
ARCHITECTS

CIVIL ENGINEER:
GUTOSKEY AND ASSOCIATES
P 406.543.6900

STRUCTURAL ENGINEER:
ORATEC DESIGN BUILD
P 330.552.8211

MEP ENGINEER:
DEWK ASSOCIATES
P 216.531.8860

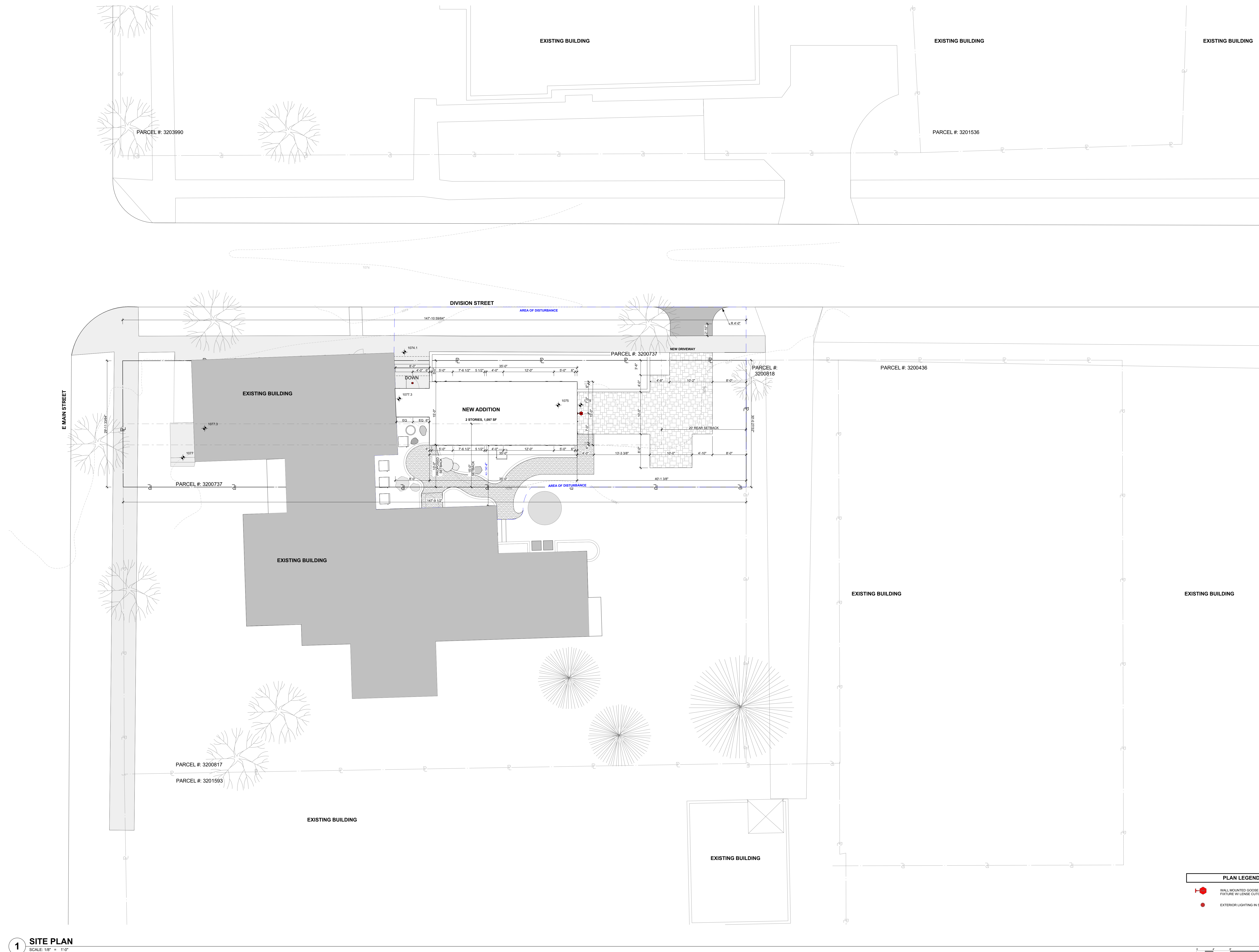
VILLAGE DENTAL
41 E. MAIN STREET, HUDSON, OH 44236




PROJECT #: 2501
ISSUE:
AHR REVIEW 04-01-2025
VARIANCE SET 04-17-2025
PLANNING COMMISSION 09-16-2025

SITE PHOTOS

AS1.00

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PLAN LEGEND	
	WALL MOUNTED GOOSE NECK EXTERIOR LIGHT FIXTURE W/ LENSE CUTOFF
	EXTERIOR LIGHTING IN SOFFIT
	AIR CONDITIONING CONDENSER UNIT

3 DEMOLITION AND PROTECTION LANDSCAPE PLAN

1 LANDSCAPE PLAN

SECTION 31 22 19 - FINISH GRADING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section applies to the final subgrade preparation, placement of Soil Mixes and amending of in-place (in-Situ) soil or on-site stockpiled soils. Sections 32 91 00 – 32 91 50 (Topsoil – Planting Mixes) for testing, soil mix components and preparation, amendments, and hauling apply.

1.02 SUMMARY

- A. This Section includes the following:
- Preparation of subgrade soils in planting areas for each specified soil mix and type.
 - Includes ripping of subgrade and in situ soils, and debris removal.
 - Placement of Soil Mix(es) and Amendments.
 - Fine Grading of Turfgrass and Planting Area Soil Surfaces.

1.03 REFERENCES

- A. ASTM – ASTM International: D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- B. EPA – Environmental Protection Agency:
- Method 8015.
 - Method 8020.
- C. SSSA – Soil Science Society of America, Inc.
- Methods of Soil Analysis Part 1 – Physical and Mineralogical Methods, 1986.
 - Methods of Soil Analysis Part 3 – Chemical Methods, 1996.
- D. USDA – United States Department of Agriculture:
- Texture Triangle Classification.
 - Handbook No. 60.

1.04 DEFINITIONS

- A. Acceptance, Acceptable, or Accepted: Acceptance by the Architect in writing.
- B. Aesthetic Acceptance of Grades: Acceptance by the Architect in writing of the aesthetic correctness of the contours. Aesthetic acceptance does not address whether areas drain properly, are at the correct elevations, or whether the soil has been compacted properly.
- C. Backfill: Soil material or controlled low-strength material used to fill an excavation.
- D. Debris or Deleterious Materials: Elements including, but not limited to, concrete, concrete masonry, wood, excavated rock and rock fragments, rubble, overburden soils, abandoned utility structures, trash, refuse, and litter.
- E. Excessive Compaction: Planting area or soil compaction greater than 75 percent maximum dry density as determined by ASTM D 1557.
- F. Finished Grades: The required final soil surface elevations and contours indicated on the Drawings.
- G. Planting Soil Mix: A specified profile of soil system components, such as, soil, sand and compost homogeneously blended to produce a specified planting soil mix.

2501 – Village Dental FINISH GRADING
31 22 19 - 1

- E. Verify placement locations and depths for each specified soil mix and type.
- F. Place the specified planting soil or mix in 6-inch lifts over the Transition Layer to the depths specified on the drawings.
- G. Carefully settle soils to eliminate air pockets and to minimize future settling. Lightly scarify previously placed lift surfaces prior to placing subsequent lifts.
- H. Compact each lift by applying enough water to achieve optimum moisture allowing consolidation and locking of soil particles.
- A vibratory plate compactor, or other suitable method, shall be used to achieve greater than 80 to 85 percent maximum dry density as determined by the Standard Proctor Test ASTM D698-12. Moisture content and compaction shall be verified using ASTM D6936-15.
 - After any additional settlement has occurred, restore areas to finished grade prior to additional work within the area commencing.
- I. For Lawn Areas, roll the whole surface of lawn bed with a hand roller weighing approximately one hundred pounds (100 lb.) per foot (12") of roller width. Fill all depressions caused by compaction operations with additional soil and re-grade. Lightly roll and rake until the surface presents a smooth, even, uniform in finish and to grade.
- J. Backfill for Trees: Unless noted otherwise or approved in writing by Architect, the excavated tree pit soil is not acceptable backfill material for trees. Remove excavated soil from site and use specified soil mix in this section. Install as specified in Section 32 93 00 "Plants" and per drawing details. Placing, shoring, or anchoring is the responsibility of the Contractor as shown on the drawings.
- K. Protect areas where soil has been placed and prepared against construction activity with site protection fence. See Section 32 92 00 Turf Grass and Sod for additional protection.

3.05 FINISH GRADING

- A. Perform, profile, and contours indicated. Provide subgrade surfaces parallel to finished surface grades. Provide uniform levels and slopes between new elevations and existing grades.
- B. General:
- Uniformly grade areas to a smooth uniform surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - Provide a smooth transition between adjacent existing grades and new grades.
 - Out out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
 - Slope finish grades to drain surface water away from buildings, walks, paving, and other structures unless indicated otherwise.
 - Slope finish grades to drain surface water to drainage swales, catch basins, area drains, or trench drains as shown on the Drawings.
 - Grade soil surface smooth to be free of high and low areas which will inhibit surface drainage.
 - Grade the soil surface at the edges of lawn areas, along paving areas, and curbs to an elevation 1 inch below the finished surface of adjacent paving and curbs, unless indicated otherwise.
 - Hand-rake soil surface using screed boards, string lines, and laser levels to achieve smooth surfaces acceptable to the Architect.

2501 – Village Dental FINISH GRADING
31 22 19 - 6

2.05 SAND JOINT FILLERS

- A. Stabilized Sand for Joints: Gator Supersand Bond by Alliance Designer Products Inc., 225 Boulevard Bellerose West, Laval Quebec H7L 6A1.
- Color: To be selected from manufacturer's full range.
- B. Herbicide: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form.

PART 3 - EXECUTION

3.01 GENERAL EXCAVATION AND EMBANKMENT

- A. Excavate to the line and grade specified in the contract documents. Minimize over-excavation.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
- Under structures, building slabs, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 98 percent.
 - Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 98 percent.
- D. Subbase: Install aggregate subbase to a compacted depth of 8 to 12-inches minimum. Install the subbase in minimum 3 to 4-inch lifts, and compact to a minimum 95% Standard Proctor Density (ASTM D698).

3.02 STONE RETAINING AND FREE-STANDING WALLS

- A. Stone walls shall be placed at locations as shown on the drawings and installed with the following requirements:
- Stone "retaining" stacked walls shall be constructed to the dimensions shown on the drawings and shall be constructed with a vertical batter on the front and back face as shown on the drawings.
 - Stone "Freestanding" walls to be vertical with no batter unless noted on drawings.
 - All walls to be dry laid.
 - The stone of the wall shall be laid to form substantial masonry presenting a neat, finished appearance.
 - Face Stones:
 - Face stones shall be laid to break joints.
 - Minimum overlap: 12-inches unless noted on drawings.
 - Freestanding wall to overlap 50/50 with joints in middle to adjacent stone course.
 - Rock shall be hand finished as needed to keep regular face profiles and batter.
 - All face stones shall be ploughed with a string line on straight walls or laid to batter status. Where batter is required, batter to be consistent with respect to all parts of the wall and shall meet the minimum requirements set forth in the detail.
 - The degree of roughness on the exposed face shall be measured with a six-foot (6') straightedge supported between adjacent projections and stone face.

2501 – Village Dental LANDSCAPE STONework
31 37 19 - 3

- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appliances, or other man-made stationary features constructed above or below the ground surface.
- I. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or soil materials.
- J. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically soil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- K. Transition Layer: The specified planting soil mix for a planting area is homogeneously blended into the existing (ripped) native soil substrate to create a "transition" layer between the subgrade and specified planting soil mix. Transition layers vary pending specified soil mix for each planting area.
- L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.05 SUBMITTALS

- A. Equipment Data: Submit descriptive information with ground pressure load data for each proposed item of equipment to be used. Equipment data will be evaluated for compost mix compaction potential. All equipment used in placing the compost shall have a ground pressure level of 4.5 psi or lower.
- Large earth moving equipment (D4, D6 dozers) must have rubberized base tracks with low ground pressure.
 - Equipment with metal cleats will not be permitted.

1.06 QUALITY ASSURANCE

- A. Qualifications:
- Installation and mixing foreman on the job shall be competent English-speaking supervisor(s), experienced in planting soil preparation for lawn and planting installations. Supervisor shall remain on the site during the entire installation process.
 - Perform work with personnel totally familiar with planting and lawn soil preparation and planting installations under the supervision of a foreman experienced with landscape work.
 - Testing Laboratory: Experienced person(s) employed by public or private testing laboratory, qualified and capable of performing tests, making soil recommendations, and issuing reports as specified. The Testing Laboratory shall submit a Statement of Qualifications regarding the specified testing. The Testing Laboratory shall be as approved by the Architect.
 - It shall be the responsibility of the Contractor to see that the specifications are being adhered to. Failure of the Architect to immediately reject unsatisfactory workmanship or to notify the Contractor of higher deviation from the specifications shall not relieve the Contractor of his/her responsibility to repair and/or replace unsatisfactory work.
- B. Pre-Installation Conferences: Person(s) responsible for soil preparation and mixes of this Section shall attend Pre-Installation Conference(s) to coordinate with other sections.
- C. Testing and Inspection Service: A qualified independent geotechnical testing and inspection laboratory shall perform soil testing and inspection services under the supervision of a registered professional engineer during earthwork and finish grading operations.
- D. Finished Grading Smoothness Mock-Up:
- Prepare a 20-foot by 20-foot area of finished graded soil representing the finished graded surface of the planting areas.
 - Locate mockup on site in an area easily referenced during fine grading operations.

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- C. Equipment: Use equipment and hand tools of appropriate size and type to achieve the profiles, and a smooth soil surface free of high areas, depressions, equipment tracks, and excessive compaction.
- D. Depressions and Loose Material: Fill any depressions and remove loose material to finish surface true to line and grade, presenting a smooth and undisturbed surface.
- E. Excessive Compaction:
- Take precautions to prevent finished graded surfaces from becoming excessively compacted.
 - Protect finished graded surfaces from excessive compaction from vehicular, equipment, and foot traffic by laying down planks, plywood, or other accepted protective devices.
 - Do not store or stockpile materials on finished soil graded surfaces.
 - Mechanically loosen excessively compacted soil areas to full depth.

3.06 TOLERANCES

- A. Planting Areas:
- Grade soil surface to within 0.05-foot of grades indicated on the Drawings, except bring soil surface grades along paving, curbs, and other structures to within 0.01-foot of grades indicated on the Drawings.
 - Transition soil surface grades along paving, curbs, and other structures to areas of less strict tolerance over a 5-foot distance.
- B. Allowances: Make proper allowances for settlement.

3.07 ADJUSTING

- A. Soil Finished Grade:
- Provide allowance for 32 hours of adjustment grading work with a 4-person hand-grading crew to smooth and shape the soil surfaces using hand rakes, shovels, and other hand tools.
 - After the soil surface elevations have been graded to be within the specified tolerances, perform adjustment grading Work under the direction of the Architect in the field.
 - Do not rely on adjustment grading to bring finished grade elevations to within specified tolerances.

3.08 FIELD QUALITY CONTROL

- A. Aesthetic Acceptance of Grades:
- Upon completion of finish grading Work, schedule a review by the Architect to obtain aesthetic acceptance.
 - Provide 3 days advance written notification.
 - Do not commence seeding, sodding, or other planting Work until receiving aesthetic acceptance in writing.
- B. Test for Excessive Compaction:
- Where excessive compaction is suspected by Architect, have a Geotechnical Engineer perform nuclear density field tests.
 - Correct excessively compacted soil areas to the depth of the excessive compaction by means and methods acceptable to the Architect prior to installing plant material.

3.09 PROTECTION

- e. Variations more than 1/2 inch in 10 feet measured from the straight edge to the extreme depression in the stone, will not be permitted.
- f. Rear faces shall present approximately plane surfaces and shall in general conform to the detail.
- g. Clean and wash face and top of walls such that the visual surfaces of the rocks are free of soil and staining to provide a clean natural appearance. If washing does not clean off unwanted residue, then Contractor shall wash off residue with muriatic acid and water, using a brush to scrub off the residue.
6. Backfill retaining wall as detailed. Fill each course as wall is assembled to maintain structural stability and batter.

END OF SECTION 31 37 19

- Protect accepted mockup from physical damage and erosion until date of Final Completion.
 - The accepted mockup shall be the standard by which finish grading will be judged.
- E. The Architect reserves the right to inspect and test grading operations at any time and as deemed necessary for verification of conformance to specification requirements. Any subsurface or grading conditions not meeting the requirements of the Specifications to be corrected by the Contractor before continuing with any further operation of the project and at no cost to the project.

1.07 PROJECT CONDITIONS

- A. Examination: Promptly notify Construction Manager and Architect of unexpected subsurface conditions. Discontinue work until notification to resume work is provided by the Construction Manager.
- B. Environmental Requirements:
- Do not work soil when moisture content is so great that excessive compaction will occur, nor when it is so dry that dust will form in the air or that clouds will not break readily.
 - Apply water, if necessary, to bring soil to optimum moisture content for fine grading operations.
 - Do not perform fine grading work when subgrade and/or soils are muddy or frozen.
- C. Existing Conditions:
- Locate existing underground utilities in areas of work. If utilities are indicated to remain in place, provide adequate means of support and protection during fine grading operations.
 - If uncharted, or incorrectly charted, piping, or other utilities are encountered during the Work, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by Construction Manager and then only after acceptable temporary utility services have been provided.
 - Provide minimum 48-hour notice to Construction Manager and receive written notice to proceed before interrupting any utility.
 - Contact the Local Utilities Protection Service before commencement.

1.08 SEQUENCING

- A. Soil Placement: To prevent excessive soil compaction, avoid placing soil in areas subject to construction vehicle and equipment traffic. Coordinate work of this section with other project work as contained in all other Sections of the project specifications.

PART 2 - PRODUCTS

2.01 SOILS

- A. Refer to Sections 32 91 00 through 32 91 50 for Soil Mixes.

PART 3 - EXECUTION

3.01 FIELD ENGINEERING

- A. General:

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- A. Protecting Fine Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where, completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Scarify or remove and replace soil material to depth as directed by Soils Engineer; reshape and recompact.
- D. Repair erosion that occurs before and during plant or lawn installation.
- E. During construction, maintain temporary soil erosion and sedimentation control measures in place. Inspect, repair, and replace damaged or missing items as work progresses.

3.10 DISPOSAL AND CLEAN UP

- A. Promptly remove soil and debris created by soil work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Legally dispose of off-site all refuse and debris from these operations. Do not dump or burn materials on site.
- C. Maintain the site in an orderly condition during the progress of the Work. Continuously and promptly remove excess waste materials; keep lawn areas, walks, and roads clear. Store materials and equipment where directed. Promptly remove equipment, surplus materials, and debris and trash resulting from operations under this Contract upon completion and prior to initial acceptance of Work. Leave the site in a neat, order condition "broom clean".

END OF SECTION 31 22 19

SECTION 32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes exterior cement concrete pavement for the following:
- Pedestrian Concrete Pavement.
 - Curbs and Gutters.
 - Steps and Ramps
 - Sub-base Slabs-on-Grade for Unit Pavements.
 - Job-Built Concrete Edge Restraints.
 - Curing and/or Sealing.

1.02 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.
- B. Construction Joint: Joint produced when one pour is placed up against an existing one (cold joint)
- C. Contraction Joint: Joint produced that isolates the crack (control joint).
- D. Isolation Joint: Joint containing expansion material and/or caulking material to allow the joint to "flex" based on air temperature (expansion joint). Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- E. W/C Ratio: The ratio by weight of water to cementitious materials.

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at project site.
- Review methods and procedures related to concrete paving, including but not limited to, the following:
 - Concrete mixture design
 - Quality control of concrete materials and concrete paving construction practices.
 - Finishes
 - Require representatives of each entity directly concerned with concrete paving to attend, including the following:
 - Contractor's superintendent.
 - Independent testing agency responsible for concrete design mixtures.
 - Ready-mix concrete manufacturer.
 - Concrete paving Subcontractor.
 - Manufacturer's representative of stamped concrete paving system used for stamped detectable warnings.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.

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- Provide all layout work required. Establish extent of fine grading by area and elevation; designate and identify datum elevation and project engineering reference points. Set required lines, levels, and elevations.
- Provide as many grade stakes and string lines as required to achieve smooth finish grades acceptable to the Architect. Mark each stake to indicate design finished grade indicated.
- Swale Flow Lines, Bottom of Slopes, Top of Slopes and Grade breaks: Install grade stakes at maximum 20 feet on center.
- High Points and Low Points: Install grade stakes at high points and low points including top of berms, catch basins and area drain runs.

3.02 EXAMINATION

- A. Examine areas and conditions under which work is to be performed. Obtain and examine the records and drawings of adjacent work and of existing utilities and their connections for conditions which may affect the work under this Section.
- B. Verify all work requiring access through or adjacent to areas where each planting soil mix is to be placed has been completed and no further access will be required. If access will be required, this must be coordinated with the Contractor.
- C. Confirm subgrade is clear of all construction debris, trash, rubble, and any foreign material. If fuels, oils, concrete washout silt or other material harmful to plants have been spilled into the subgrade material, excavate the soil sufficiently to remove the harmful material. Fill any over excavation with approved fill and compact to the required subgrade compaction.
- D. Confirm subgrade is at the proper elevation, parallel to the finished grade and compacted as shown on the Drawings.
- E. Verify that conditions are suitable to receive Work and that no defects or errors are present which would cause defective installation of products or cause latent defects in workmanship and function.
- F. Excessive Compaction: Verify subgrade in planting area is not excessively compacted.
- G. Soil Preparation: Verify off-site soil preparation is complete and ready for transporting to site.
- H. Notify Architect of any unacceptable sub-grade conditions. Do not start the installation of the soil mix until sub-grade conditions have been corrected.

3.03 PREPARATION

- A. Review soil analysis testing results and requirements needed for each specified soil mix and amendment. Testing Agency recommendations may vary and require contractor to provide additional testing or preparations prior to placement of soils.
- B. Protection of Existing Conditions:
- Protect structures, utilities, sidewalks, pavements, irrigation systems, paving, plant materials, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by fine grading operations.
 - Provide barricades, fences, or other barriers to protect existing conditions to remain from damage during construction.
 - Use every possible precaution to prevent excessive compaction of planting area soil within or adjacent to the areas of Work.
 - Do not store material or equipment, permit burning, or operate or park equipment under the branches of existing trees to remain.
 - Submit written notification of conditions damaged during construction immediately to the Owner.

SECTION 31 37 19 – LANDSCAPE STONework

PART 1 - GENERAL

1.01 SUMMARY

- A. The work shall consist of furnishing and installing natural landscape stone, such as ledge rock and/or boulders, constructed and in conformance with the details shown on the contract drawings, and/or as directed by the Architect.
- B. Stonework shall consist of the following:
- Dry – Stacked Sandstone Free Standing Wall
 - Dry – Stacked Sandstone Retaining Wall
- 1.02 REFERENCES
- A. The following is a list of standards which may be referenced in this section:
- ASTM International (ASTM):
 - D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³)).

1.03 DEFINITIONS

- A. Terms "boulders," and "rock," may be used interchangeably in this section.
- B. Boulders: Shall be granite, limestone, sandstone (as indicated on the drawings), of an approved size, shape, and type. Boulder dimensions shall be as shown on the contract drawings.
- C. Ledge Rock: Irregular naturally flat pieces of limestone or sandstone protruding to form a ledge. Typically used along stream beds, irregular wall structures and steps.
- D. Flagstone: Irregular naturally flat pieces of limestone or sandstone used for walkways, patios, and flooring. Dimensions vary with each type approximately 4 sq. ft. or larger.

1.04 SUBMITTALS

- A. Contractor shall cooperate with Architect in obtaining and providing samples of all specified materials.
- B. Contractor shall submit certified laboratory test certificates for all items required in this section.

1.05 QUALITY ASSURANCE

- A. Mock-up:
- Prior to the construction of the dry stacked stonework, Contractor shall show Architect an example of similar rock features equal to or better than they had constructed previously.
 - After acceptance of this previous work, Contractor shall construct approximately 3 full step risers as shown on the drawings and 3 courses of stone wall by 6 ft length (of each wall type) for approval by Architect.
 - If the construction is approved, Contractor shall construct the rest of the steps. If the construction is not approved, Contractor shall make any changes required by Owner and Architect to obtain approval and construct the remainder of the steps as approved.

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- B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Jointing Plan: Show drawings indicating locations for all Construction, Contraction, and Isolation/Expansion joints.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer, ready-mix concrete manufacturer and testing agency.
- B. Material Certificates: For the following, from manufacturer:
- Cementitious materials.
 - Steel reinforcement and reinforcement accessories.
 - Admixtures.
 - Curing and Sealing compounds.
 - Bonding agent or epoxy adhesive.
 - Joint fillers.
- C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
- Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
 - Field quality-control reports.
 - Minutes of Preinstallation conference.

1.06 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C-94 requirements for production facilities and equipment.
- B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C-94 requirements for production facilities and equipment.
- C. Testing Agency Qualifications: Qualified according to ASTM C 1017 and ASTM E 329 for testing indicated.
- Personnel conducting field tests shall be qualified as ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- D. Installer Qualifications:
- Minimum of five (5) years' experience installing finished concrete paving in climates that experience seasonal freeze-thaw cycles.
 - Installer shall demonstrate minimum of five (5) years successful experience installing exposed/seeded aggregate special finish concrete paving and cite five (5) successful installations in climates within the same climate region as the project. At least one project shall be 3,000 sq. minimum. For each project, include the following information:
 - Project description
 - Project location
 - Date of installation
 - Completed project photos

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- C. Assure all grass and weed growth has been extinguished prior to placing the specified soil mix as indicated on the drawings. Respray areas still exhibiting grass, weed, or other plant growth. Follow manufacturer's recommendation for allowing grass and weed control to properly kill vegetation prior to amending soils.
- D. De-compact sub-grade soils and in situ soils by soil ripping.
- Prior to placing each specified soil mix or, rip areas to receive the specified soil on the same day soil mix is placed.
 - Rip subgrade to a depth of 6 inches. Place ripping lines at 18 inches on center.
 - Make second ripping pass in the direction 90 degrees to the direction of the first ripping pass.
 - Do not rip closer than 24 inches to installed underground utility lines and structures.
 - Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so soil material will bond with existing material.
 - Once the subgrade is ripped, only equipment with a ground pressure not to exceed 4.5 p.s.i. shall be used, ex. padded, wide-tracked LGP rated dozers and/or excavators, small to medium tractors with turf tires, etc.
- E. Transition Layer:
- Uniformly place 3 inches or as designated by the drawings, the specified soil over the ripped areas. Using mechanical equipment, blend the specified soil into the ripped subgrade approx. 2-4 inches in depth and/or as designated on the drawings.
 - For 32 91 30 - HSCS Soil Mix, uniformly place 3 inches (or as designated by the drawings) HSCS Base Mix soil over the ripped areas. Using mechanical equipment, blend the Base Mix soil into the ripped subgrade approx. 2-4 inches in depth or as designated on the drawings.
 - Do not place final lifts of specified soil until the Transition Layer has been blended.
 - Remove any debris (see Definitions) greater than 1 inch in diameter or 2 inches in length that has been worked to the surface of the transition zone.
 - Tree Root Protection
 - All work inflicting on root systems of existing plant material shall be reviewed and approved by the Architect prior to beginning work.
 - Protect tree root systems from damage adjacent to soil work where ripping is required.
 - Soil ripping may not be conducted when existing roots are in the immediate vicinity. All work inflicting on root systems of existing plant material shall be reviewed and approved by the Architect prior to beginning work.
 - Where tree roots are present within the designated soils zone, carefully blend native soils with the Compost using hand tools.
 - Uniformly moisten or aerate Transition Layer before compaction to within 2 percent of optimum moisture content.

3.04 PLACEMENT OF SOIL MIXES

- A. Verify proper placement and blending of Transitions Layer has been completed.
- B. Lightly scarify Transition Layer prior to placing the specified soil mix.
- C. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
- D. Remove and replace or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Obtain each type of paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.02 NATIVE STONE WALLS – BARN STONE

- A. Native sandstone by:
- Basis of Design Manufacturer:

The Bear Hill Stone Company
12470 State Rd. 520
P.O. Box 457
Glenmont, OH 44428
Ph. No. 330 – 377-5110
www.bearhillstone.com
 - Wall Type 2a and 2b:
 - Match stone type and finish as per Architecture (Ph. No. 440-543-8300)
 - Size: 8" x 8" x 30"

2.03 SUB-BASE AND SUB-SLABS

- A. Compacted Aggregate Base Course (without concrete sub-slabs): Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve unless noted otherwise drawings.

2.04 GEOTEXTILES

- A. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters, with elongation less than 50 percent, complying with AASHTO M 288 and the following, measured per test methods referenced:
- Survivability: Class 2; AASHTO M 288.
 - Survivability: As follows:
 - Grab Tensile Strength: 247 lbf; ASTM D 4632.
 - Sewn Seam Strength: 222 lbf; ASTM D 4632.
 - Tear Strength: 90 lbf; ASTM D 4533.
 - Puncture Strength: 90 lbf; ASTM D 4833.
 - Apparent Opening Size: No. 60sieve, maximum; ASTM D 4751.
 - Permeability: 0.02 per second, minimum; ASTM D 4491.
 - UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
 - Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - Mirafi 140N

<p>PART 2 - PRODUCTS</p> <p>2.01 CONCRETE, GENERAL</p> <p>A. ACI Publications: Comply with ACI 301 unless otherwise indicated.</p> <p>2.02 FORMS</p> <p>A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.</p> <p>1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.</p> <p>B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.</p> <p>2.03 STEEL REINFORCEMENT</p> <p>A. Reinforcing Bars: ASTM A615, Grade 60, deformed.</p> <p>B. Steel Bar Mats: ASTM A104; with ASTM A615, Grade 60 deformed bars; assembled with clips.</p> <p>C. Joint Dowel Bars: ASTM A615, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.</p> <p>1. Sleeves for Round Dowels: "Speed Dowel", size to fit dowel, as available from Greenstreak, Inc., St. Louis, MO (800-8325-9504), www.greenstreak.com; or equal.</p> <p>D. Tie Bars: ASTM A615, Grade 60, deformed.</p> <p>E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSi's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:</p> <p>1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.</p> <p>2.04 CONCRETE MATERIALS</p> <p>A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project.</p> <p>1. Portland Cement: ASTM C150, Gray Portland cement Type II Type III.</p> <p>a. Type III - High early strength may be used with written approval and at the contractor's expense.</p> <p>2. Fly Ash: ASTM C618, Class C or Class F.</p> <p>3. Slag Cement: ASTM C898, Grade 100 or 120.</p> <p>B. Normal-Weight Aggregates: ASTM C33, Class 4S, uniformly graded. Provide aggregates from a single source throughout entire project. Provide aggregates free of iron pyrite.</p> <p>1. Maximum Coarse-Aggregate Size: 3/4-inch nominal.</p> <p>2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.</p> <p>C. Air-Entraining Admixtue: ASTM C260.</p> <p>D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain no more than 0.1 percent water-soluble chloride ions by mass of cementitious material.</p> <p>1. Water-Reducing Admixtue: ASTM C494, Type A.</p>	<p>2. Retarding Admixtue: ASTM C494, Type B.</p> <p>3. Water-Reducing and Retarding Admixtue: ASTM C494, Type D.</p> <p>4. High-Range, Water-Reducing Admixtue: ASTM C494, Type F.</p> <p>5. High-Range, Water-Reducing and Retarding Admixtue: ASTM C494, Type G.</p> <p>6. Plasticizing and Retarding Admixtue: ASTM C1017, Type II.</p> <p>E. Water: Potable and complying with ASTM C94.</p> <p>2.05 CURING MATERIALS</p> <p>A. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.</p> <p>B. Water: Potable.</p> <p>C. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating (Standard Broom Finishes)</p> <p>1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:</p> <p>a. Daylon Superior Corporation; Day Chem Res Cure (J-11-W).</p> <p>b. Eucil Chemical Company (Thi); Kurex DR VOG.</p> <p>c. L&M Construction Chemicals, Inc.; L&M Cure R.</p> <p>d. Meadows, W. R., Inc.; Series 1100.</p> <p>2. The curing compound shall not be used as the final sealer for the concrete.</p> <p>3. For concrete indicated to be sealed, curing compound shall be compatible with sealer.</p> <p>2.06 RELATED MATERIALS</p> <p>A. Expansion and Isolation Joint-Filler Strips: ASTM D 1752. Provide with joint caps.</p> <p>1. Basis of design: Products by WR Meadows.</p> <p>a. Cork: ASTM-D1752 Type II.</p> <p>b. Joint Thickness: 1/4 inch.</p> <p>c. Typical Cap: Two-piece device with upper portion removable after curing period; width corresponding to joint filler.</p> <p>2. Plastic strips with a removable top for placing caulking or sealant that is designed specifically for expansion between concrete pours.</p> <p>B. Epoxy-Bonding Adhesive: ASTM C681, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:</p> <p>1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.</p> <p>C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.</p> <p>2.07 CONCRETE MIXTURES</p> <p>A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.</p> <p>1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.</p>	<p>2. When automatic machine placement is used, determine design mixtures, and obtain laboratory test results that comply with or exceed requirements.</p> <p>B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.</p> <p>1. Fly Ash or Pozzolan: 25 percent.</p> <p>a. Slag Cement: 50 percent.</p> <p>b. Combined Fly Ash or Pozzolan, and Slag Cement: 50 percent, with fly ash or pozzolan not exceeding 25 percent.</p> <p>C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:</p> <p>1. Air Content: 6 percent plus or minus 1-1/2 percent for 3/4-inch nominal maximum aggregate size.</p> <p>D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.</p> <p>E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.</p> <p>1. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.</p> <p>F. Concrete Mixtures: Normal-weight concrete.</p> <p>1. Compressive Strength (28 Days): 4500 psi.</p> <p>a. Job-Built Edge Restraints: 3000 psi compressive Strength (28 days).</p> <p>2. Maximum W/C Ratio at Point of Placement: 0.45.</p> <p>2.08 CONCRETE MIXING</p> <p>A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94. Furnish batch certificates for each batch discharged and used in the Work.</p> <p>1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.</p> <p>B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94. Mix concrete materials in appropriate drum-type batch machine mixer.</p> <p>1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.</p> <p>2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.</p> <p>3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.</p>	<p>PART 3 - EXECUTION</p> <p>3.01 EXAMINATION</p> <p>A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.</p> <p>1. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.</p>	<p>B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.</p> <p>1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.</p> <p>2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, landem-axle dump truck weighing not less than 15 tons.</p> <p>3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 31 20 00 "Earth Moving."</p> <p>C. Proceed with installation only after unsatisfactory conditions have been corrected.</p> <p>D. Paving thickness varies. See plans and details for each specific condition. Any concrete paving thickness not shown in plan shall be 4-inch minimum thickness.</p> <p>3.02 PREPARATION</p> <p>A. Remove loose material from compacted subbase surface immediately before placing concrete.</p> <p>3.03 EDGE FORMS AND SCREED CONSTRUCTION</p> <p>A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grade, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.</p> <p>B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.</p> <p>3.04 STEEL REINFORCEMENT INSTALLATION</p> <p>A. General: Comply with CRSi's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.</p> <p>3.05 JOINTS</p> <p>A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.</p> <p>1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.</p> <p>B. Construction Joints (Cold Joints): Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.</p> <p>1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.</p> <p>2. Provide tie bars at sides of paving strips where indicated.</p> <p>3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.</p> <p>4. Dowelled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.</p> <p>C. Isolation Joints (Expansion Joints): Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.</p> <p>1. Locate expansion joints at intervals as shown, unless otherwise indicated.</p>	<p>2. Extend joint fillers full width and depth of joint.</p> <p>3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.</p> <p>4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.</p> <p>5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.</p> <p>6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.</p> <p>D. Contraction Joints (Control Joints): Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:</p> <p>1. Sawn Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.</p> <p>a. Curbs and Gutters: Provide saw cut joints at 10 ft on-center unless noted otherwise. Throat cut to 9 inches deep.</p> <p>b. Walls, Walls, and Concrete Paved Surfaces: Refer to drawings for details and general layout.</p> <p>c. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.</p> <p>2. Dowelled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.</p> <p>E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Do not re-tool edges after applying surface finishes. Eliminate tool marks on concrete surfaces. "Picture Framing" tooling anywhere is not to be done, unless noted.</p> <p>3.06 CONCRETE PLACEMENT</p> <p>A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in. Notify other trades to permit installation of their work.</p> <p>B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.</p> <p>C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.</p> <p>D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.</p> <p>E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.</p> <p>F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.</p> <p>G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.</p> <p>1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only</p>
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square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislodging reinforcement dowels and joint devices.					
H. Spread paving surface with a straightedge and strike off.					
I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.					
J. Curbs, Gutters, and Edge Restraints: If automatic machine placement is used for curb, gutter, and edge restraint placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove, and replace with formed concrete.					
K. When adjoining pavements are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength. Do not drive vehicles on pavement until the full 28-day strength is attained.					
L. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.					
3.07 SUB-BASE SLABS FOR UNIT PAVING					
A. General: Comply with ACI 301 for formwork, placement, and screeding of concrete.					
B. Deposit and consolidate concrete for sub-base slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.					
1. Consolidate concrete during placement and screed slab surfaces with a straightedge and strike off to correct elevations.					
2. Slope surfaces uniformly to drains where required.					
C. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess bleed water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.					
1. Class B Finish: Finished concrete surface for subbases shall be wood floated to a slightly rough surface. Surface shall not deviate more than 1/4 in. in 10 ft.					
3.08 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS					
A. Curbs and Edge Restraints: Provide monolithic finish by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.					
3.09 FLOAT FINISHING					
A. General: Do not add water to concrete surfaces during finishing operations.					
B. Bull Float Finish: After striking off initial pour of concrete, begin the second floating operation when bleed water sheen has disappeared, and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.					
3.10 BROOM FINISH					
A. Monolithic Broom Finish: After float brooding concrete surface and prior to applying curing compound or curing and sealing compounds, provide a monolithic broom finished concrete surface as specified below.					
1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.					
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a. Available Products:					
1) Sika Corporation; Sikaflex – 2c NS.					
2) DynaTred by Pecora, Harleyville, PA; (800) 523-6688, (215) 723-6051; www.pecora.com .					
b. Color: To be selected by Architect from manufacturer's "Color Pack" system.					
2.04 JOINT-SEALANT BACKER MATERIALS					
A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.					
B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.					
C. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.					
D. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.					
2.05 PRIMERS					
A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.					
PART 3 - EXECUTION					
3.01 EXAMINATION					
A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.					
1. Proceed with installation only after unsatisfactory conditions have been corrected.					
3.02 PREPARATION					
A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.					
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.					
B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.					
3.03 INSTALLATION OF JOINT SEALANTS					
A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.					
B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.					
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1. Joint Location:					
a. Joints between concrete and asphalt paving.					
b. Joints between concrete curbs and asphalt paving.					
c. Other joints as indicated.					
2. Joint Sealant: Refer to Civil Asphalt Work specifications.					
3.06 PROTECTION					
A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion.					
B. Cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.					
END OF SECTION 32 13 13					
SECTION 32 14 00 - UNIT PAVING					
PART 1 - GENERAL					
1.01 SUMMARY					
A. This Section includes all labor, materials, equipment, and testing requirements necessary to complete the installation of unit pavers as specified on the drawings:					
1. Clay Brick Pavers on concrete subbase slab with sand setting bed.					
2. Steel edge restraints for retaining paver systems.					
1.02 PREINSTALLATION MEETINGS					
A. Preinstallation Conference: Conduct conference at Project site.					
1.03 REFERENCES AND STANDARDS					
A. Federal, State, and local laws and regulations governing this Work are hereby incorporated into and made part of this Section. When this Section calls for certain materials, workmanship, or a level of construction that exceeds the level of Federal, State, or local requirements, provisions of this Section take precedence.					
B. The following references are used herein and shall mean:					
1. ASTM: American Society of Testing Materials					
a. ASTM C-33 Standard Specification for Concrete Aggregates.					
b. ASTM C-136 Standard Method for Sieve Analysis for Fine and Coarse Aggregates					
2. BIA: The Brick Institute of America					
3. American Disabilities Act, Part 36, Appendix A- Standards for Accessible Design.					
1.04 ACTION SUBMITTALS					
A. Product Data: For materials other than water and aggregates.					
B. Product Data: For the following:					
1. All paver types.					
2. Setting bed materials.					
3. Joint materials.					
4. Edge restraints.					
5. Joint Sand					
C. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C136.					
D. Samples for Initial Selection: For the following:					
1. Each type of unit paver indicated.					
2. Joint materials involving color selection.					
3. Exposed edge restraints involving color selection.					
E. Samples for Verification:					
1. Full-size units of each type of unit paver indicated. Assemble not less than five Samples of each type of unit on suitable backing and grout joints.					
2. Joint Sand Materials.					
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a. Provide three representative 1/4-pound samples in containers of Joint Sand materials.					
3. Exposed edge restraints.					
F. Shop Drawings:					
1. Plans: Show location, laying patterns, and sizes of each type of unit paving.					
2. Plans: Concrete subbase slab expansion and contraction joints.					
3. Details for edge restraint connection methods, including welding and anchor bolt locations.					
4. Details: Show detail of each type of setting assembly and interface between both types of adjoining paving.					
1.06 INFORMATIONAL SUBMITTALS					
A. Affidavit of Data: For Installer.					
B. Adhesion and Compatibility Test Reports: From latex-additive manufacturer for mortar and grout containing latex additives.					
C. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standard material properties and size of unit.					
D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.					
1. For solid interlocking paving units, include test data for freezing and thawing according to ASTM C 67.					
E. Cleaning and Maintenance Instructions:					
1. Brick Pavers					
2. Joints					
1.06 QUALITY ASSURANCE					
A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from one source with references to provide materials and products of consistent quality in appearance and physical properties.					
B. Certificates: Provide certificates as required by law for transportation and inspections of materials. Inspection and/or approval by governmental agencies does not preclude rejection of materials at project site.					
C. Paver Manufacturer's Qualifications:					
1. The manufacturer shall demonstrate a minimum of 5 years successful experience in the manufacture of interlocking pavers or clay pavers respectively.					
2. The manufacturer shall have sufficient production capacity and established quality control procedures to produce, transport, and deliver the required number of pavers with the quality specified, without causing a delay to the work.					
3. The manufacturer shall have suitably experienced personnel and a management capability sufficient to produce the number of quality pavers as depicted on the contract drawings and as specified herein.					
D. Installer Qualifications:					
1. A qualified unit paving installer. Installer's field supervisor shall have Concrete Paver Installer Certification from the Interlocking Concrete Pavement Institute (ICPI) with the following designations:					
a. Commercial Paver Technician Designation.					

LANDSCAPE SPECIFICATION

- A clean, loamy, friable mineral soil free from heavy or stiff clay lumps (3/4" max dia.), stones, cinders, concrete, brick, roots, sticks brush, litter, plastics, metals, refuse or other deleterious materials in accordance with ASTM D 5286-92.
- The soil shall be free of herbicides, petroleum-based materials, manures, or other substances of a hazardous or toxic nature which may inhibit plant growth.
- The soil shall be free of noxious weeds, seeds or vegetative parts of weedy plants that cannot be selectively controlled in the planting.
- The soil shall be taken from the A Horizon or B Horizon of a well-drained site and have a USDA soil texture classification of a Clay Loam or Loam. The soil shall have the following particle size distribution:

U.S.D.A. Particle Name	Size (mm)	Allowable Limit
Gravel	2.00 - 4.75	Less than 10%
Sand	0.05 - 2.00	25 - 40 %
Silt	0.002 - 0.05	10 - 45 %
Clay	minus 0.002	30 - 50 %

- Perform the following tests and submit test reports showing the following criteria are met:
 - The particle size analysis as defined above.
 - The pH shall be approx. 5.5 to 7.8 (NCR 221)
 - The soluble salts shall be less than 1.5 mmol/cm (NCR 221)
 - The organic matter content shall be 3.0 to 6.0% (ASTM D 2974 Method C)
 - Certified test results of bulk topsoil stored by certified suppliers must be within the last 12 months from the date of bid opening.
- Provide certification from the supplier that the topsoil does not contain any toxic substances harmful to plant growth.
- Composted Organic Mix Component
 - Organic Component – Non-proprietary Requirements:
 - The organic amendment shall be stable, mature aerobically composted yard debris (green waste) compost, Leaf humus compost, manure composts, biosolids compost, peat, peat-humus, and mushroom compost products are not acceptable.
 - Compost Component Testing submitted results, per the Quality Assurance requirements shall meet the following characteristics:
 - The compost shall be a homogeneous material essentially free of soil clods, lumps, roots, and stones.
 - The compost shall have a man-made foreign material (hard plastics, metal, glass, etc.) content less than 1.5% as material retained on a U.S. Std.No.5 (4 mm) sieve (TMECC 03.06)
 - The compost shall be screened such that a minimum of 90% passes a U.S. Std. 3/4" sieve and that no more than 10% passes a U.S. Std. No.10 sieve on a dry weight basis.
 - The compost shall have a pH of 7.2 to 8.0.
 - The compost shall have a soluble salts content less than 6.0 millimhos per cm, when determined on a 1:5 compost:water slurry.

2.03 ORGANIC PLANTING SOIL MIX (OPS):

- OPS "Soil System" Mix - Non-proprietary Requirements:
 - For the purpose of bidding, the OPS Mix shall substantially conform to a mix of 4 parts of the approved Soil and 1 part (vol./vol.) of the approved Compost. The actual Soil: Compost ratio will be determined by the soil physical testing laboratory to meet the required performance specifications (TMECC) unless otherwise specified above.
 - Organic Matter Content: 5 to 8 percent
 - pH Level: 5.5 to 7.8 percent
 - The controlling factor will be the percent (%) organic matter by weight specified for OPS mix. Note that the intended volume ratios of the Organic Amendment (compost) components will be, in large part, determined by the organic matter content of the compost.
- Uniformly mix components using a mechanical soil blender designed for such purpose.
- Perform initial tests to confirm compliance with the OPS mixes organic matter content specifications.

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- not be interpreted as prescribing or dictating procedures or indicating quantities of soil materials for the work of this Contractor.
- Changing testing laboratories during the mix development phase or for quality assurance testing must be authorized by the Architect.
- Statement(s) of Qualifications: Submit within 45 days of notice to proceed to confirm qualifications of the selected testing agencies.
- Submit samples of all tested materials to the Architect for approval:
 - Sand, each source, 2-4 lb., packaged.
 - Native Soil, each source, 2-4 lb., packaged.
 - Compost, each source, 2-4 lb., packaged.
 - HSCS Base Mix, 2-4 lb., packaged.
 - HSCS Planting Mix, 2-4 lb., packaged.
- Submit for approval at least two weeks prior to installation a written plan for mixing, transporting, storing, placing, and setting installed materials.

1.06 QUALITY ASSURANCE

- Prior to manufacturing the specified soil mix, each Soil System Component of the HSCS as defined, must meet the specification, and be verified by testing as specified herein.
- Submit testing and certification reports in the format specified.
- Inspections and Testing
 - Testing required in this Section or required by the Architect for the Soil System Components such as, sands, soils, composts, and HSCS Mix Types for Lawns and Planting Mixes, shall be furnished and paid for by Contractor.
 - The Architect reserves the right to take and analyze at any time such additional samples of materials as deemed necessary for verification of conformance to the specification requirements. Contractor shall furnish samples for this purpose upon request and shall perform testing as requested.
 - Samples of individual components for the HSCS Mixes shall be submitted by the Contractor for testing and analysis to the approved testing laboratory.
 - HSCS Soil System Components shall not be used until test reports from the approved testing laboratory have been received and approved by the Architect.
 - HSCS Soil System Components or HSCS Mix samples that do not meet the Specifications will require the Contractor to re-submit additional samples for testing. Costs for re-testing will be the responsibility of the Contractor.
 - When HSCS Mixes do not meet specification, make the needed adjustments per the test results recommendations, mix new batch and retest. Retest, amend and test amended mix until mix meets specifications. Submit final results.
- Observations and periodic testing will be made by the Owner or its designated representative on materials delivered to the site. HSCS Mix not meeting the requirements of the Specifications shall be removed by the Contractor at no cost to the project.
- Qualifications:
 - Testing Laboratory: Experienced person (s) employed by public or private testing laboratory, qualified and capable of performing tests, making soil recommendations, and issuing reports as specified. The Testing Laboratory shall submit a Statement of Qualifications regarding the specified testing. The Testing Laboratory shall be as approved by the Architect.

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- The heavy metal content as determined by TMECC 04.06 shall not exceed the following limits:

Element	Concentration Limits (mg/Kg d.w.)
Arsenic	41
Cadmium	39
Chromium	1200
Copper	1500
Lead	300
Mercury	17
Molybdenum	50
Nickel	420
Selenium	36
Zinc	2800

- The compost shall meet all applicable state regulations based on the feedstock type.
- All compost testing shall be done in conformance with the U.S. Compost Council's publication Test Methods for the Examination of Composting and Compost (TMECC) unless otherwise specified above.

2.04 HSCS PLANTING MIX (HSCS-P)

- For bidding, the Planting Mix shall substantially conform to a mix of 3 parts approved Base Mix and 1 part (vol./vol.) approved Compost. The actual Base Mix to Compost ratio will be determined by the soil mix type specified and the physical testing laboratory to meet the required performance specifications shown below.
- At least six weeks prior to mixing at a certified mixing facility, submit to the physical soil testing laboratory a 4-gallon volume (minimum) of the approved Base Mix and a 4-gallon volume (minimum) of the approved Compost.
- Instruct the laboratory to determine the Base Mix to Compost ratio that results in an organic matter content to the following percentages on material passing a U.S. Std. 1/4-inch sieve using ASTM 2974 Method C.
 - Planting Installations – Soil Mix Type HSCS-P: Organic content level of 5 to 8%, a. 7.5 to 8.0 pH.
- Manufacture 10 to 20 cu. yds. of the of each specified Planting Mix Type using the Base Mix and the Compost in the ratio specified by the laboratory using a mechanical soil blender designed for such purpose. Submit a representative sample, of not less than 5 pounds, to the soil physical testing laboratory for comparison to the test mix prepared by the soil physical testing laboratory.
- The manufactured Planting Mix shall have a granular consistency essentially free of soil lumps larger than 1 inch.
- If the manufactured Planting Mix results do not substantially match the laboratory test mix, manufacture another 10 bags or cubic yards following the new recommendations provided by the soil physical testing laboratory. Repeat as necessary until the test results substantially match.
- The final test results and criteria, when approved by the Architect, shall establish the standard for each Soil Mix Type to which all subsequent HSCS Planting Mix tests must conform.
- For each Planting Mix Type, have one sample tested from each 1000 cu. yds. of manufactured material using the testing as noted above.

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- agrees of this work site. Conform to all governmental regulations regarding the transportation of materials to, from, and at the job site, and secure in advance such permits as may be necessary.
- Environmental Requirements for Soils, Soil Components and Soil System Mixes:
 - Perform both off-site mixing and on-site soil work only during suitable weather conditions. Do not work or place soil when frozen, excessively wet, or dry, or in otherwise unsatisfactory condition.
 - Soil Mixes shall not be handled or hauled during rain or wet weather or when near or above the point where maximum compaction will occur.
 - When stockpiling is permitted, the Contractor shall install silt fence around the perimeter of the stockpile area and maintain the silt fence until the stockpile is removed. Planting Soil Mixes shall be kept in neat and separate piles from other excavated material.
 - Sequencing and Scheduling: Adjust, relate together and otherwise coordinate work of this Section with other Project work as contained in all other Sections of the Project Specifications.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- Packaged Materials: Deliver packaged materials to the location where soils are to be mixed, in unopened bags or containers, each bearing the name, guarantee, and trademark of the producer, material composition, manufacturer's certified analysis, and the weight or the material. Retain packages for the Architect.
- Store and handle packaged materials in strict compliance with manufacturer's instructions and recommendations. Protect all materials from weather, damage, and theft.
- Soil mixes or amendment materials stored on site temporarily in stockpiles prior to placement shall be protected from intrusion of contaminants and erosion. All temporary storage means, and methods shall be approved by the Architect.
- After mixing, soil mixes shall be covered with a tarpaulin until time of actual use and protected from contamination, excessive rainfall, excess water entering the site or erosion.
- Stockpiling
 - On-site and Certified Mixing Facility stockpiles should be restricted to no more than the needs of what can be used in a 72-hr. period. Under no circumstances shall on-site or off-site stored material exceed 1000 cubic yards.
 - Stockpiles should be no more than 6 feet in height to prevent anaerobic conditions within the pile. Stockpiled composts should be turned every other week (unless otherwise instructed by the Architect) to prevent anaerobic conditions excessive water absorption and anaerobic conditions. Storage areas for topsoil, soil components or planting system mixes shall be constructed on well drained land, away from the stream.

PART 2 - PRODUCTS

2.01 GENERAL

- All Organic Planting Soil components shall fulfill the requirements as specified.
- Site salvaged topsoil will not be permitted for use as an OPS "Soil System Mix" component.
- For the purposes of this specification, all OPS mix is mixed off site, tested, approved, and imported from a certified facility.

2.02 SOIL SYSTEM MIX – COMPONENT MATERIALS

- Soil Component

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- Sand: A naturally occurring mineral that has been processed to remove coarse gravel, silt and clay and sized to meet the specifications.
- Soil: A mineral soil from the A Horizon or B Horizon of a well-drained site and having a USDA soil texture classification of a Clay or Clay Loam and an organic matter content of not greater than 3% by weight as specified below.
- Soil System: Exclusive to this technical specification section, a profile consisting of native soil blended with the specified sand and organic (Compost) to approved and specified levels.
- Subgrade: Surface or elevation of subsol remaining after completed excavation or backfill of soils or other materials immediately beneath a planting mix or other soil mix.
- Transition Layer: The specified soil mix (in this case = HSCS "Lawn or Plant") is homogeneously blended into the existing native soil substrate to create a conversion layer between the native and specified soil mix (HSCS). Transition mixes and depths vary pending specified soil mix and plantings. Refer to drawings for depths.

1.05 SUBMITTALS

- Refer to and comply with specifications for submittal procedures and criteria.
- Product Data: Submit technical descriptive data for each manufactured or packaged product of this Section. Include manufacturer's product testing and analysis and installation instructions for manufacture or processed items and materials.
 - Locations: Submit locations of material sources and suppliers.
- Soil System Components and Soil Mix Suppliers.
 - Architect shall have the right to reject any soil supplier.
 - Soil mix suppliers shall have a minimum of 5-years of experience at supplying custom mixes.
 - Submit supplier name, address, email, telephone, and fax numbers and contact name.
 - Submit certification that accepted supplier can provide enough materials and mixes for the entire project and within the limitations of the Project Schedule.
- Certificates: Submit certified analysis for each chemical soil analysis and fertilizer material specified (specimen label) and as used (product label) including guaranteed analysis and weight for packaged materials.
- Soil System Testing Submittals: Engage an independent testing agency to qualify HSCS components and specified soil mix types. The Contractor shall submit representative samples of all component materials which are intended to be used to make mixes and all final mixes to an agricultural soil testing laboratory acceptable to the Architect.
 - All tests shall be performed in accordance with the current methods specified by ASTM, SSSA or USEPA, unless otherwise noted. All reports prepared by the testing laboratory shall be sent to the Architect for approval.
 - After reviewing the Testing Agency report and as directed by the Architect, deficiencies in the sand, organic materials, mix components or final soil mix are to be corrected by the Contractor.
- Sand and Soil Component Test reports shall include the following:
 - Date issued.
 - Project Title and names of Contractor and supplier.
 - Testing laboratory name, address and telephone number, and name(s), as applicable, of each field inspector or laboratory contact.
 - Date, place, and time of sampling or test, with record of temperature and weather conditions.

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- Soils shall be clean, loamy, friable mineral soil essentially free from heavy or stiff clay lumps (3/4" max dia.). Once qualified for HSCS use, soil shall be processed and screened to meet this requirement.
- Soils shall be essentially free of stones, cinders, concrete, brick, roots, sticks brush, litter, plastics, metals, refuse or other deleterious materials in accordance with ASTM D 5286-92. The soil shall be free of herbicides, petroleum-based materials, manures, or other substances of a hazardous or toxic nature which may inhibit plant growth.
- The soil shall be free of noxious weeds, seeds or vegetative parts of weedy plants that cannot be selectively controlled in the planting.
- The soil shall be taken from the A Horizon or B Horizon of a well-drained site and have a USDA soil texture classification of a Clay or Clay Loam. The soil shall have the following particle size distribution:

U.S.D.A. Particle Name	Size (mm)	Allowable Limit
Gravel	2.00 - 4.75	Less than 10%
Sand	0.05 - 2.00	25 - 40 %
Silt	0.002 - 0.05	25 - 45 %
Clay	minus 0.002	30 - 50 %

- Perform the following tests and submit test reports showing the following criteria are met:
 - The particle size analysis as defined above.
 - The pH shall be approx. 5.5 to 7.5 (NCR 221)
 - The soluble salts shall be less than 1.5 mmol/cm (NCR 221)
 - The organic matter content shall be 4.0% (ASTM D 2974 Method C)
 - Certified test results of bulk soils stored by certified suppliers must be within the last 12 months from the date of bid opening.
- Representative samples shall be taken for each 500 cu. yds. of stockpiled soil and submitted to the soil physical testing laboratory for qualification to the specification above.
- Provide certification from the supplier that the soil does not contain any toxic substances harmful to plant growth.
- Base Mix Preparation
 - For bidding, the Base Mix shall substantially conform to a mix of 4 parts approved Sand and 1 part (vol./vol.) approved Soil. The actual Sand to Soil ratio will be determined by soil physical testing laboratory to meet the required performance specification shown below.
 - At least six weeks prior to mixing at a certified mixing facility, submit to the physical soil testing laboratory a 4-gallon volume (minimum) of the approved Sand and a 3-gallon volume (minimum) of the approved processed and screened Soil.
 - Instruct the laboratory to develop a Sand to Soil mix ratio that results in a saturated hydraulic conductivity (ASTM F 1815) of 6 to 12 inches per hour at approximately 85% Proctor.
 - Manufacture 10 to 20 cu. yds. of Base Mix using the Sand to Soil ratio specified by the laboratory using a mechanical soil blender designed for such purpose. Submit a representative sample, of not less than 5 pounds, to the soil physical testing laboratory for comparison to the test mix prepared by the soil physical testing laboratory.
 - If the manufactured Base Mix results do not substantially match the laboratory test mix, manufacture another 10 to 20 cu. yds. following the new recommendations provided by the

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- Compost, each source, 5 lb., packaged.
- Organic Planting Soil (final mix), 5 lb., packaged.
- Submit for approval at least two weeks prior to installation a written plan for mixing, transporting, and storing materials.

1.06 QUALITY ASSURANCE

- The OPS mix is comprised of approved topsoil, additional organic amendment, and possibly other soil amendment materials, as determined by the testing laboratory. Each component of the OPS mix must meet the specification and be verified by testing as specified herein, prior to delivery to the site.
- Soil System Components of the OPS mix will not be accepted unless they meet all submittal, testing and certification requirements including the testing and certification reports in the format specified herein.
- Inspections and Testing
 - Soil, compost, and other material testing as well as "Soil System Mix" testing required in this Section or additionally required by the Architect shall be furnished and paid for by Contractor.
 - The Architect reserves the right to take and analyze at any time such additional samples of materials as deemed necessary for verification of conformance to specification requirements. Contractor shall furnish samples for this purpose upon request and shall perform testing as requested.
 - Samples of individual components to the OPS mix shall be submitted by the Contractor for testing and analysis to the approved testing laboratory.
 - OPS soil components shall not be used until test reports from the approved testing laboratory have been received and approved by the Architect.
- OPS Mix Components and Soil System Mix samples that do not meet the Specifications will require the Contractor to re-submit additional samples for testing. Costs for re-testing will be the responsibility of the Contractor.
- Observations and periodic testing will be made by the Owner or its designated representative on materials delivered to the site. HSCS Mix not meeting the requirements of the Specifications shall be removed or amended by the Contractor at no cost to the project.
- Qualifications:
 - Testing Laboratory: Experienced person (s) employed by public or private testing laboratory, qualified and capable of performing tests, making soil recommendations, and issuing reports as specified. The Testing Laboratory shall submit a Statement of Qualifications regarding the specified testing. The Testing Laboratory shall be as approved by the Architect.
 - It shall be the responsibility of the Contractor to see that the specifications are being adhered to. Failure of the Architect to immediately reject unsatisfactory workmanship or to notify the Contractor of higher deviation from the specifications shall not relieve the Contractor of his/her responsibility to repair and/or replace unsatisfactory work.
- Pre-Installation Conferences: Person(s) responsible for soil preparation and mixes of this Section shall attend Pre-Installation Conference(s) to coordinate with work of other sections.

1.07 PROJECT CONDITIONS

- Investigate the conditions of site and public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of this work site.

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SECTION 32 91 30 – HIGH SAND CONTENT LAWN AND PLANTING SOIL

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- The Specified Soil Mix in this section shall be manufactured off-site and hereafter be referred to as High Sand Content Soil mix or HSCS. HSCS may be blended with two different levels of Organic materials specific to Planting (P) areas.
 - Plans will identify areas as: HSCS – P.
- This Section applies only to the manufacturing and delivery of the planting soil mix to the site. Refer to Section 32 20 19 – Finish Grading for subgrade preparation, placement, and final grading.

1.02 SUMMARY

- Section Includes:
 - All labor, materials, equipment, and testing requirements necessary to complete soil system component selection, soil preparation, mix blending as shown on the drawings and specified herein, including but not necessarily limited to the following:
 - Construct the specified HSCS profile(s) using the specified materials and techniques as contained herein, on the drawings.
 - Imported or Off the shelf products from authorized soil manufacturing facilities or suppliers.
- Test, furnish and deliver all soil materials, including off-site borrow soils and soil amendment materials, such as composted materials, used in the OPS or per detail sections shown on the drawings.

1.03 REFERENCES AND STANDARDS

- The following references are used herein and shall mean:
 - ASTM: American Society of Testing Materials
 - NCR221: Recommended Soil Testing Procedures for the North Central Region
 - SSSA: Soil Science of America, Methods of Soil Analysis, Part 1 & Part 3
 - TMECC: Test Methods for the Examination of Composting and Compost
 - USDA: United States Department of Agriculture
 - USEPA: United States Environmental Protection Agency

1.04 DEFINITIONS

- Compost: An organic material that has been aerobically composted and stabilized from feedstocks such as green waste (yard debris), biosolids or other suitable materials.
- Debris or Deleterious Materials: Elements including, but not limited to, concrete, concrete masonry, wood, excavated rock and rock fragments, rubble, overburden soils, abandoned utility structures, trash, refuse, and litter.
- Finish Grade: Elevation of finished surface of a Soil System after specified compaction and natural setting.
- High-Sand Content Soils: Homogeneously blended mix of the specified sand, topsoil, and organic amendment.

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- Base Mix: Sand and Soil.
- "P" Planting Mixes (Plantings): Base Mix plus Compost.
- Soil components for HSCS Base Mix must be off-site, processed soil, (no exceptions).

2.02 BASE MIX – SOIL SYSTEM COMPONENT MATERIALS

- Base Mix: Sand Component
 - The sand shall be a clean, sharp, natural silica sand that has been suitably washed and classified (sieved). Suitable sands may be referred to in commerce as a uniform, ASTM-33 concrete sand (preferred) or a coarse mason's sand. The selected sand must meet the following U.S.D.A. particle size distribution as well as the other grading characteristics listed in Part 3 when tested in accordance with the ASTM D-422 using U.S.D.A. particle size classifications.
- The allowable particle size distribution is as follows:

U.S.D.A. Particle	Percent Class Size (mm)	Retained
Gravel	> 4.75	0
Gravel	3.94 - 4.75	0 - 3
Fine Sand	0.10 - 0.25	0 - 10
Very Fine Sand	0.05 - 0.10	20 - 40
Silt + Clay	> 0.05	0 - 10

Not more than 12% combined Gravel + Fine Gravel
- Other Gradation Characteristics must fall within the limits specified below:
 - Finesness Modulus (FM) - 2.5 to 3.2
 - Coefficient of Uniformity - 2.5 to 3.8
- The sand shall meet the following specifications. Perform the following tests and submit test reports showing the following criteria are met:
 - The particle size analysis/distribution as defined above
 - The pH shall be 5.5 to 8.2
 - The soluble salts shall be less than 0.5 mmol/cm (NCR 221)
 - The organic matter content shall be less than 1.0% (ASTM D 2974 Method C)
 - The material drainage rate shall be greater than 20 inches per hour and the total porosity shall be greater than 40% when compacted and tested at 85% Proctor.
- Provide certification from the supplier that the sand does not contain any toxic substances harmful to plant growth.
- Base Mix: Soil Component
 - Off-site (borrow) soils meeting the specifications below may be used as the soil component for the HSCS Base Mix. The source or location of the soil used shall be communicated to the Owner's Representative.

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- Analysis for levels of heavy metals to include arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc. Test results shall be cited in milligrams per kilogram dry weight with comparisons to USEPA 40 CFR Table 3 of 503.13 Pollutant Concentrations.
- Particle size analysis shall be performed and compared to the USDA Soil Classification System per ASTM D422 (hydrometer test). The USDA sand and gravel classifications shall be determined on material retained on the #270 sieve following a wet washing procedure.
- Deleterious materials shall be determined by ASTM D 5286.
- Percent of organic matter by weight shall be determined by ASTM D 2974 Method C, loss on ignition at 440°C.
- Saturated hydraulic conductivity shall be determined by ASTM F1815.
- Analysis for nutrient levels in parts per millions or pound per acre including Nitrate Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Iron, Manganese, Zinc, Copper, Boron, and Sodium as Exchangeable Sodium Percentage (ESP) per NCR221.
- Soluble salts shall be determined by electrical conductivity of a 1:2 soil:water slurry reported in millimhos per cm.
- Cation Exchange Capacity (CEC) per NCR221 using the ammonium acetate method.
- Soil analysis reports shall also show recommendations for soil additives, including organic and inorganic soil amendments, necessary to accomplish particular mix objectives noted.
- Compost Component Testing Submittals

- Report(s) of analyses from producers of composted organic materials are required. The compost shall be analyzed using the USCS STA test methods and reporting format, unless otherwise noted. Submit USCS STA Compost Technical Data Sheet for the delivered compost and dated within 6 months of delivery.
 - Contact the testing laboratory to review testing and sampling requirements before sending samples.
- Composted organic amendments shall be sampled according to the Ohio EPA State Law / Legislation Code: OAC Chapter 3745-24-46.
- Maintain clear and concise records of testing and sampling procedures.

F. Testing Agencies: The following firms are acceptable testing agencies for the various components.

- Soils and mixes shall be determined by an A2LA Accredited Lab, such as Turf Diagnostics and Design, 613 E. 1st Street, Linwood, KS 66052, tel. 855-769-4231, www.turfdiag.com or other qualified soil physical testing laboratory approved by the Architect.
 - Certified Local Agencies may be used pending approval by Architect.
- Although the report(s) may contain the laboratory's comments or recommendations to the Architect regarding amendment requirements or procedures, the report shall not be interpreted as prescribing or dictating procedures or indicating quantities of soil materials for the work of this Contract.
- Changing testing laboratories during the mix development phase or for quality assurance testing must be authorized by the Architect.
- Statement(s) of Qualifications: Submit within 45 days of notice to proceed to confirm qualifications of the selected testing agencies.
- Submit samples of all listed materials to the Architect for approval:
 - Topsoil, each source, 5 lb., packaged.

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- Follow the OPS System Mix recommendations provided by the soil testing laboratory to achieve the target organic matter content for OPS soil. These test results, when approved, will establish the standard to which all other test results must conform.
- Provide one sample test from each 1000 cu. yds. of manufactured material using the testing as noted above.
- Adequate quantities of OPS mix shall be provided to attain all design finish grades after compaction at greater than between 80 to 85 percent Proctor. Verify quantities for placement as specified to suit site conditions.
- Mixing of soil and compost: Add compost as recommended by the testing laboratory to achieve the specified organic matter content for the OPS mix. Other amendments shall not be added to OPS mix unless approved by the Architect and additional tests have been conducted to verify type and quantity of amendment.
- After OPS mix has been placed and where organic levels need to be higher for key areas, add and blend in 3 inches of approved composted organic material for every 2 percent increase to the "in-place" OPS mix.

PART 3 - EXECUTION

3.01 GENERAL

- Section 31 22 19 – Finish Grading applies.

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- It shall be the responsibility of the Contractor to see that the specifications are being adhered to. Failure of the Architect to immediately reject unsatisfactory workmanship or to notify the Contractor of higher deviation from the specifications shall not relieve the Contractor of his/her responsibility to repair and/or replace unsatisfactory work.
- Pre-Installation Conferences: Person(s) responsible for soil preparation and mixes of this Section shall attend Pre-Installation Conference(s) to coordinate with work of other sections.
- PROJECT CONDITIONS
 - Investigate the conditions of site and public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of this work site. Conform to all governmental regulations regarding the transportation of materials to, from, and at the job site, and secure in advance such permits as may be necessary.
- Environmental Requirements for Soils, Soil System Components and Soil System Mixes:
 - Perform both off-site mixing and on-site soil work only during suitable weather conditions. Do not work or place soil when frozen, excessively wet, or dry, or in otherwise unsatisfactory condition.
 - HSCS mixes shall not be handled or hauled during rain or wet weather or when near or above the point where maximum compaction will occur.
 - When stockpiling is permitted, the Contractor shall install silt fence around the perimeter of the stockpile area and maintain the silt fence until the stockpile is removed. Soil Mix shall be kept in neat and separate piles from other excavated material.
- Sequencing and Scheduling: Adjust, relate together and otherwise coordinate work of this Section with other Project work as contained in all other Sections of the Project Specifications.

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