

TOWN OF AVON, CONNECTICUT

INVITATION FOR BID

AVON HIGH SCHOOL SYNTHETIC TURF FIELD AND TRACK IMPROVEMENTS

IFB 18/19-7 – ADDENDUM ONE (1)

Date: Monday, February 25, 2019

BID DUE DATE REMAINS UNCHANGED

QUESTIONS:

1. Question: Would the Town of Avon consider an alternate price for post tension concrete in lieu of asphalt for the base of the new running track?
 - a. *Response: Yes. The Town will consider an alternate price for items that may offer added value to the project. However, the contractor shall submit their Bid based on the scope of work presented in the IFB documents, to not do so shall render the Bid “unresponsive.” Any such “value added” information shall be provided separately from the Base Bid. The Base Bid shall be used as the primary selection criteria.*

2. Question: In Spec Section 01 2010- Measurement and Payment; 1.5 ALTERNATE BID ITEMS, Paragraph C Alternate Bid Item 2- Sports Field and Pedestrian Lighting Extended Construction Schedule, can you clarify the following; if selected would Alternate 2 be included in the contract at the time of award? OR Is it the intent to simply delay this portion of the work until after 8/23? OR is it the intent to extend the Town’s option to add lighting up to 180 days after the project is substantially complete?
 - a. *Response: Add Alternate 2 should represent the scope of work identified in Add Alternate 1 being completed out of sequence with the base bid scope of work, most likely following the substantial completion of the base bid.*

3. Question: At the completion of the project (8/23/2019) will the Town release the 10% retainage? What effect will Alt 2 have on retainage?
 - a. *Response: It is the intention of the Town to release the 10% retainage following final completion of the base project (9/20/19) and the Town’s final acceptance of the project. Any Add Alternate selected will carry a retainage value that is separate from that of the base bid scope of work.*

4. Question: In Spec Section 32 18 23 All Weather Running Track Surfacing Polyurethane Structural Spray, Paragraph 1.4 BID SUBMITTALS Requires a letter of conformance to be submitted with our bid. Is this correct? Is this actually required?
 - a. *Response: Yes*

5. Question: Section 32 18 23.29 Synthetic Grass Sports Surfacing, Similar to above, is the letter of conformance required to be submitted with the bid? Is this required in other specification sections?
 - a. *Response: Yes. The contractor shall familiarize themselves with the requirements of the bid documents including all required bid submittals.*
6. Question: Section 32 18 23.29 Synthetic Grass Sports Surfacing, Paragraph 2.1.B.4 Lists acceptable Manufacturers, Paragraph 6 requires “equals” to be submitted to the Engineer for prequalification prior to the bid. Does this mean that the Engineer will not consider “equals” (to those listed in paragraph 4) after the bid? ie: subject to compliance with the spec we would have to use one of the products identified in paragraph 4 a, b, c, d, e?
 - a. *Response: Yes. Submit as an RFI, bidding phase substitution request. Request will be processed in the time frame of RFI responses.*
7. Question: The system being proposed consists of a combination of synthetic turf, resilient pad, and green acrylic coated sand. In our region, there has been a pattern of failures with the use of all three of these components as one system, without exact cause or proven solution. Why is this system being specified for this project?
 - a. *Response: The Town of Avon has selected a system that will best meets its needs.*
8. Question: Section 1.4 of the Synthetic Grass Sports Surfacing spec contains a list of bid submittals. Are these required to be submitted with our bid package?
 - a. *Response: Yes*
9. Question: Note 17 on C-3.0 says all drainage pipe 12” or larger shall be RCP, but all pipe on C-3.0 is noted as HDPE. What pipe is to be RCP?
 - a. *Response: Disregard this note. Refer to plan callouts for pipe type. There is a section of RCP pipe called for that passes under the new storage shed.*
10. Question: Note 20 on C-3.0 says all underdrains are to be 6” HDPE. Where are these underdrains?
 - a. *Response: Disregard this note. There are two 4-inch underdrains required, one at each long/triple jump sand pits.*
11. Question: Detail 6/L-3.1 shows 6.5” min. field base bottom stone, but note #1 says top stone and base stone for a finish profile of 8”. Is the total stone profile 6.5” or 8”?
 - a. *Response: Refer to detail on revised Sheet L-3.1.*
12. Question: What is the pitch of the subgrade under the field? Detail 11/L-3.1 shows the subgrade pitching towards the collector pitch on both sides at a steeper pitch than the finish grade.
 - a. *Response: The slope of the subgrade shall be parallel to the finished grade. Detail has been further clarified on revised detail sheet included with this addendum.*
13. Question: Can you please provide electrical drawings?
 - a. *Response: Electrical drawings are included with this addendum.*

14. Question: What type of Bid Bond Form is required (AIA or special form)? If special form, please provide a copy. I didn't see it in the specs.
- a. *Response: AIA is acceptable.*
15. Question: All things being equal will the award be based on the base bid or the base bid plus the alternates? Is there an order of precedence regarding the Alternates? Usually there is an order of precedence regarding the alternates ie: the owner has to accept them in order to avoid the appearance of favoritism).
- a. *Response: Contract award will be based in part on base bid price. Please also refer to Section 21 of Standard Instructions to Bidders, "Award Criteria; Preliminary Selection; Contract Execution."*

CHANGES TO PROJECT DRAWINGS:

1. Sheet L-1.0 Layout Plan
2. Sheet L-2.0 Materials Plan
3. Sheet L-3.1 Details
4. Sheet L-3.3 Details
5. Sheet L-3.4 Details
6. Sheet L-4.1 Planting Plan Enlargements
7. Sheet L-4.2 Planting Plan Enlargements (Cont.)
8. Sheet S-1 Segmental Retaining Wall Plan, Elevation and Details

ATTACHMENTS

Pre-bid Sign-in Sheet

Specifications:

26 05 00 Common Work Results for Electrical
26 05 19 Low Voltage Electrical Power Conductors and Cables
25 05 26 Grounding
26 05 33 Raceways and Boxes for Electrical Systems
26 24 01 Service Equipment
26 24 16 Panelboards
26 28 00 Overcurrent Protective Devices
26 56 00 Exterior Lighting
26 56 68 Exterior Athletic Field Lighting

Drawings:

1. Sheet L-1.0 Layout Plan
2. Sheet L-2.0 Materials Plan
3. Sheet L-3.1 Details
4. Sheet L-3.3 Details
5. Sheet L-3.4 Details
6. Sheet L-4.1 Planting Plan Enlargements
7. Sheet L-4.2 Planting Plan Enlargements (Cont.)
8. Sheet S-1 Segmental Retaining Wall Plan, Elevation and Details

- 9. Sheet DSE-1 – Site Lighting Demolition Plan
- 10. Sheet SE-1 – Site Lighting Plan
- 11. Sheet SE-1A – Add Alternate #1 & #2 Site Lighting Plan
- 12. Sheet SE-2 – Electrical Schedules and Diagrams
- 13. Sheet SE-3 - Details, Symbols, Notes and Abbreviations

Please note that all other terms and conditions appearing in the original Invitation for Bid remain unchanged. Vendors are asked to sign, date and return this sheet **along with their bids** in order to verify their receipt of this addendum prior to the submission deadline. Please fill out all sections below in order to ensure that your response is considered complete.

Name: _____

Title: _____

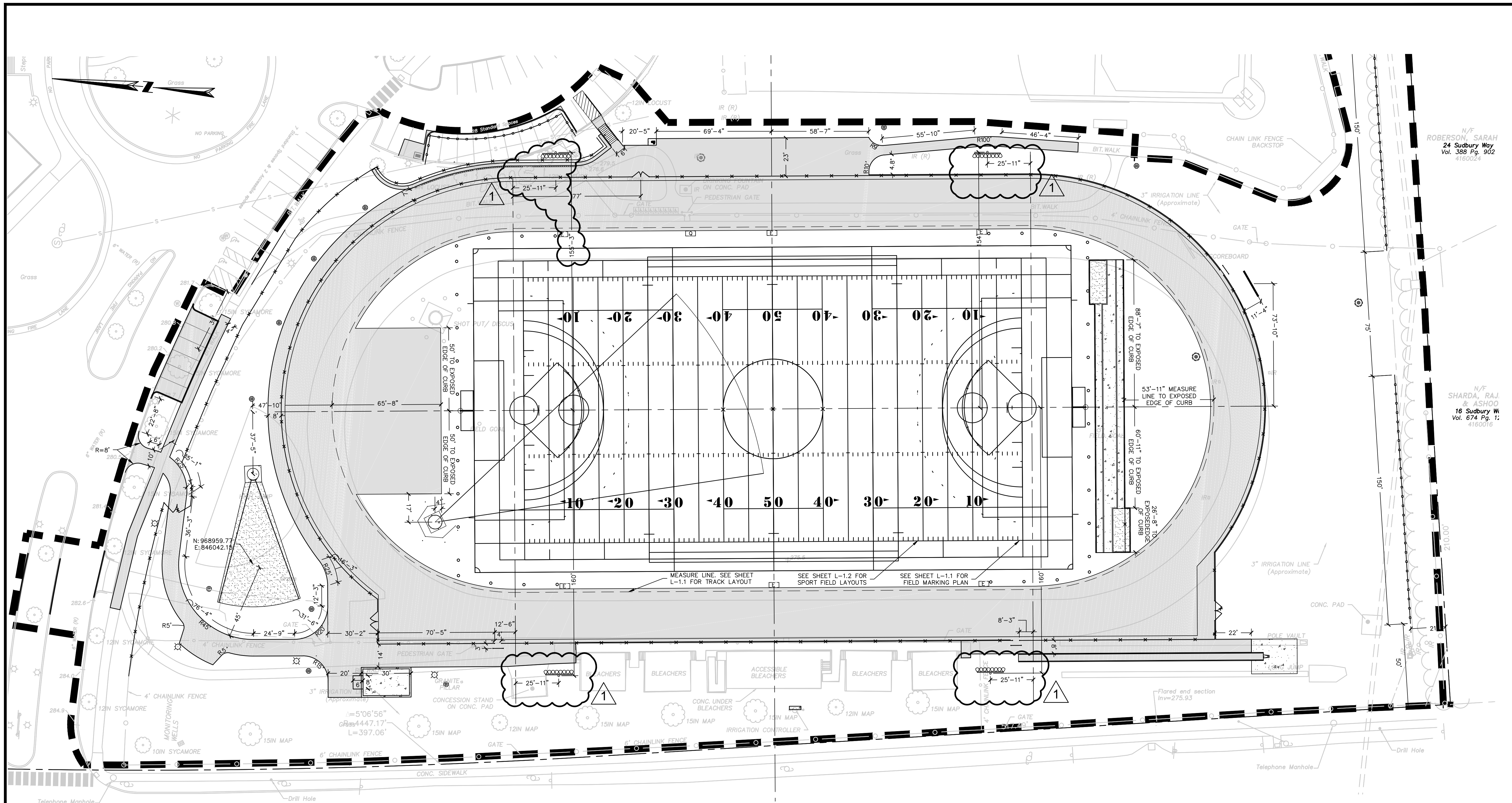
Company: _____

Address: _____

City State Zip Code

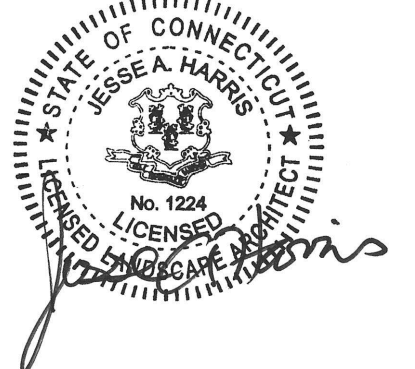
Telephone: _____ Date: _____

End of Addendum Number 1



N/F ROBERSON, SARAH
24 Sudbury Way
Vol. 359 Pg. 902
4160024

N/F SHARDA, RAJ & ASHOO
16 Sudbury Way
Vol. 674 Pg. 11
4160016



JESSE A. HARRIS, P.L.A. No. 1224

ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL

510 WEST AVON ROAD
IN
AVON CONNECTICUT
LAYOUT PLAN

FEBRUARY 22, 2019

REVISIONS:

1	2019/02/22	ADDENDUM 1

PREPARED FOR:
TOWN OF AVON
60 WEST MAIN STREET
AVON, CT 06001

300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

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SCALE: 1" = 30'

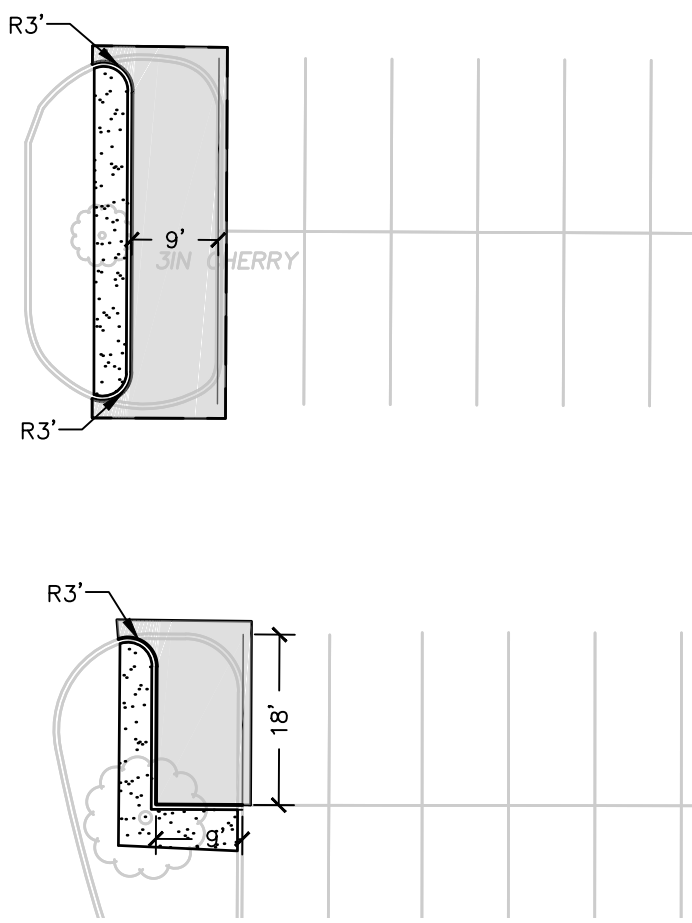


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DWG. NO:
JOB. NO: 83572.02

L-1.0

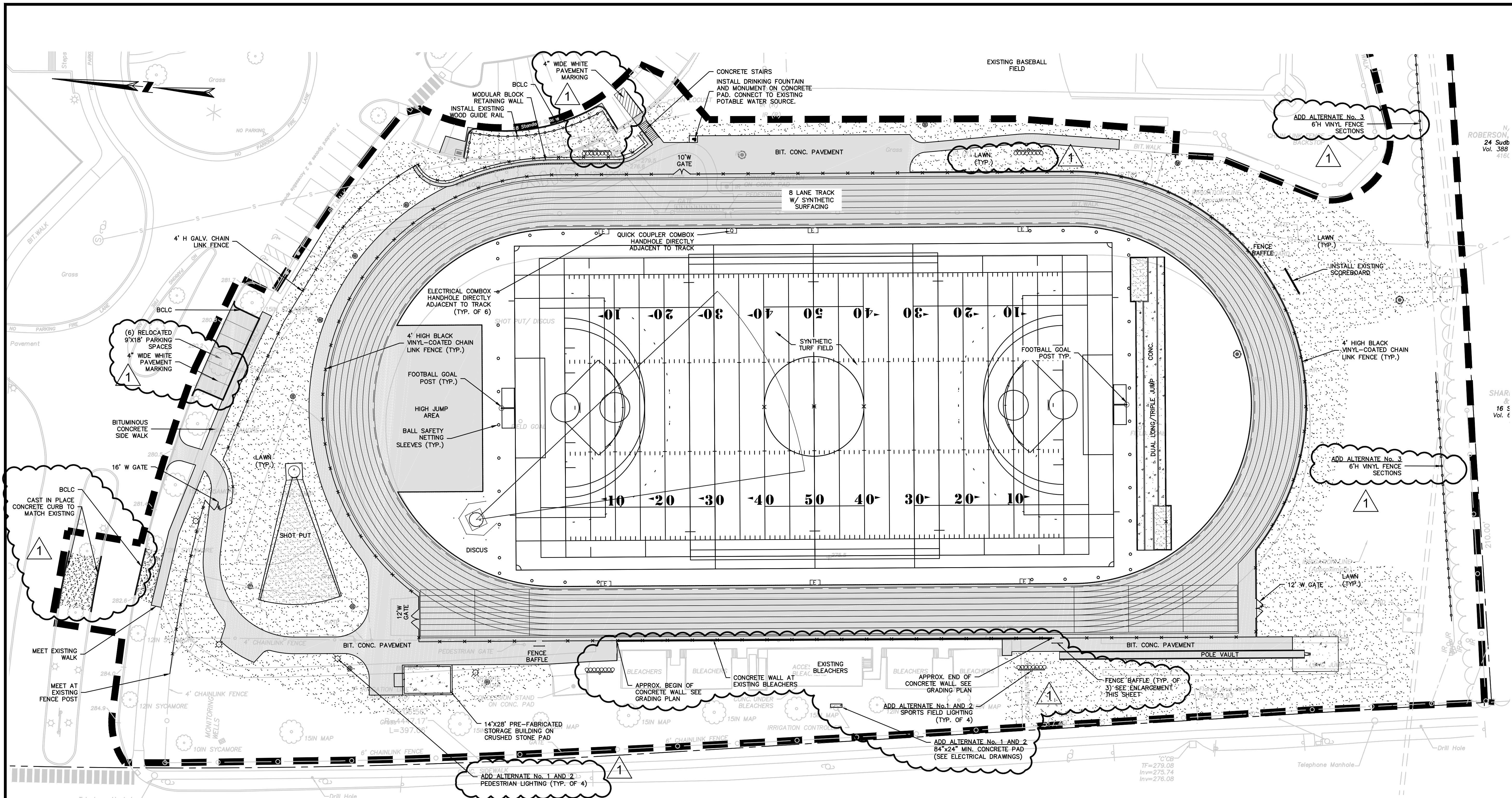
- NOTES:**
- NOTIFY 'CALL BEFORE YOU DIG' (1-800-922-4455) AND VERIFY UTILITY MARK-OUT WITH THE OWNER PRIOR TO THE INITIATION OF ANY SITE DISTURBANCE.
 - THE CONTRACTOR IS SOLELY RESPONSIBLE FOR VERIFYING THE LOCATION AND NATURE OF ALL SUBSURFACE UTILITIES AT THE PROJECT WHICH MAY BE AFFECTED BY THE WORK. COORDINATE WITH RESPECTIVE UTILITY OWNERS AND PERFORM VERIFICATION OF TYPE, LOCATION AND INVERTS AS REQUIRED.
 - NOTIFY THE ENGINEER OF ANY AND ALL DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH THAT PORTION OF THE WORK.
 - THE LOCATIONS OF EXISTING SITE FEATURES AS SHOWN HAVE BEEN OBTAINED FROM MAPS, SURVEYS, FIELD INSPECTIONS, AND OTHER AVAILABLE INFORMATION. THEY MUST BE CONSIDERED APPROXIMATE BOTH TO LOCATION, SIZE, AND AS-BUILT CONDITION AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ACTUAL FIELD CONDITIONS.
 - THE DIMENSIONS SHOWN ON THE PLANS, INCLUDING THE INTENDED DIMENSIONS OF THE WORK, MAY VARY FROM ACTUAL EXISTING CONDITIONS IN THE FIELD. THE CONTRACTOR SHALL TAKE APPROPRIATE MEASUREMENTS TO VERIFY ALL DIMENSIONS SHOWN ON THE DRAWINGS AS WELL AS OTHER DIMENSIONS HE MAY DEEM APPROPRIATE TO FACILITATE THE COMPLETION OF THE WORK. NOTIFY THE ENGINEER OF ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH THAT PORTION OF THE WORK.
 - THIS DRAWING IS INTENDED TO DEPICT THE LOCATION, AND LAYOUT OF CONSTRUCTION AND IS INTENDED TO BE USED IN CONJUNCTION WITH ASSOCIATED DRAWINGS AND APPLICABLE SPECIFICATION SECTIONS.
 - IMPLEMENTING WORKER SAFETY AND/OR HEALTH PROTOCOLS THAT ADDRESS COMPLIANCE WITH RULES, LAWS, AND REGULATIONS PERTAINING TO CONSTRUCTION SAFETY AND/OR THE POTENTIAL AND/OR ACTUAL RISK OF EXPOSURE TO SITE-SPECIFIC PHYSICAL OR CHEMICAL HAZARDS IS SOLELY THE RESPONSIBILITY OF THE CONTRACTOR.
 - ENGAGE A CONNECTICUT-LICENSED LAND SURVEYOR TO PERFORM LAND-SURVEYING SERVICES REQUIRED, INCLUDING, BUT NOT LIMITED TO VERIFICATION AND LAYOUT OF PROPOSED IMPROVEMENTS, DIMENSIONS, AND ELEVATIONS. REPORT DISCREPANCIES TO THE ENGINEER.
 - ACCESSIBLE ROUTES SHALL COMPLY WITH CONNECTICUT BUILDING CODE. THE RUNNING SLOPE OF WALKING SURFACES SHALL NOT BE STEEPER THAN 1:20 (5%). THE CROSS SLOPE OF A WALKING SURFACE SHALL NOT BE STEEPER THAN 1:48 (2%).
 - RAMPS SHALL COMPLY WITH CT BUILDING CODE, REF. 2012 IBC SECTION 1010 AND ICC/ANSI A117.1 2009 CHAPTER 4, SECTION 405.
 - DIMENSIONS INDICATED ARE TO FACE OF CURB, PAVEMENT EDGE, EDGE OR CENTERLINE OF IMPROVEMENT, OR AS OTHERWISE NOTED. NOTIFY THE ENGINEER OF ANY AND ALL DIMENSIONAL DISCREPANCIES BEFORE PROCEEDING WITH THAT PORTION OF THE WORK.
 - PROVIDE FOR THE LAYOUT AND STAKING/MARKING OF THE PROPOSED LOCATION OF ALL PROPOSED SITE IMPROVEMENTS, INCLUDING FURNISHINGS. OBTAIN ENGINEER'S APPROVAL OF THE LAYOUT PRIOR TO PROCEEDING WITH THE WORK.
 - UNLESS OTHERWISE INDICATED, LINES ARE PARALLEL OR PERPENDICULAR TO LINE FROM WHICH THEY ARE MEASURED.

- LEGEND**
- PROPERTY LINE
 - LIMIT OF WORK
 - PROPERTY SETBACK
 - PROPOSED CURBING
 - CHAIN LINK FENCE
 - BIT. - BITUMINOUS CONCRETE
 - CONC. - CONCRETE
 - BCLC - BITUMINOUS CONCRETE LIP CURB
 - EOP - EDGE OF PAVEMENT
 - R - CURVE RADIUS
 - L - CURB LENGTH
 - CONCRETE PAVEMENT
 - BITUMINOUS CONCRETE PAVEMENT
 - LAWN



1 PARKING ENLARGEMENT
SCALE: 1" = 20'

ISSUED FOR BID



ROBERSOHN
24 Sudb
Vol. 388
476

SHAR
16 S
Vol. 6



JESSE A. HARRIS, P.L.A. No. 1224

ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL

510 WEST AVON ROAD
IN
AVON
CONNECTICUT
MATERIALS PLAN

FEBRUARY 22, 2019

REVISIONS:

1	2019/02/22	ADDENDUM 1

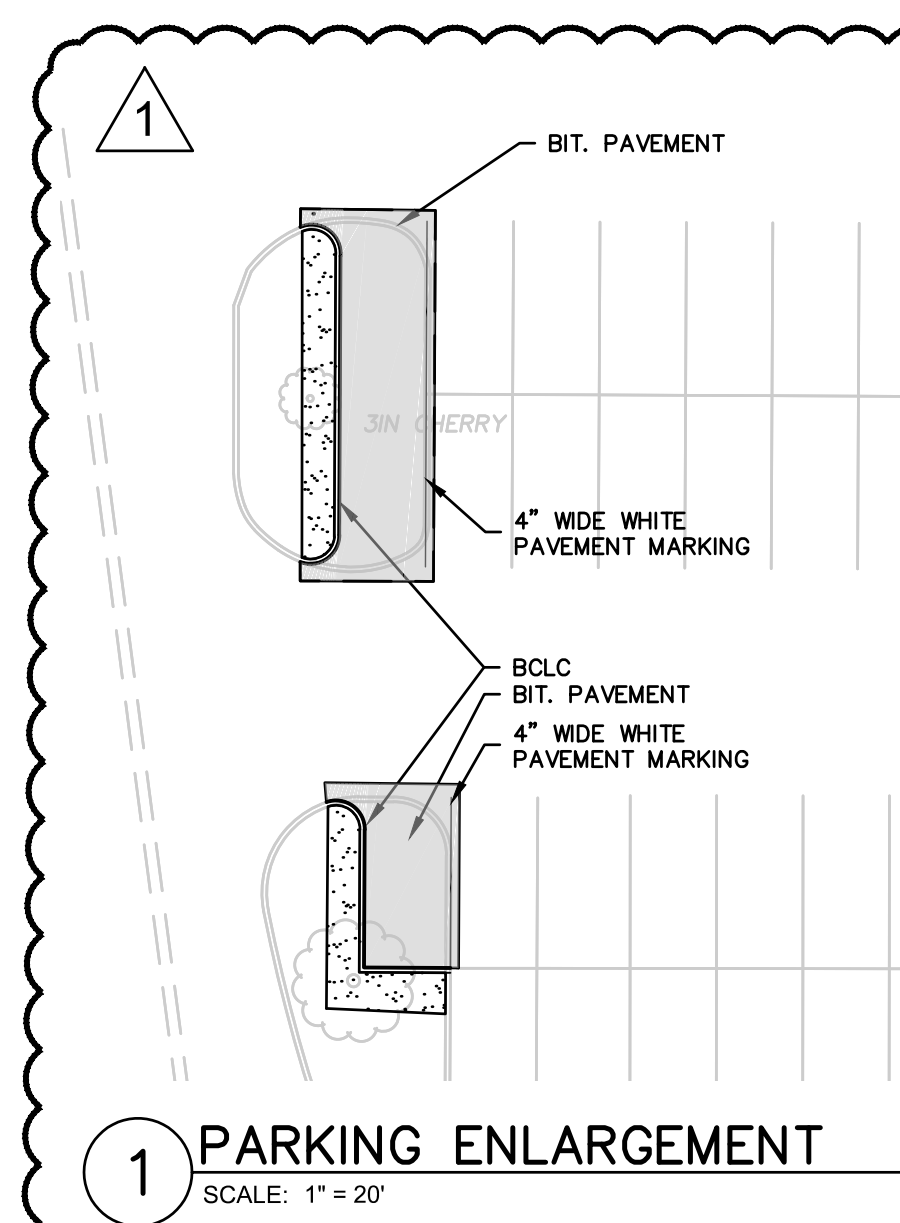
PREPARED FOR:
TOWN OF AVON
60 WEST MAIN STREET
AVON, CT 06001



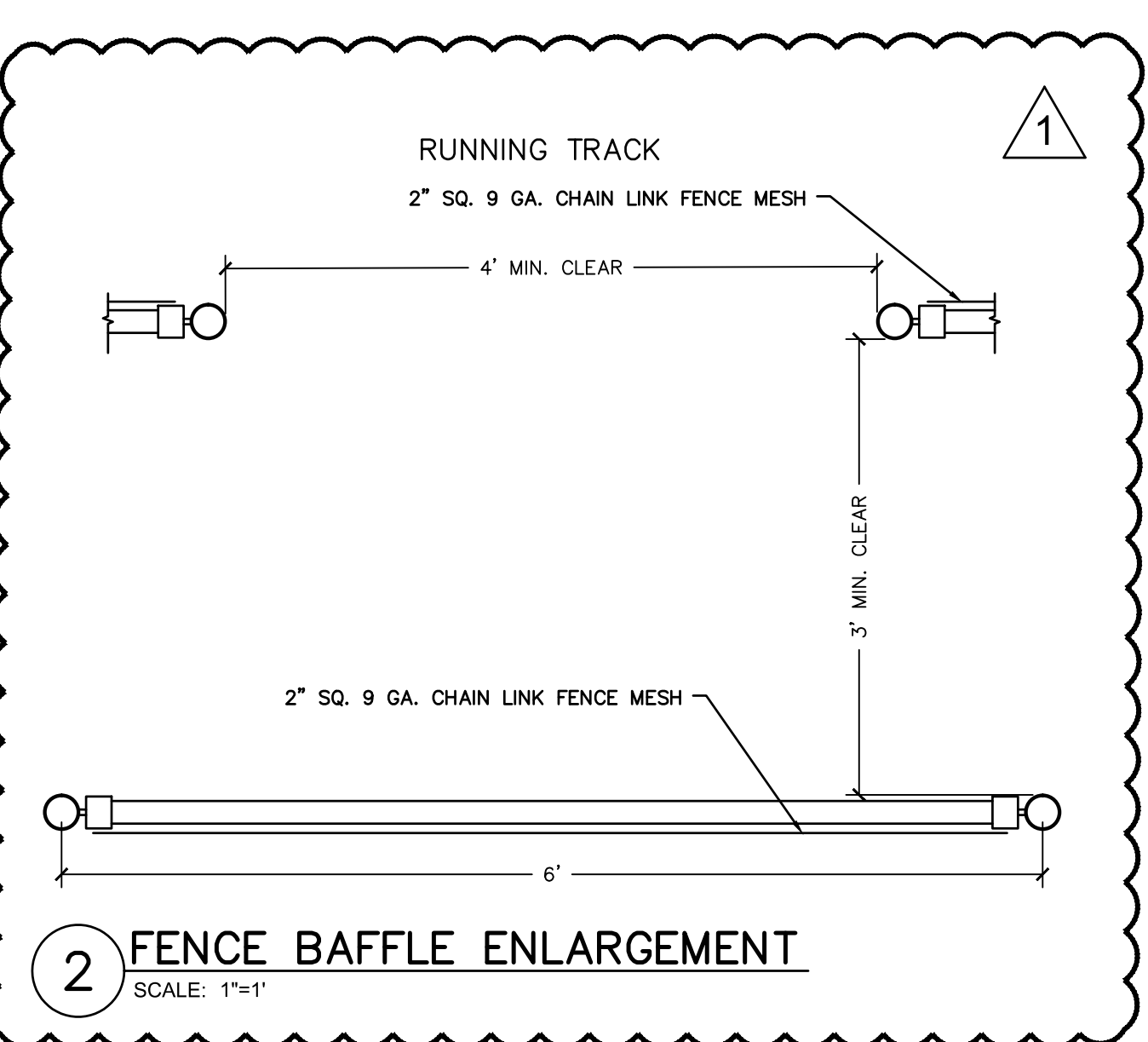
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SCALE: 1" = 30'
0 15 30 60 FEET

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DWG. NO:
JOB. NO: 83572.02

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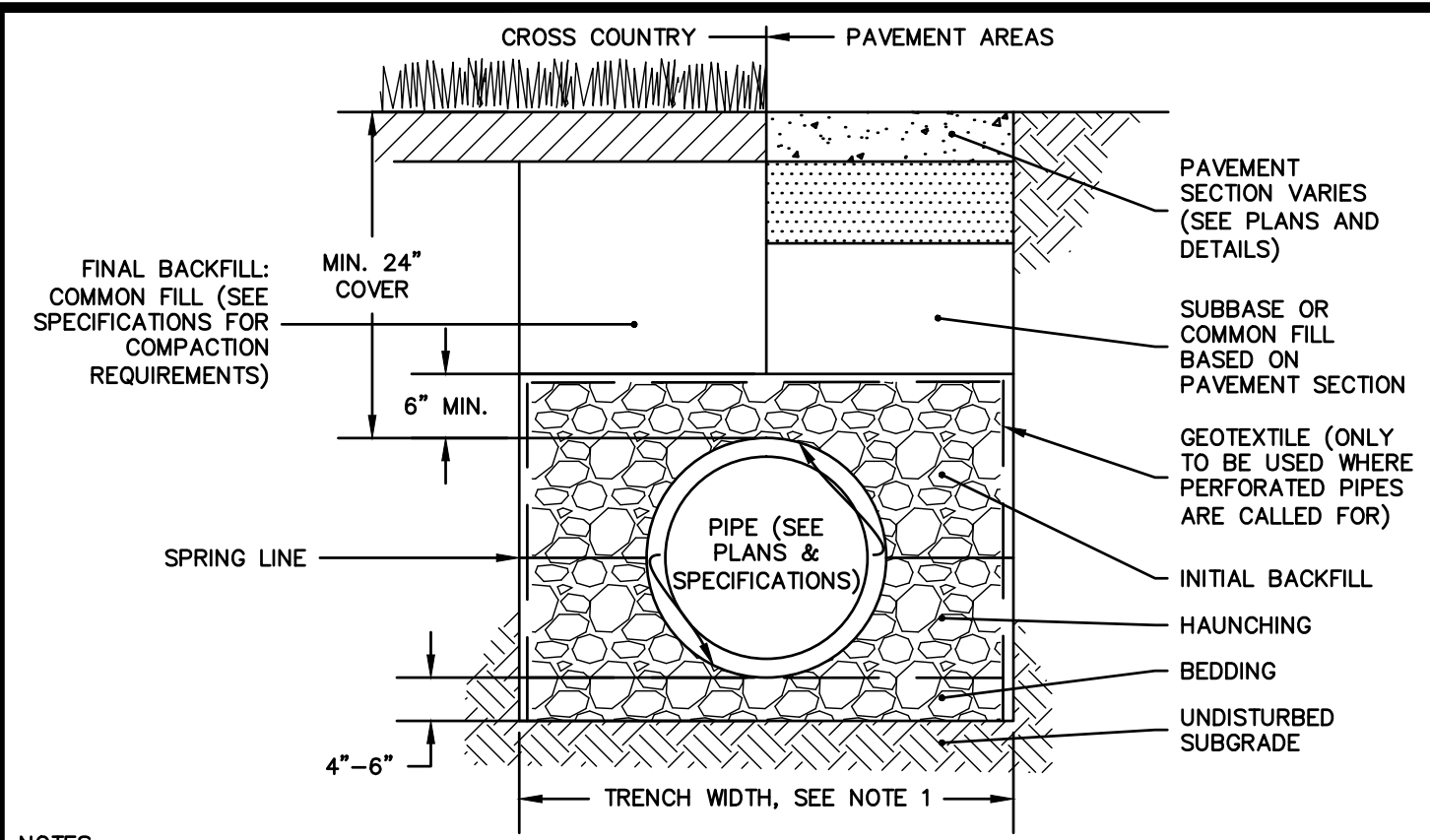
- NOTES:
1. NOTIFY "CALL BEFORE YOU DIG" (1-800-922-4455) AND VERIFY UTILITY MARK-OUT WITH THE OWNER PRIOR TO THE INITIATION OF ANY SITE DISTURBANCE.
 2. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR VERIFICATION OF THE LOCATION AND NATURE OF ALL SUBSURFACE UTILITIES AT THE PROJECT WHICH MAY BE AFFECTED BY THE WORK. COORDINATE WITH RESPECTIVE UTILITY OWNERS AND PERFORM VERIFICATION OF TYPE, LOCATION AND INVERTS AS REQUIRED.
 3. NOTIFY THE ENGINEER OF ANY AND ALL DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH THAT PORTION OF THE WORK.
 4. THE LOCATIONS OF EXISTING SITE FEATURES AS SHOWN HAVE BEEN OBTAINED FROM MAPS, SURVEYS, FIELD INSPECTIONS, AND OTHER AVAILABLE INFORMATION. THEY MUST BE CONSIDERED APPROXIMATE BOTH TO LOCATION, SIZE, AND AS-BUILT CONDITION AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ACTUAL FIELD CONDITIONS.
 5. THIS DRAWING IS INTENDED TO DEPICT THE LOCATION, LAYOUT, AND MATERIALS OF CONSTRUCTION AND IS INTENDED TO BE USED IN CONJUNCTION WITH APPLICABLE SPECIFICATION SECTIONS.
 6. IMPLEMENTING WORKER SAFETY AND/OR HEALTH PROTOCOLS THAT ADDRESS COMPLIANCE WITH RULES, LAWS, AND REGULATIONS PERTAINING TO CONSTRUCTION SAFETY AND/OR THE POTENTIAL AND/OR ACTUAL RISK OF EXPOSURE TO SITE-SPECIFIC PHYSICAL OR CHEMICAL HAZARDS IS SOLELY THE RESPONSIBILITY OF THE CONTRACTOR.
 7. UNLESS OTHERWISE INDICATED, ALL DISTURBED AREAS SHALL BE RESTORED WITH FOUR (4) INCHES OF LOAM, SEED, FERTILIZED, AND MULCHED. PROVIDE ADDITIONAL EROSION CONTROLS AS REQUIRED.
 8. ALL CURBING IS BITUMINOUS CONCRETE UNLESS OTHERWISE INDICATED.
 9. THE CROSS-SLOPE OF ANY SIDEWALK, WALKWAY, OR OTHER PEDESTRIAN SURFACE SHALL NOT BE STEEPER THAN 1:48 (2%).
 10. ACCESSIBLE ROUTES SHALL COMPLY WITH CONNECTICUT BUILDING CODE. THE RUNNING SLOPE OF WALKING SURFACES SHALL NOT BE STEEPER THAN 1:20 (5%). THE CROSS SLOPE OF A WALKING SURFACE SHALL NOT BE STEEPER THAN 1:48 (2%).
 11. RAMPS SHALL COMPLY WITH CT BUILDING CODE, REF. 2012 IBC SECTION 1010 AND ICC/ANSI A117.1 2009 CHAPTER 4, SECTION 405.
 12. UNLESS OTHERWISE SPECIFIED, CONCRETE USED FOR SIDEWALKS, PADS, STAIRS, LANDINGS, PEDESTRIAN AND VEHICLE RAMPS, CURBING, AND WALLS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS OF 4,500 PSI.
 13. CONSTRUCTION JOINTS: SIDEWALK REINFORCEMENT SHALL NOT CONTINUE THROUGH CONSTRUCTION JOINTS.
 14. PRIOR TO INITIATION OF CONCRETE FLATWORK, SUBMIT PROPOSED CONSTRUCTION JOINT PLAN TO THE ENGINEER FOR REVIEW AND APPROVAL. COORDINATE SUCH PLAN WITH THE JOINT PATTERNS DEPICTED ON THE DRAWINGS.
 15. UNLESS OTHERWISE SPECIFIED, MISCELLANEOUS CONCRETE PADS SHALL BE CONSTRUCTED PER SIDEWALK CROSS-SECTION DETAIL TO THE SIZE INDICATED.



- ALTERNATES:
1. ALTERNATE 1 - SPORTS FIELD AND PEDESTRIAN LIGHTING.
 2. ALTERNATE 2 - SPORTS FIELD AND PEDESTRIAN LIGHTING, EXTENDED CONSTRUCTION SCHEDULE
 3. ALTERNATE 3 - LANDSCAPE PLANT BUFFER, WEST AVON ROAD AND SUDBURY WAY
 4. ALTERNATE 4 - LANDSCAPE PLANT BUFFER, SOUTHEAST
 5. ALTERNATE 5 - LANDSCAPE PLANT BUFFER, NORTH FIELD

ISSUED FOR BID

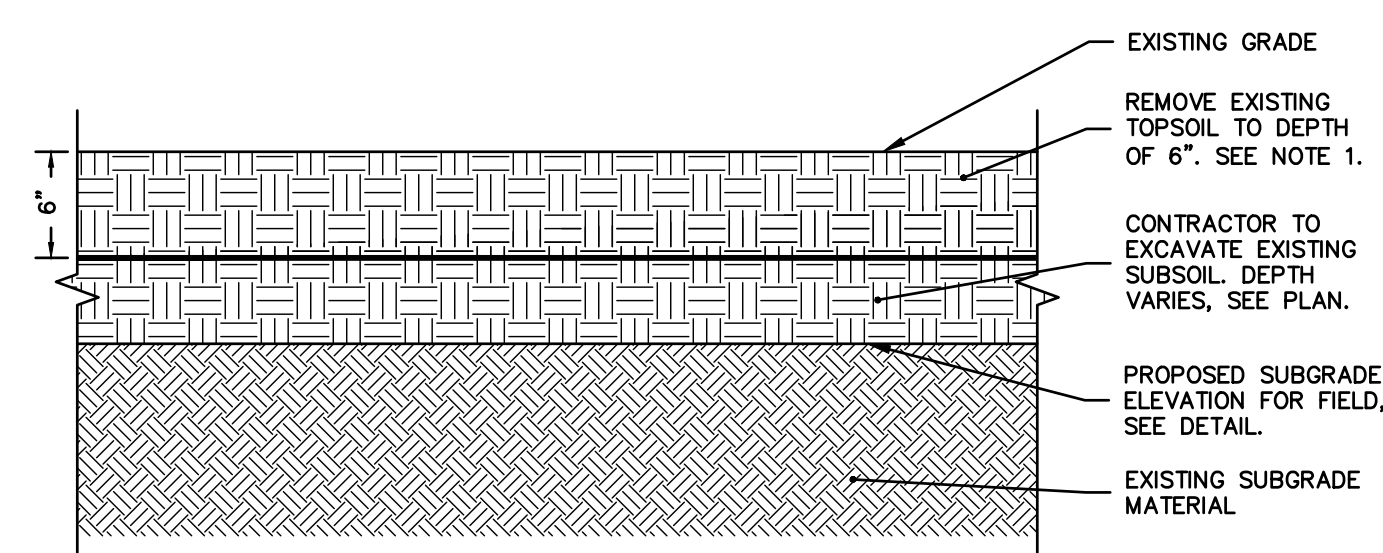
ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL - FEBRUARY 22, 2019



NOTES:

- WHERE TRENCH WALLS ARE STABLE OR SUPPORTED, PROVIDE A WIDTH SUFFICIENT, BUT NO GREATER THAN NECESSARY, TO ENSURE WORKING ROOM TO PROPERLY PLACE AND COMPACT HAUNCHING AND OTHER EMBEDMENT MATERIALS, UNLESS OTHERWISE SPECIFIED BY THE PIPE MANUFACTURER, THE SPACE BETWEEN THE PIPE AND TRENCH WALL MUST BE WIDER THAN THE COMPACTION EQUIPMENT USED IN THE PIPE ZONE. MINIMUM WIDTH SHALL BE NOT LESS THAN THE GREATER OF EITHER THE PIPE OUTSIDE DIAMETER PLUS 16 INCHES OR THE PIPE OUTSIDE DIAMETER TIMES 1.25, PLUS 12 INCHES.
- WHERE PERFORATED PIPES ARE CALLED-FOR, BEDDING, HAUNCHING, AND INITIAL BACKFILL SHALL BE CONDOT NO. 6 CRUSHED STONE SHALL MEET THE REQUIREMENTS OF FORM 816 M.O.B.
- WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL PER THE SPECIFICATIONS, AS AN ALTERNATIVE, AND AT THE DISCRETION OF THE ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL UNDER SOME CIRCUMSTANCES.
- BEDDING, HAUNCHING, AND INITIAL BACKFILL SHALL BE CONDOT NO. 6, NO. 67, OR NO. 8 AGGREGATE OR OTHER MATERIALS MEETING THE REQUIREMENTS OF ASTM D2321 FOR CLASS IA, IB, II, OR III UNLESS OTHERWISE INDICATED BY THE PIPE MANUFACTURER.

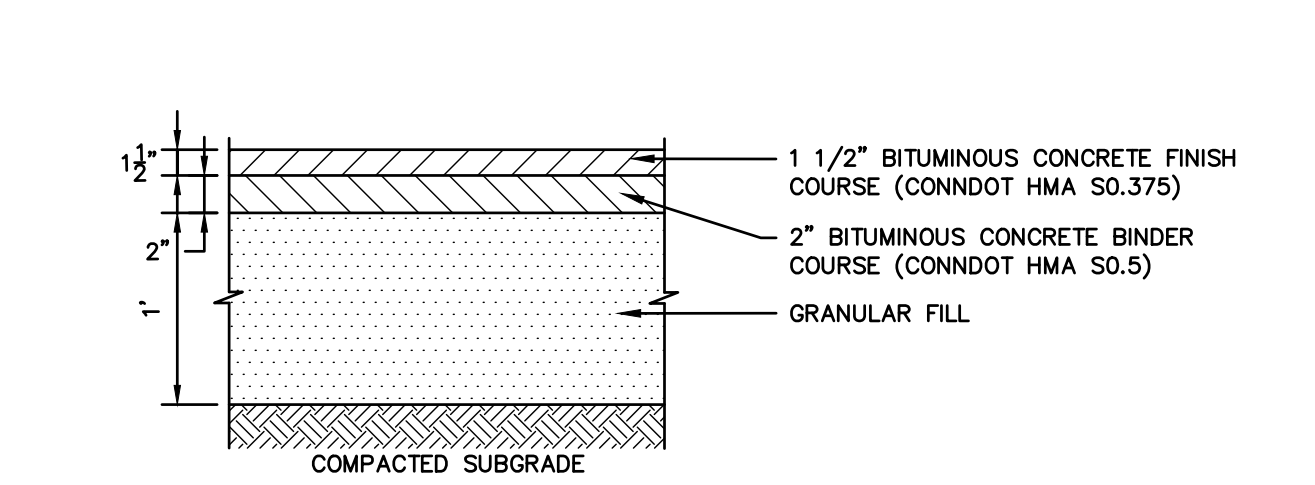
1 TYPICAL TRENCH SECTION - THERMOPLASTIC DRAINAGE PIPE
SCALE: NONE



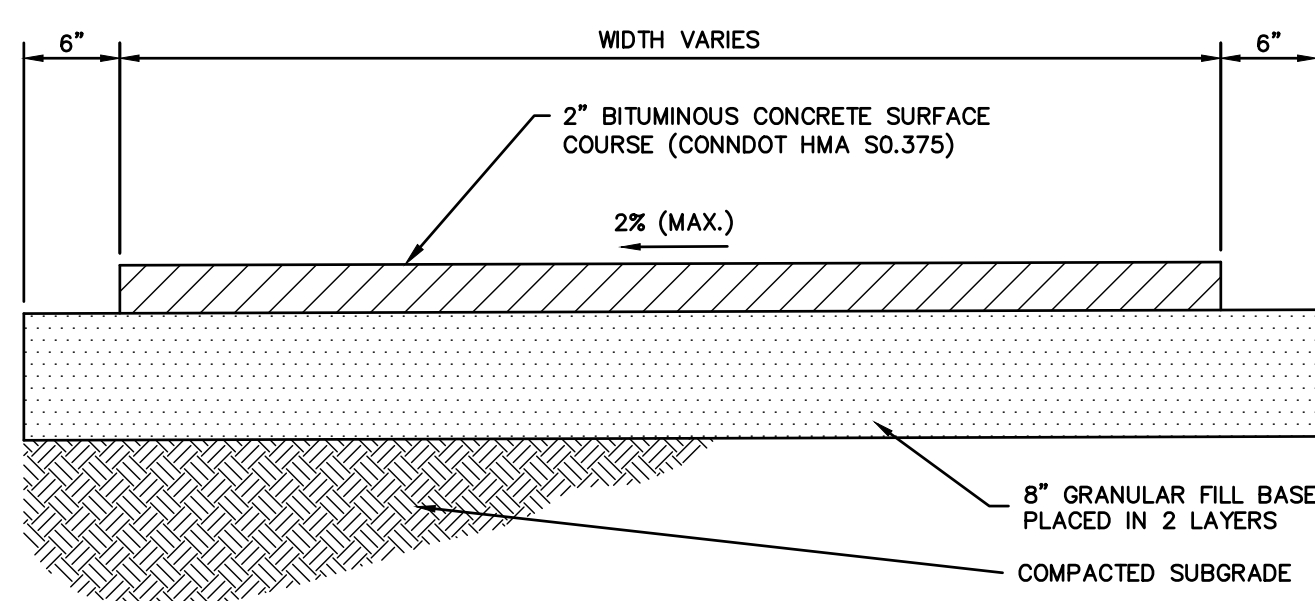
NOTES:

- TOPSOIL REMOVED FROM THE FIELD MAY BE USED FOR THE RESTORATION OF OTHER PROJECT AREAS WITH APPROVAL OF THE ENGINEER. THE TOWN SHALL RETAIN OWNERSHIP OF ALL EXCESS TOPSOIL NOT USED ON THE PROJECT. ALL EXCESS TOPSOIL SHALL BE TRANSPORTED TO THE FOLLOWING OFF-SITE LOCATION: 281 HUCKLEBERRY HILL ROAD, AVON, CONNECTICUT, AND DEPOSITED AT THE SPECIFIC LOCATION DIRECTED BY THE TOWN OF AVON UNDER BID ITEM #1. IF ADDITIONAL TOPSOIL REMOVAL WITHIN THE FIELD AREA IS REQUESTED BY THE ENGINEER BEYOND THE LIMITS CALLED FOR ON THE DRAWINGS, SUCH ADDITIONAL TOPSOIL SHALL BE REMOVED, LOADED, AND TRANSPORTED TO THE OFF-SITE LOCATION UNDER BID ITEM #6. DO NOT MIX SUBSOIL WITH TOPSOIL. MIXED SOIL SHALL BE CONSIDERED SUBSOIL AND SHALL BE REMOVED FROM THE SITE. EXCESSIVE MIXING OF TOPSOIL AND SUBSOIL SHALL BE CONSIDERED DAMAGE TO EXISTING CONDITIONS, FOR WHICH CONTRACTOR SHALL BE RESPONSIBLE FOR COMPENSATING OWNER.
- ALL OTHER EXCESS SOIL MATERIALS SHALL BECOME PROPERTY OF THE CONTRACTOR AND SHALL BE PROPERLY REMOVED FROM THE SITE AND DISPOSED OF IN A LEGAL MANNER.

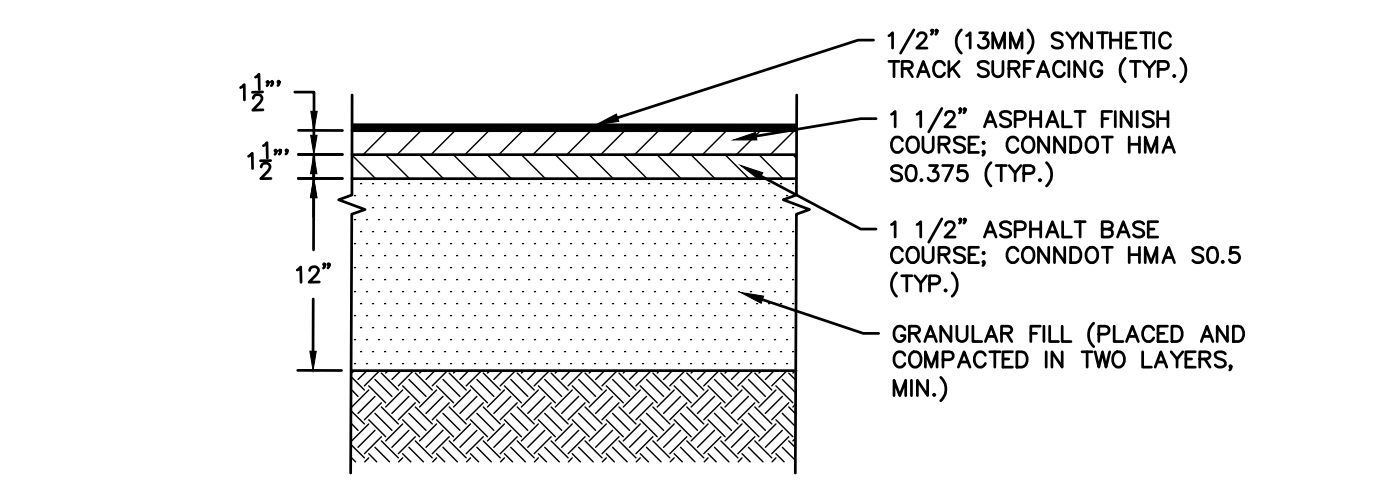
2 TYPICAL FIELD EXCAVATION
SCALE: NONE



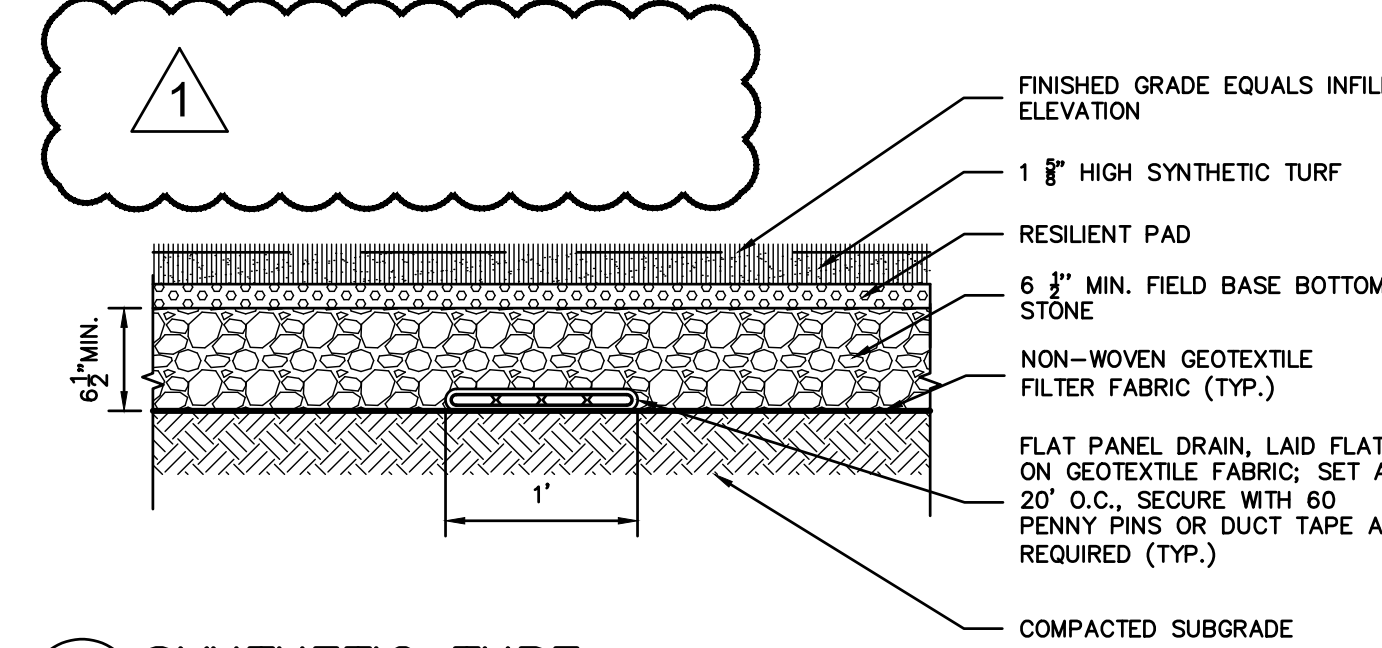
3 BITUMINOUS CONCRETE PAVEMENT
SCALE: NONE



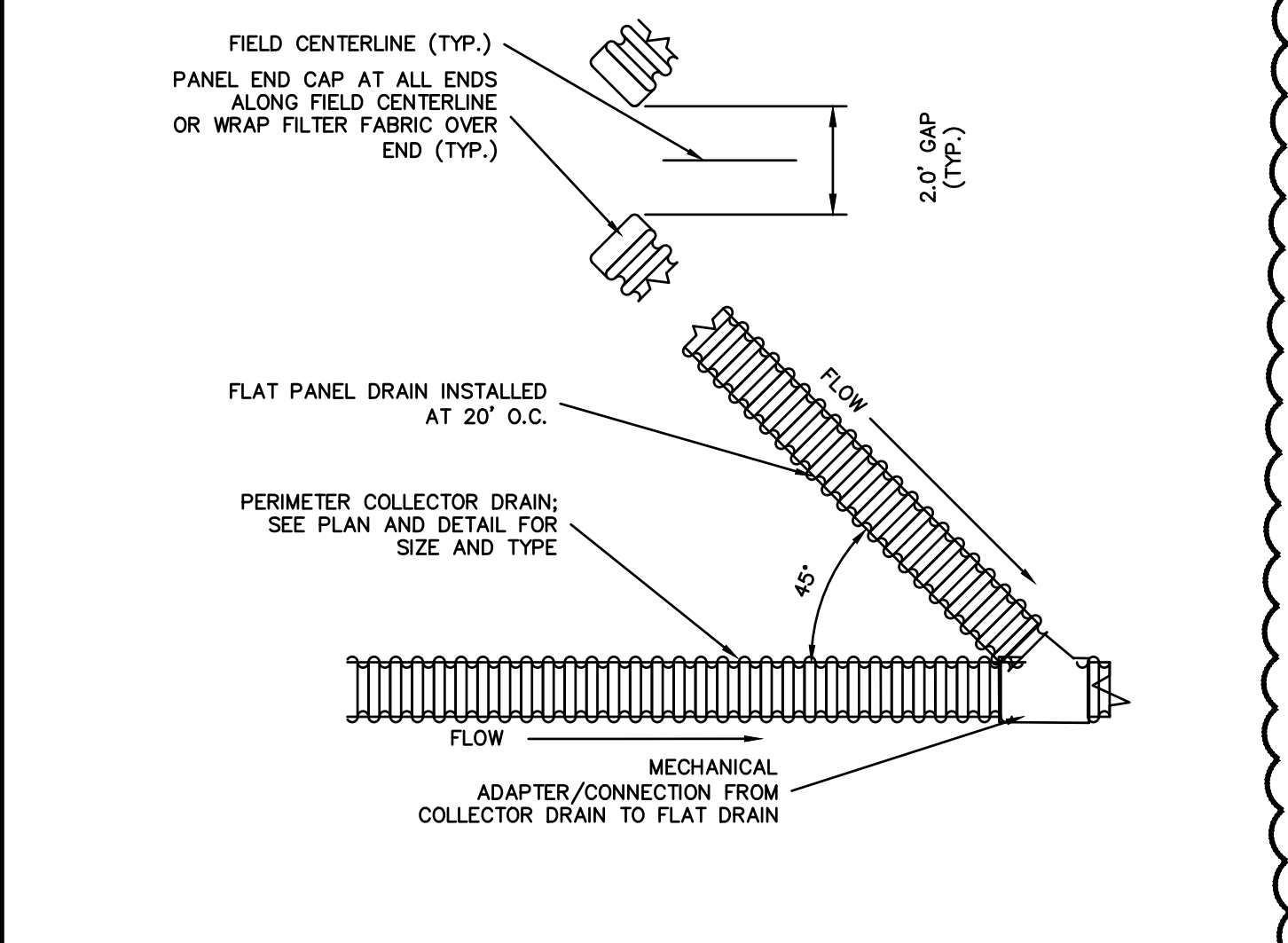
4 BITUMINOUS CONCRETE SIDEWALK
SCALE: NONE



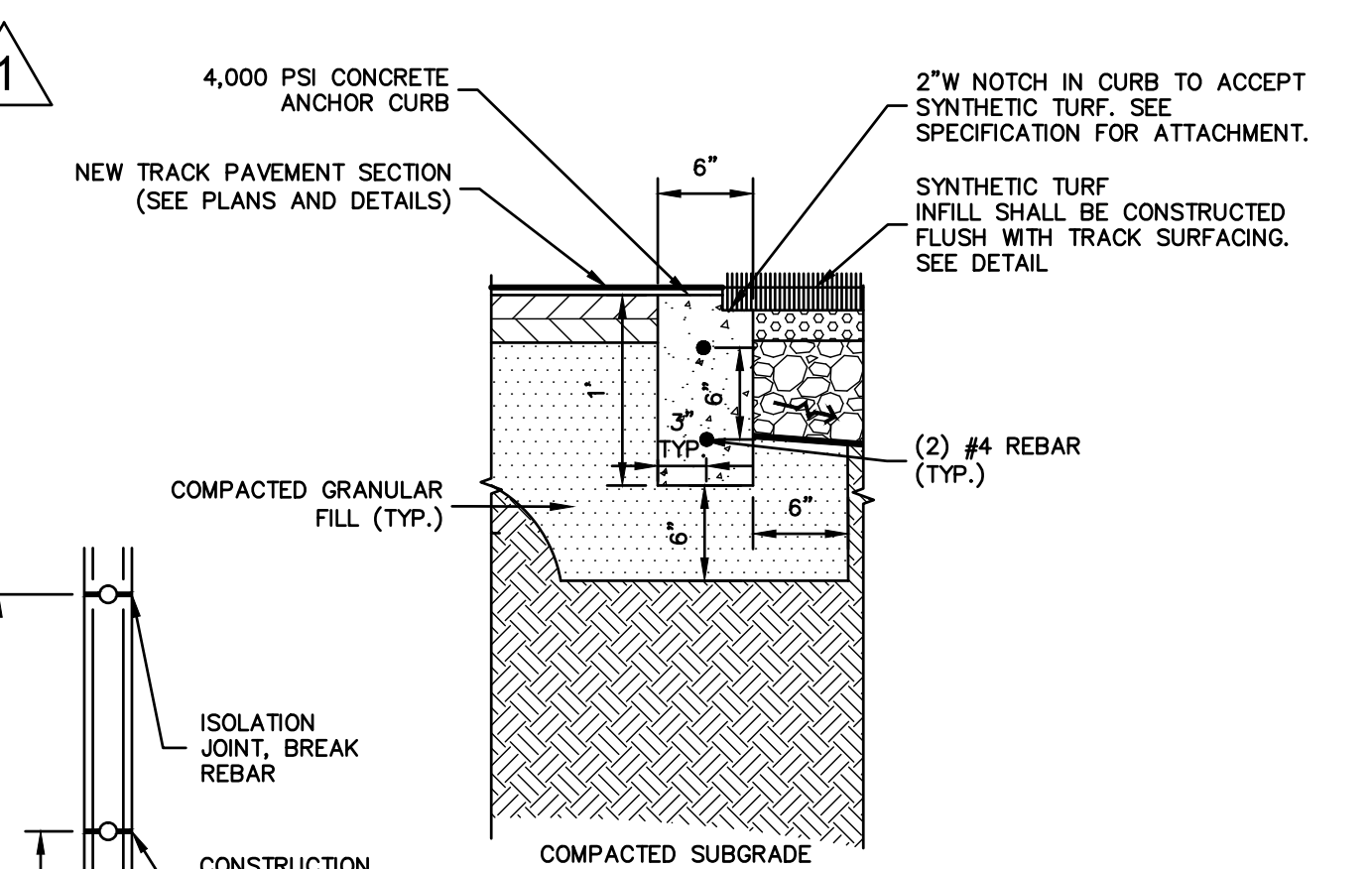
5 NEW TRACK PAVEMENT SECTION
SCALE: NONE



6 SYNTHETIC TURF
SCALE: NONE



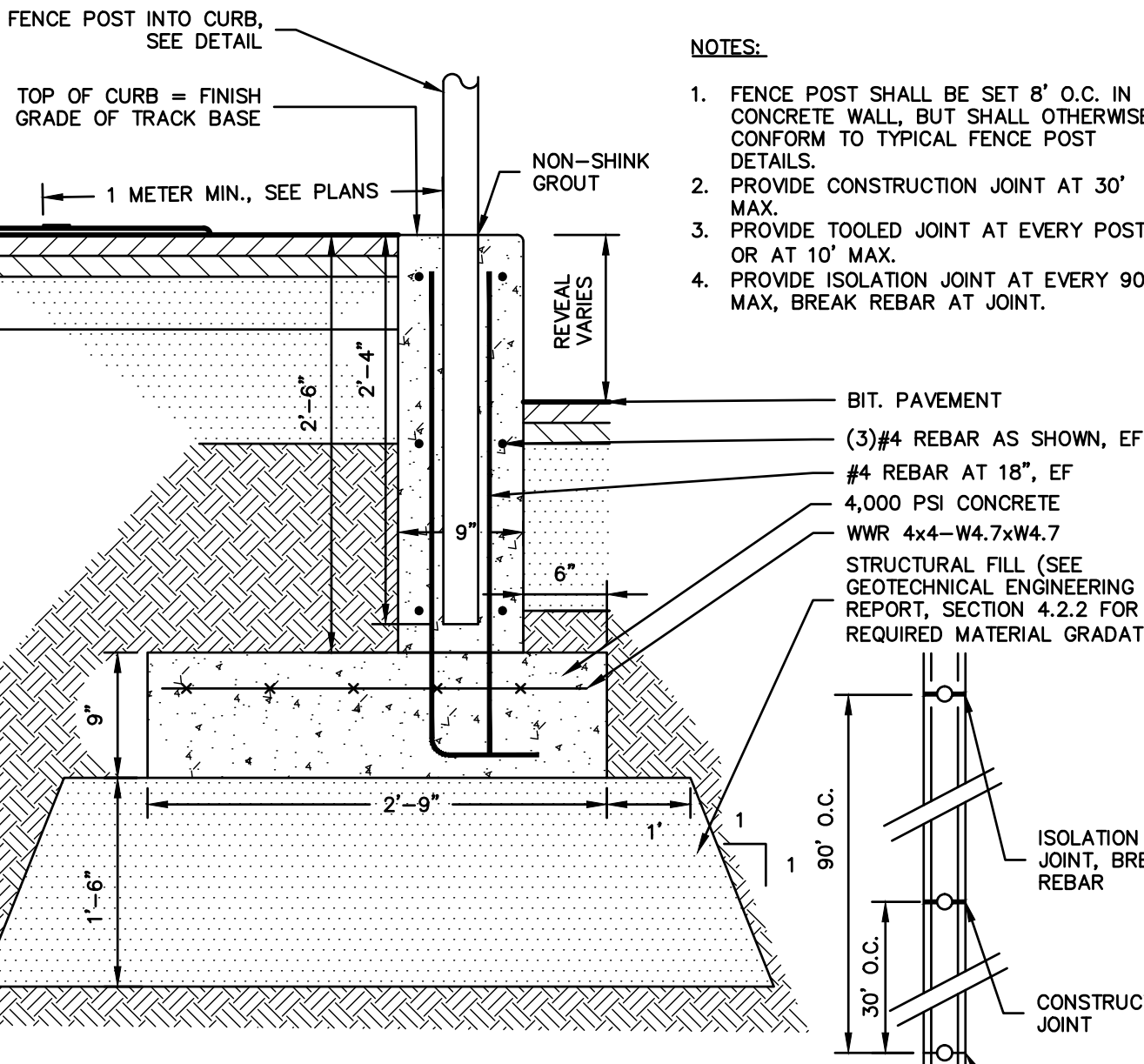
7 FLAT PANEL AND COLLECTOR DRAIN CONNECTION
SCALE: NONE



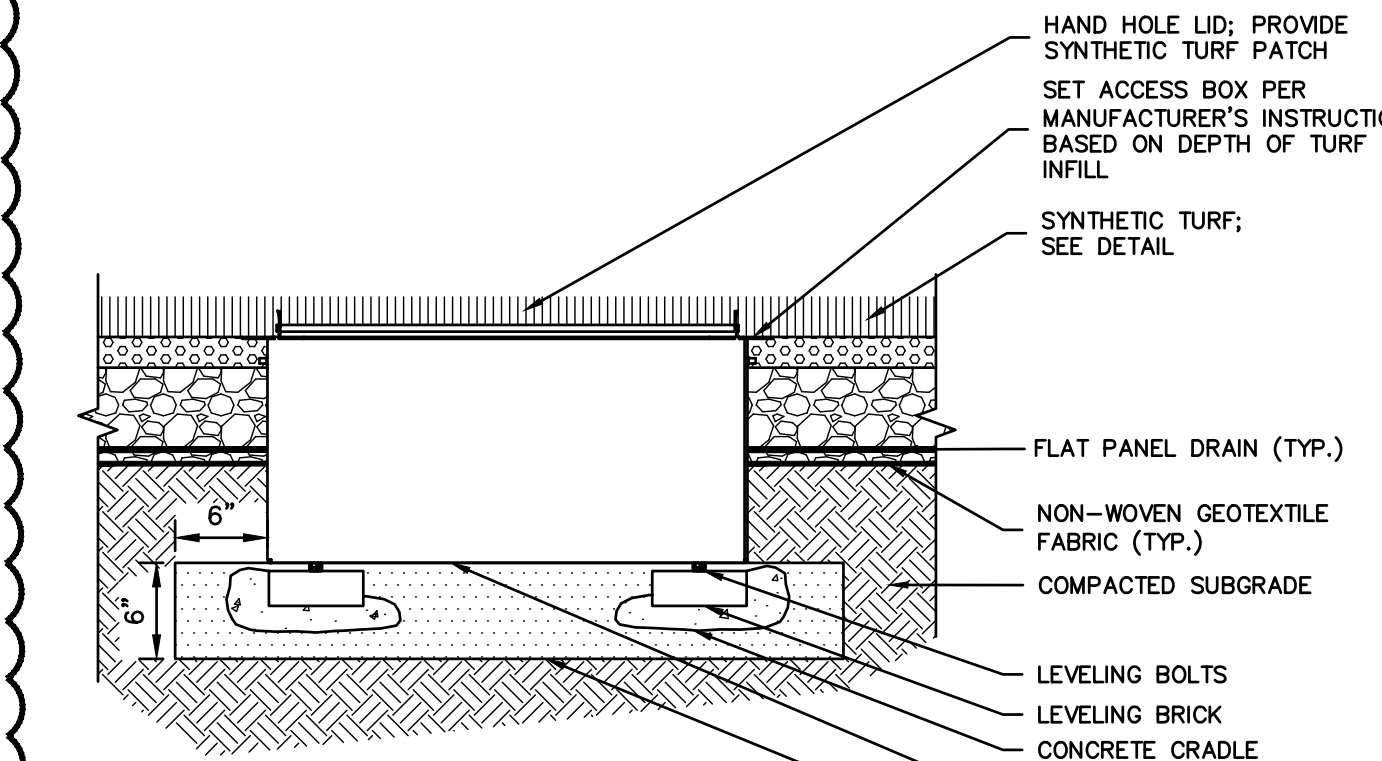
NOTES:

- PROVIDE CONSTRUCTION JOINT AT 30' MAX.
- PROVIDE TOOLED JOINT AT EVERY POST, OR AT 10' MAX.
- PROVIDE ISOLATION JOINT AT EVERY 90' MAX, BREAK REBAR AT JOINT.

8 CONCRETE ANCHOR CURB AT NEW TRACK
SCALE: NONE



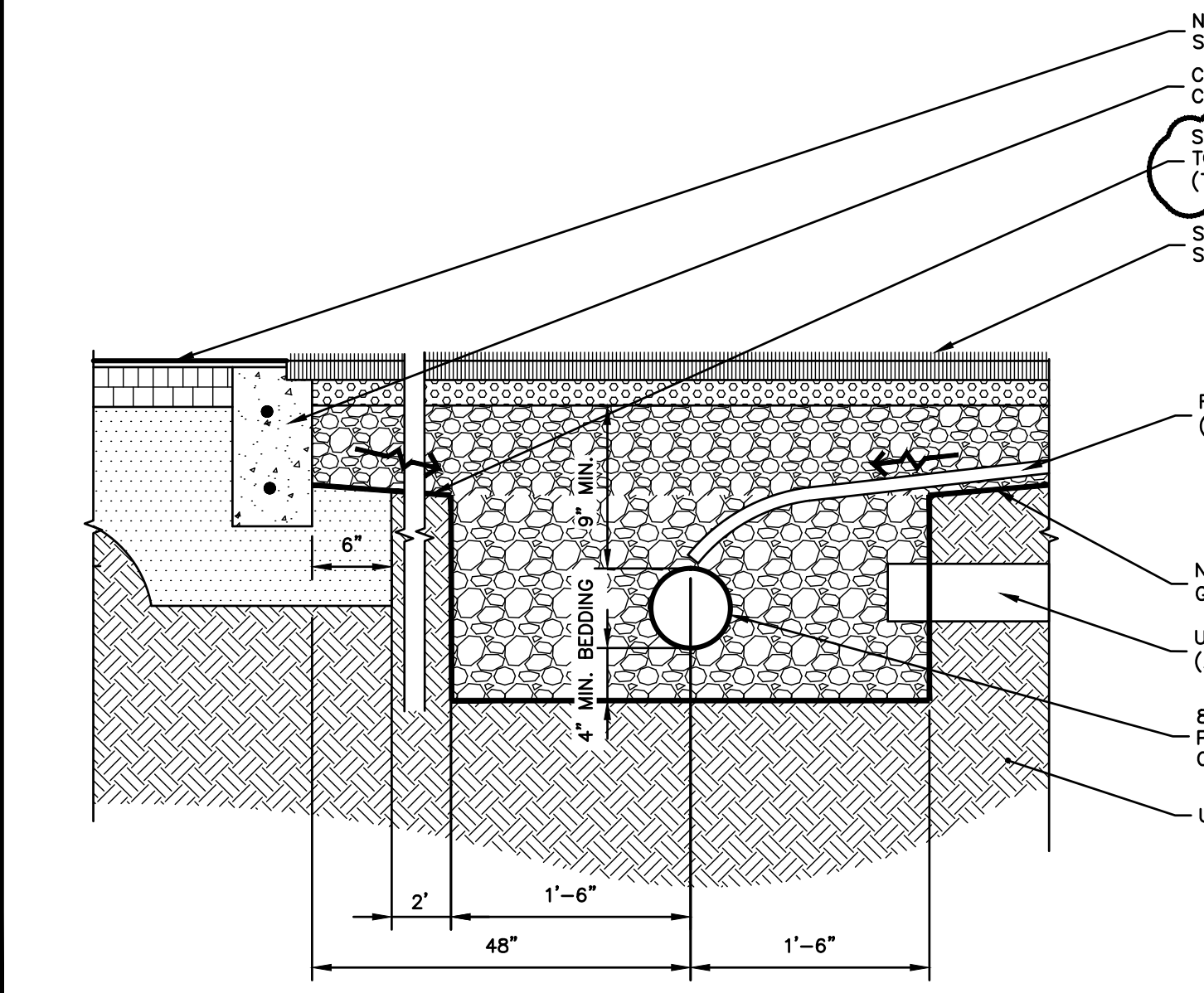
9 CONCRETE WALL AT EXISTING BLEACHERS
SCALE: NONE



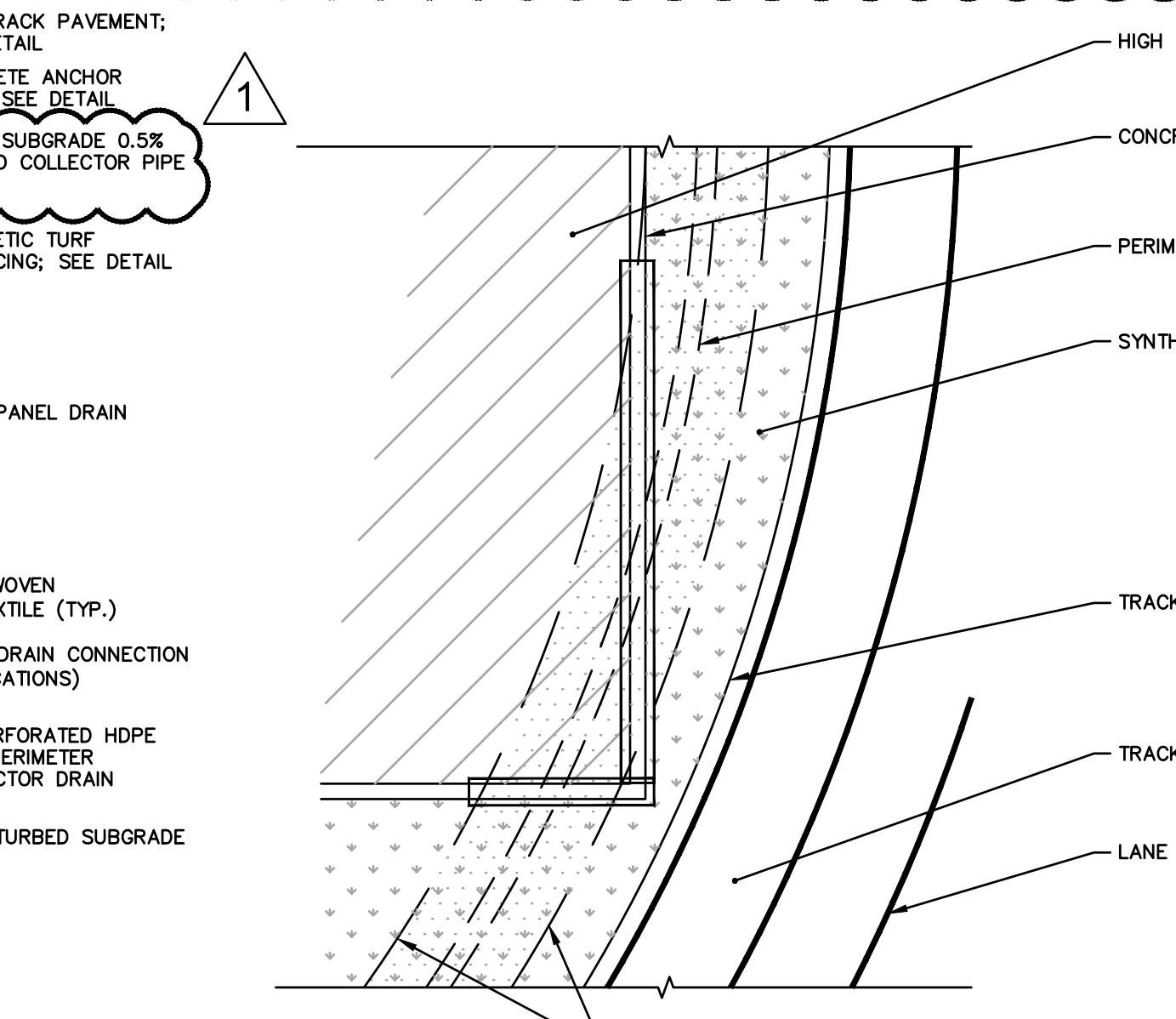
NOTES:

- THIS DETAIL IS DIAGRAMMATIC. REFER TO MANUFACTURER'S SPECIFICATIONS AND INSTALLATION INSTRUCTIONS.
- HANDHOLE FOR ELECTRICAL SERVICE: CBT1815 COMBOX AS MANUFACTURED BY SPORTSFIELD SPECIALTIES, INC., 41155 STATE HIGHWAY 10, PO BOX 231, DELHI, NY OR APPROVED EQUAL.
- HANDHOLE FOR COMBINED SCOREBOARD CONTROL AND ELECTRICAL SERVICE: OBN1830 COMBOX AS MANUFACTURED BY SPORTSFIELD SPECIALTIES, INC., 41155 STATE HIGHWAY 10, PO BOX 231, DELHI, NY OR APPROVED EQUAL.
- HANDHOLE FOR WATER SERVICE: TURFCOOL QUICK CONNECT VALVE/GATE BOX, TQ10CV AS MANUFACTURED BY SPORTSFIELD SPECIALTIES, INC., 41155 STATE HIGHWAY 10, PO BOX 231, DELHI, NY OR APPROVED EQUAL. HOSE CONNECTION TYPE TO BE DETERMINED BY OWNER.

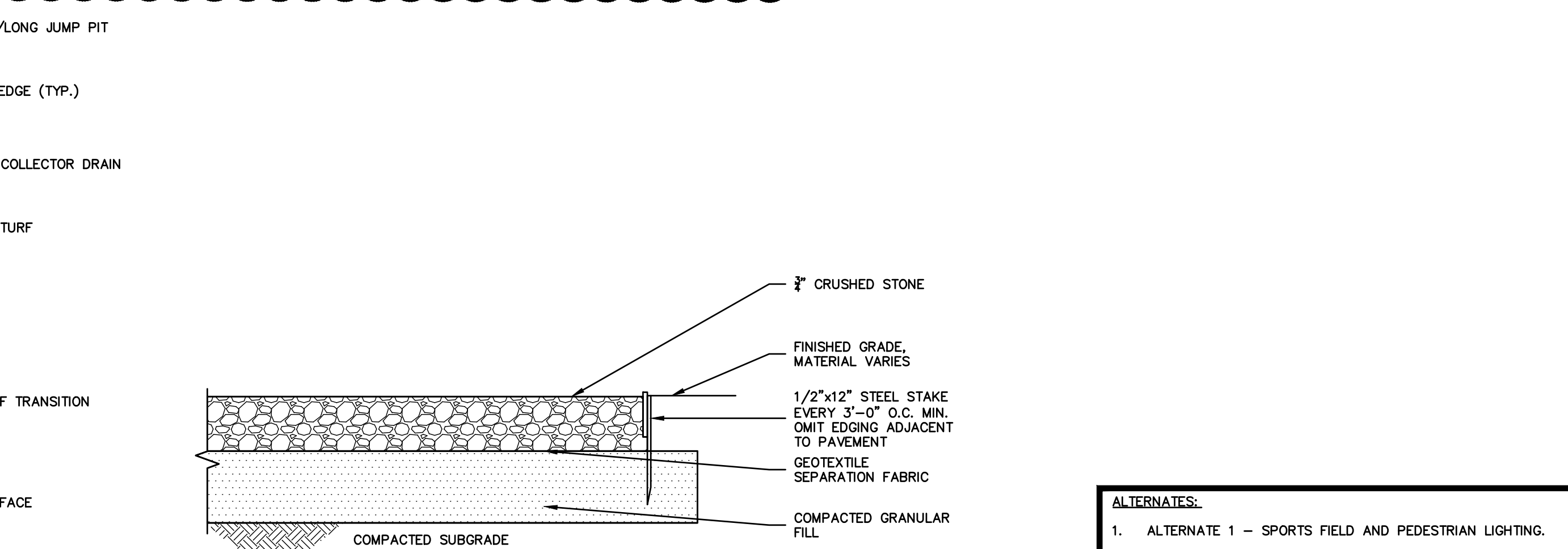
10 HANDHOLE IN SYNTHETIC TURF
SCALE: NONE



11 PERIMETER COLLECTOR DRAIN
SCALE: NONE



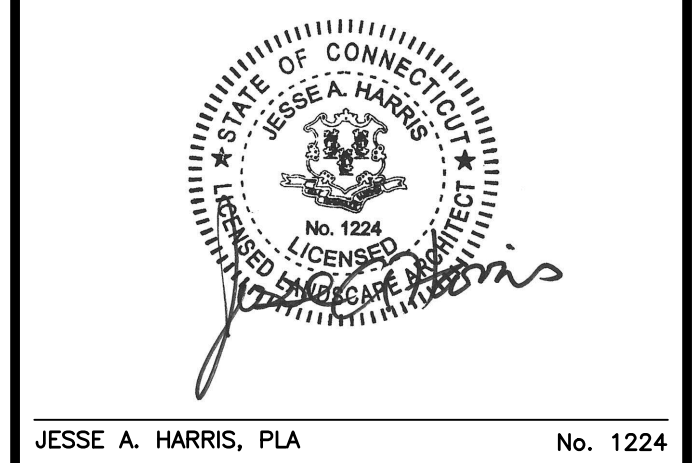
12 CONCRETE EDGE/COLLECTOR DRAIN CROSSING
SCALE: NONE



ALTERNATES:

- ALTERNATE 1 - SPORTS FIELD AND PEDESTRIAN LIGHTING.
- ALTERNATE 2 - SPORTS FIELD AND PEDESTRIAN LIGHTING, EXTENDED CONSTRUCTION SCHEDULE
- ALTERNATE 3 - LANDSCAPE PLANT BUFFER, WEST AVON ROAD AND SUDBURY WAY
- ALTERNATE 4 - LANDSCAPE PLANT BUFFER, SOUTHEAST
- ALTERNATE 5 - LANDSCAPE PLANT BUFFER, NORTH FIELD

13 CRUSHED STONE PAD
SCALE: NONE



ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL

510 WEST AVON ROAD

IN AVON CONNECTICUT

DETAILS

FEBRUARY 22, 2019

REVISIONS:

1	2019/02/22	ADDENDUM 1

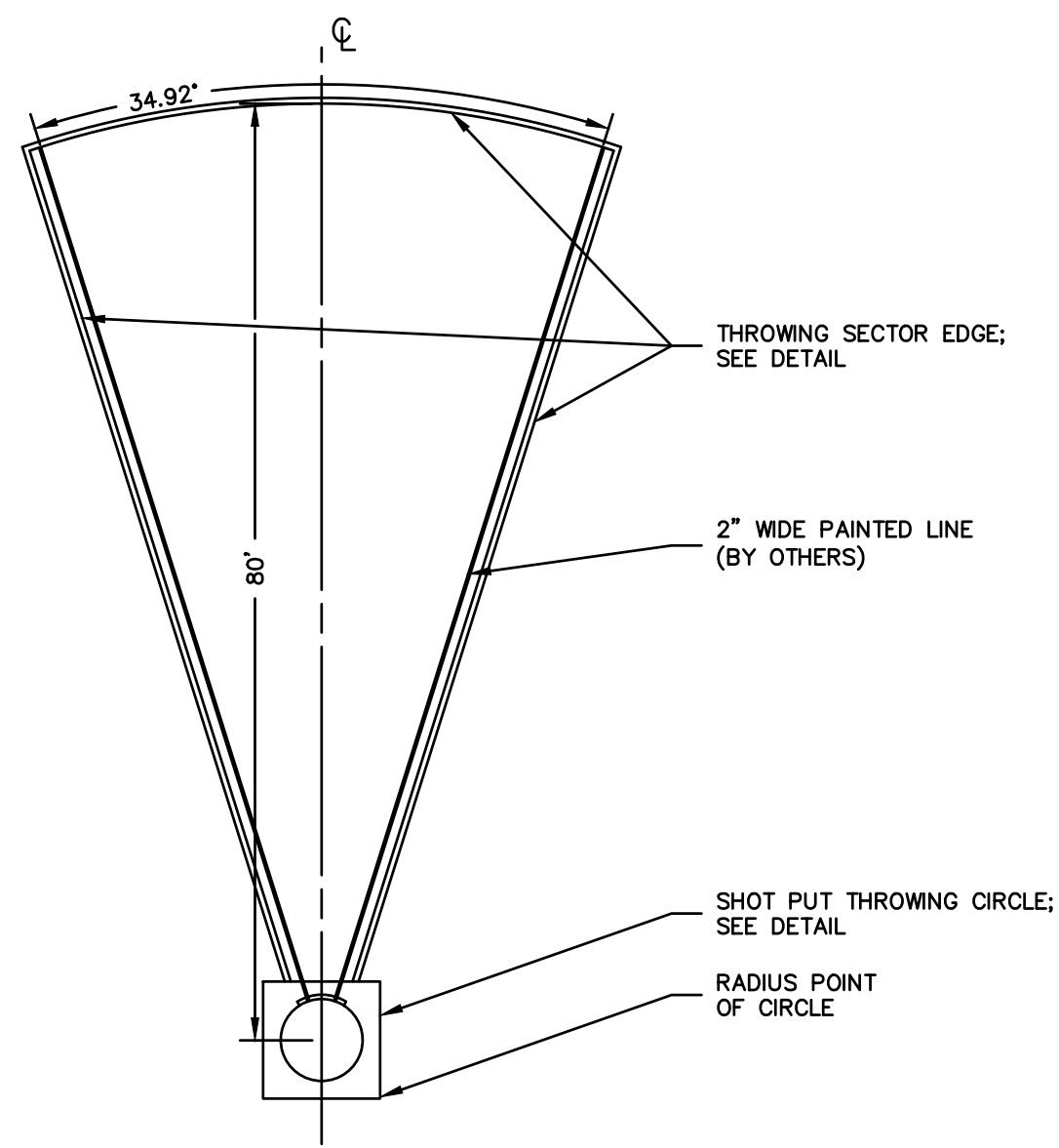
PREPARED FOR:
TOWN OF AVON
60 WEST MAIN STREET
AVON, CT 06001

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

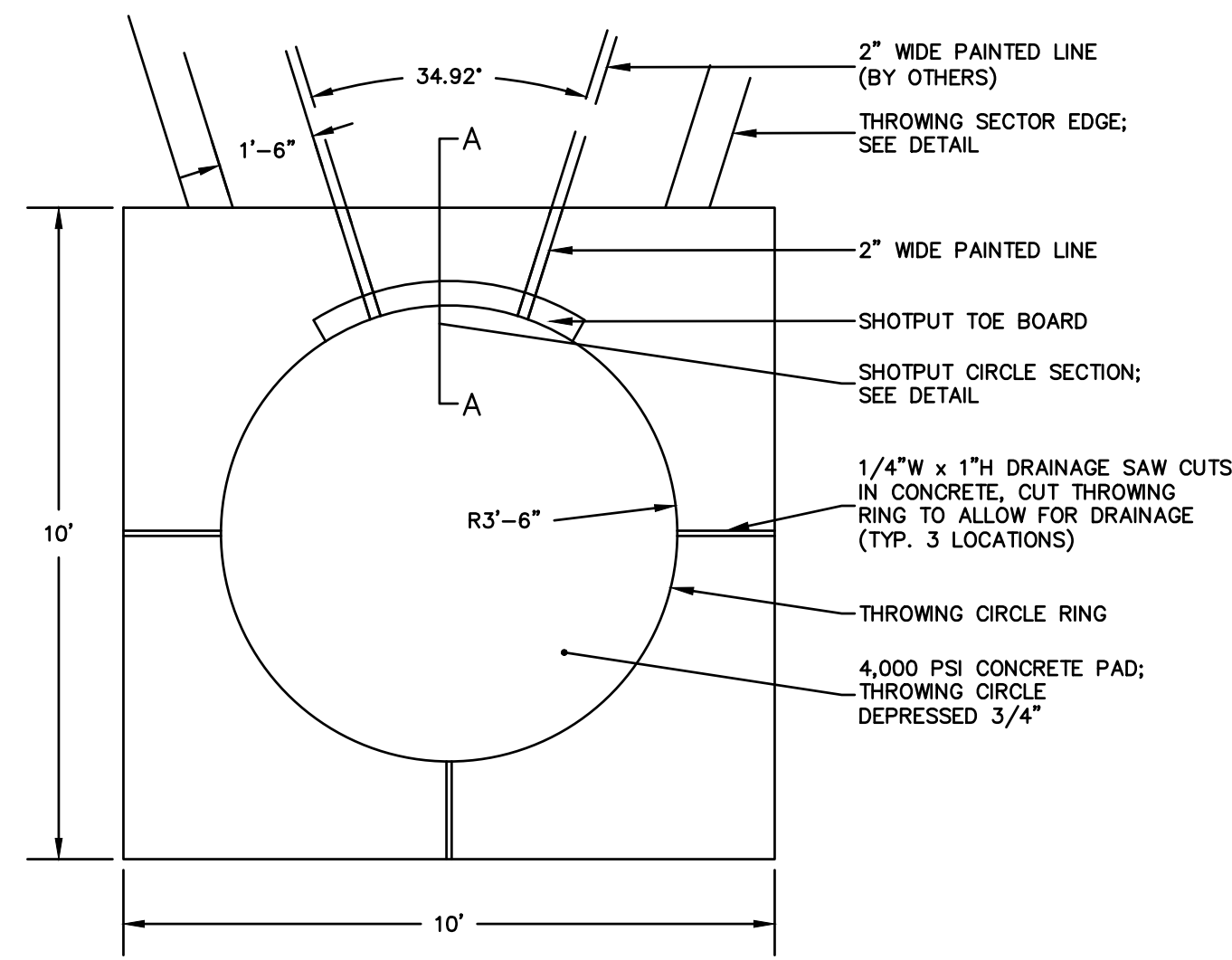
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SCALE: AS SHOWN

FILE: 8357202 - DET.DWG
DWG. NO:
JOB. NO: 83572.02

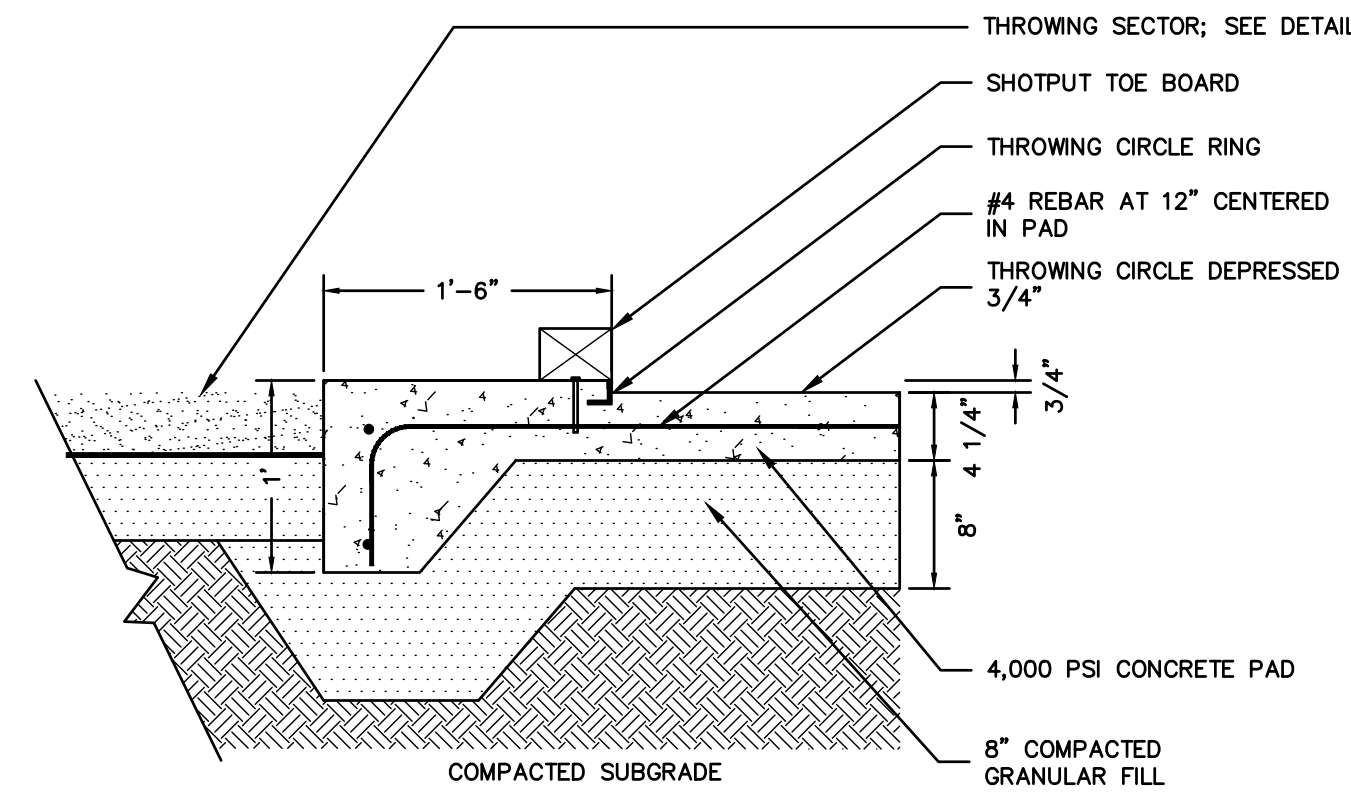
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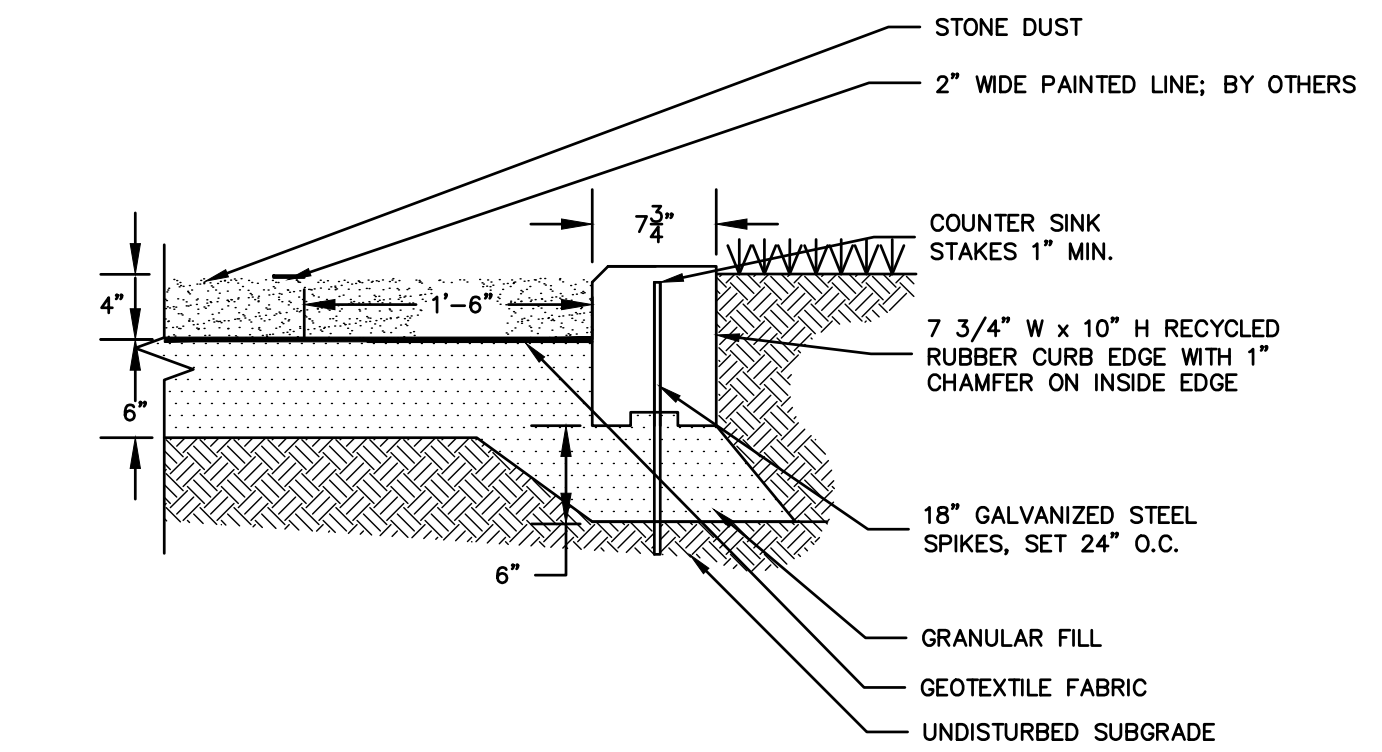
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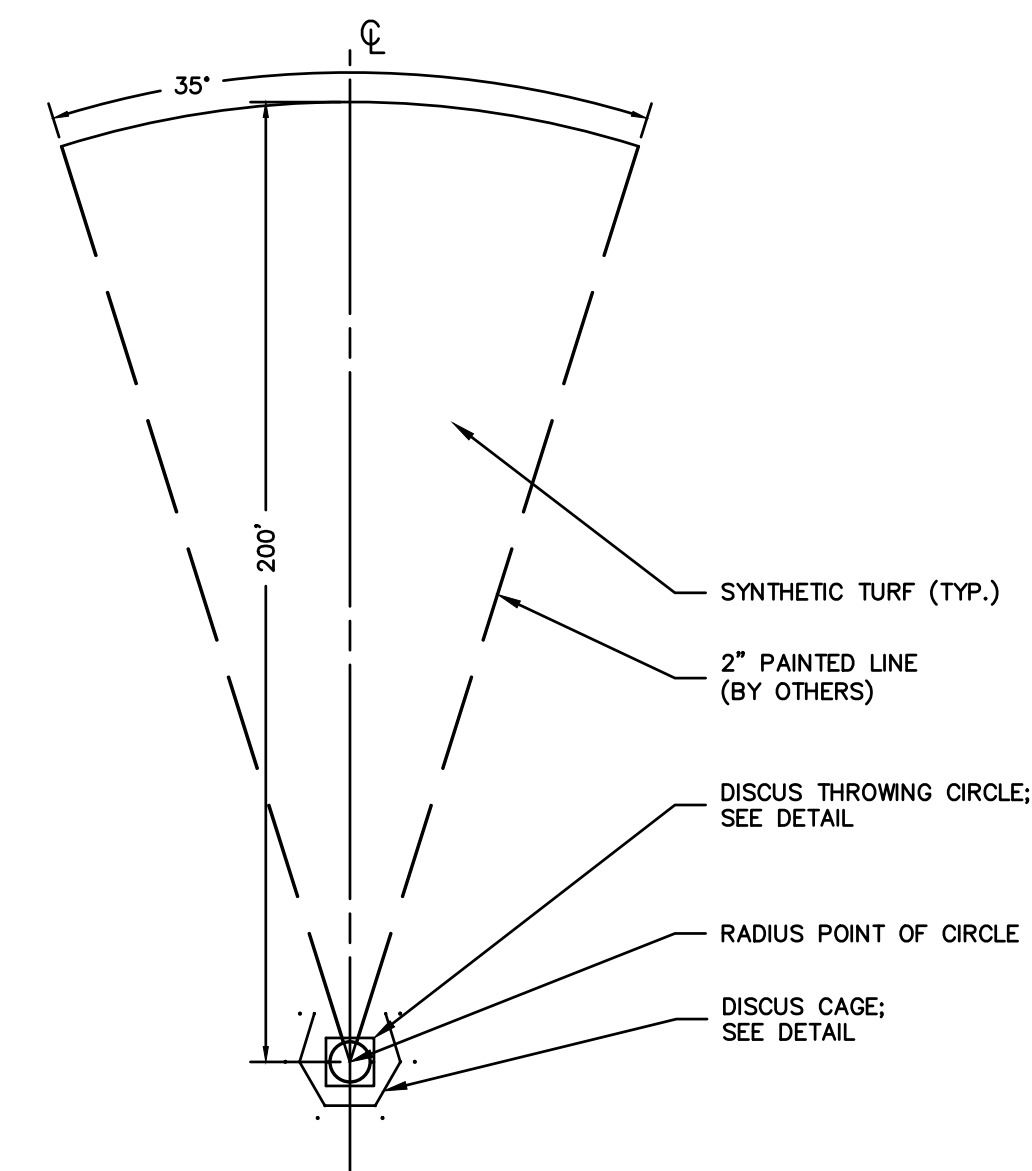
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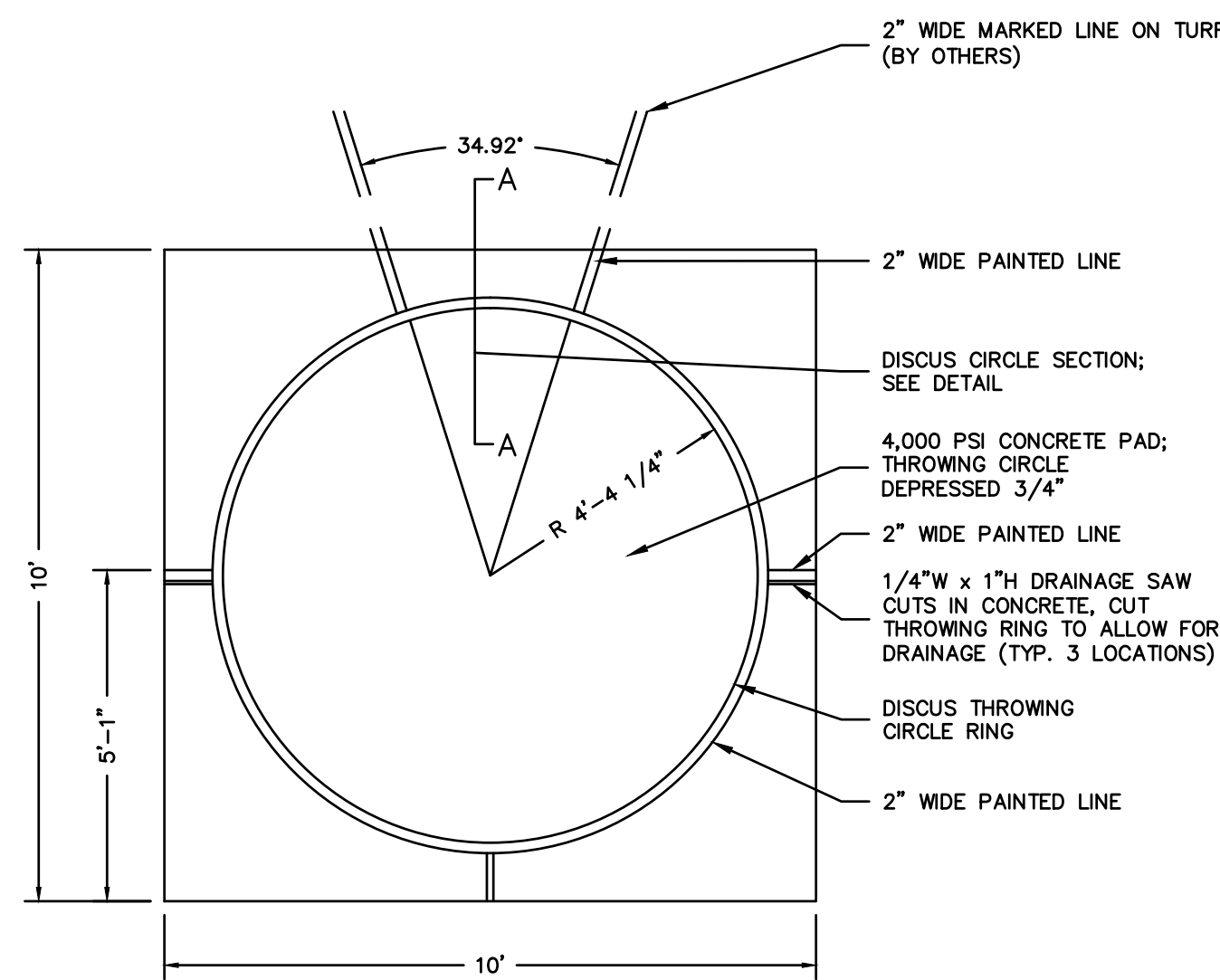
3 SHOT PUT CIRCLE SECTION
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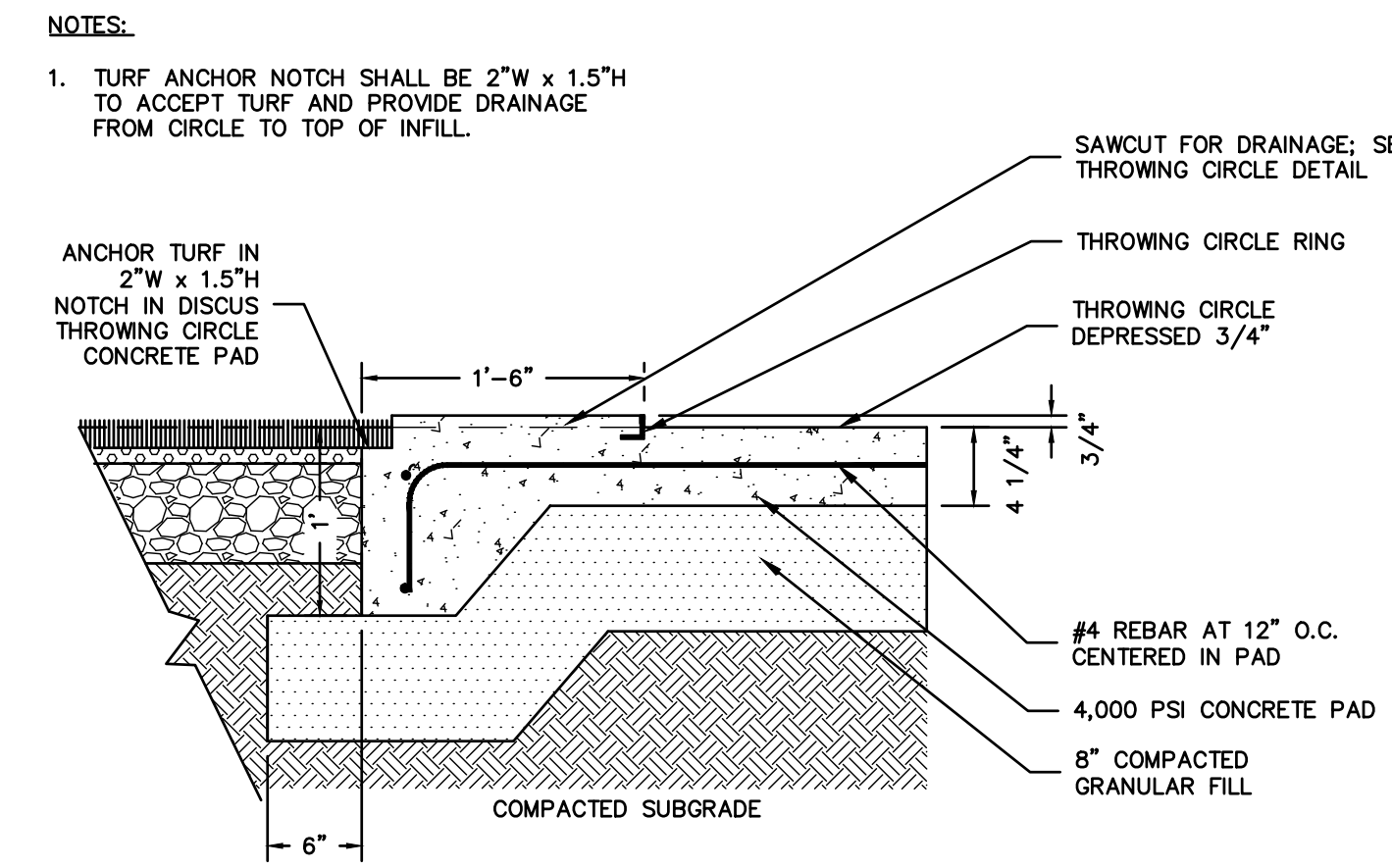
4 THrowing SECTOR EDGE
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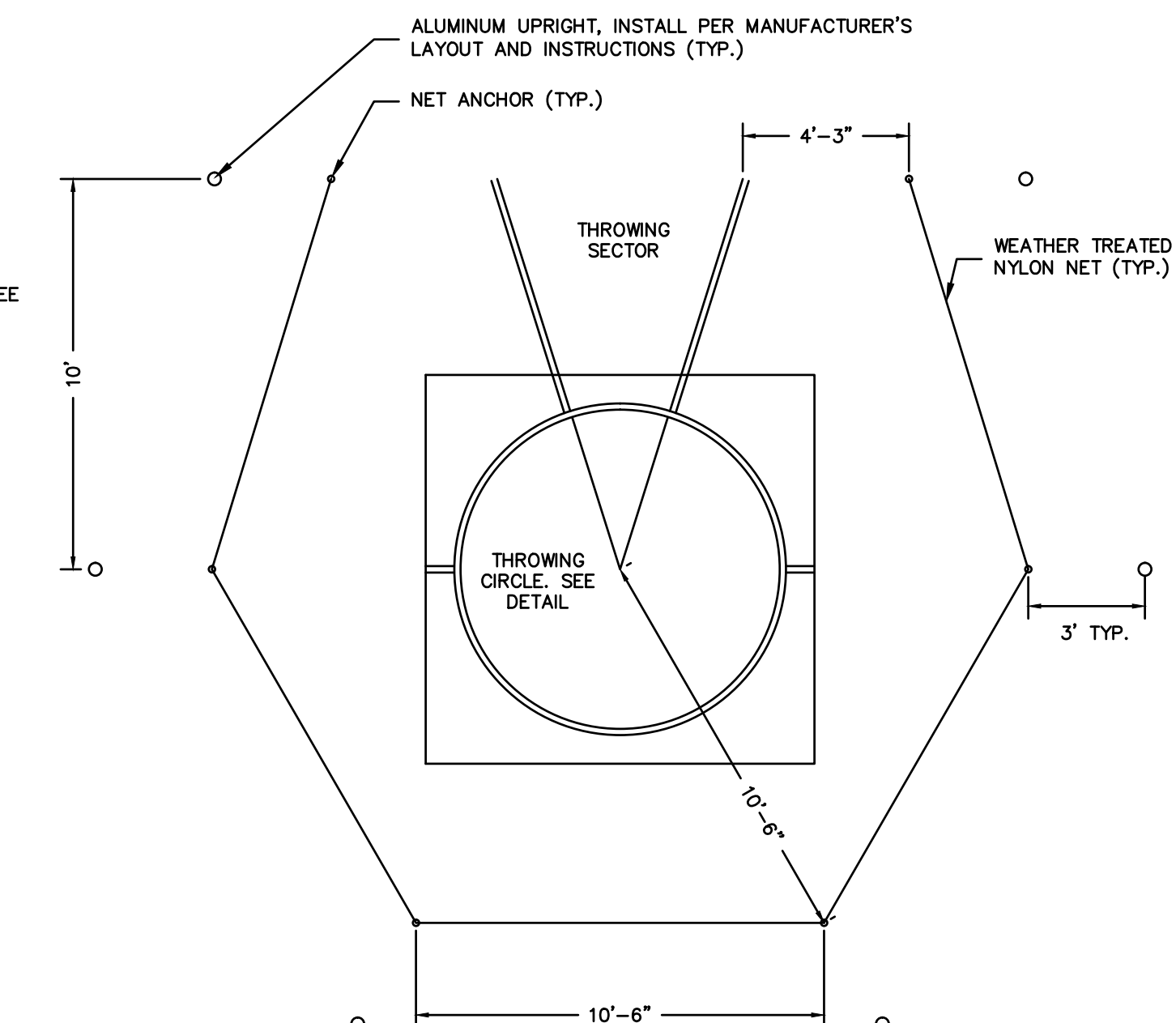
5 DISCUS LAYOUT
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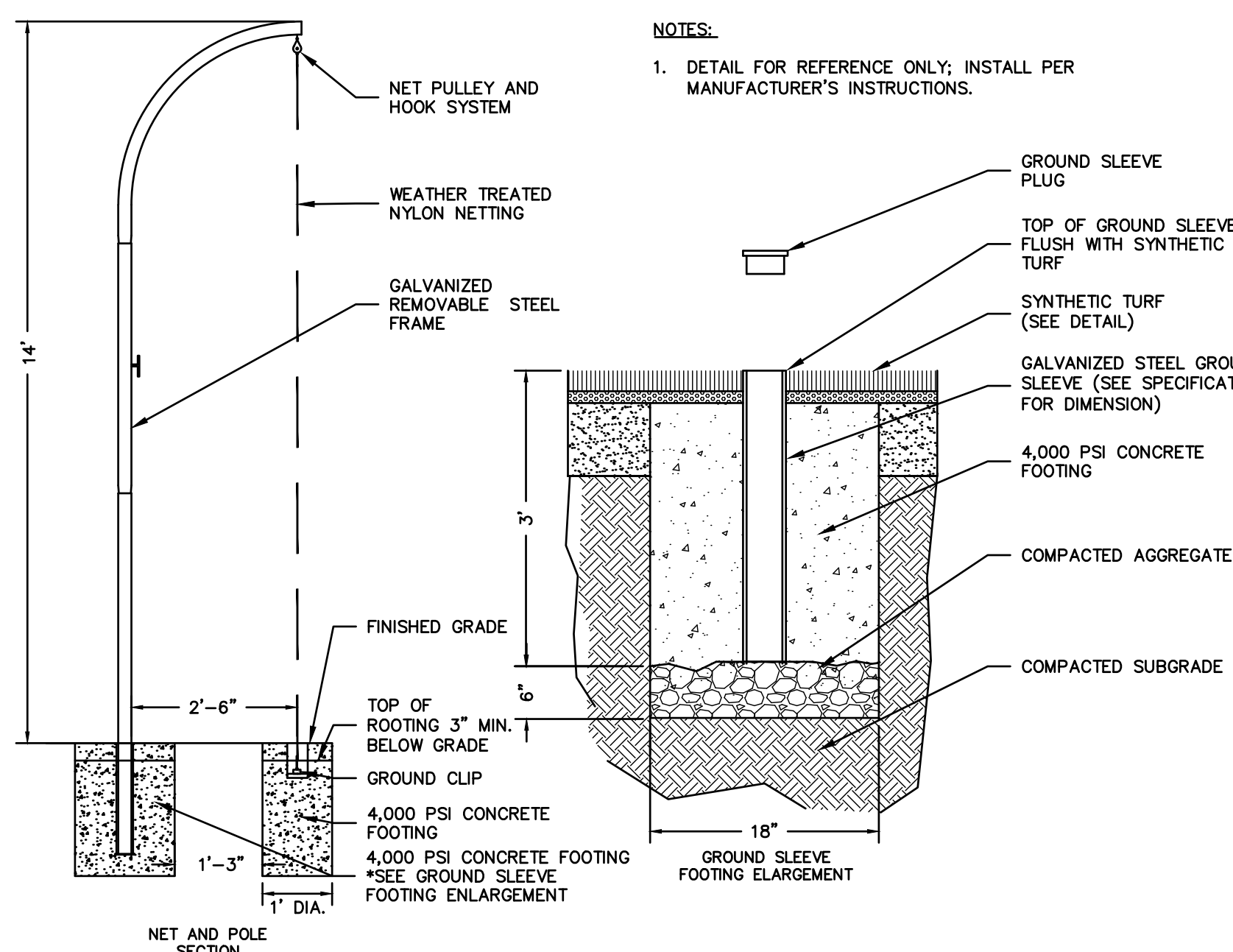
6 DISCUS THrowing CIRCLE
SCALE: NONE



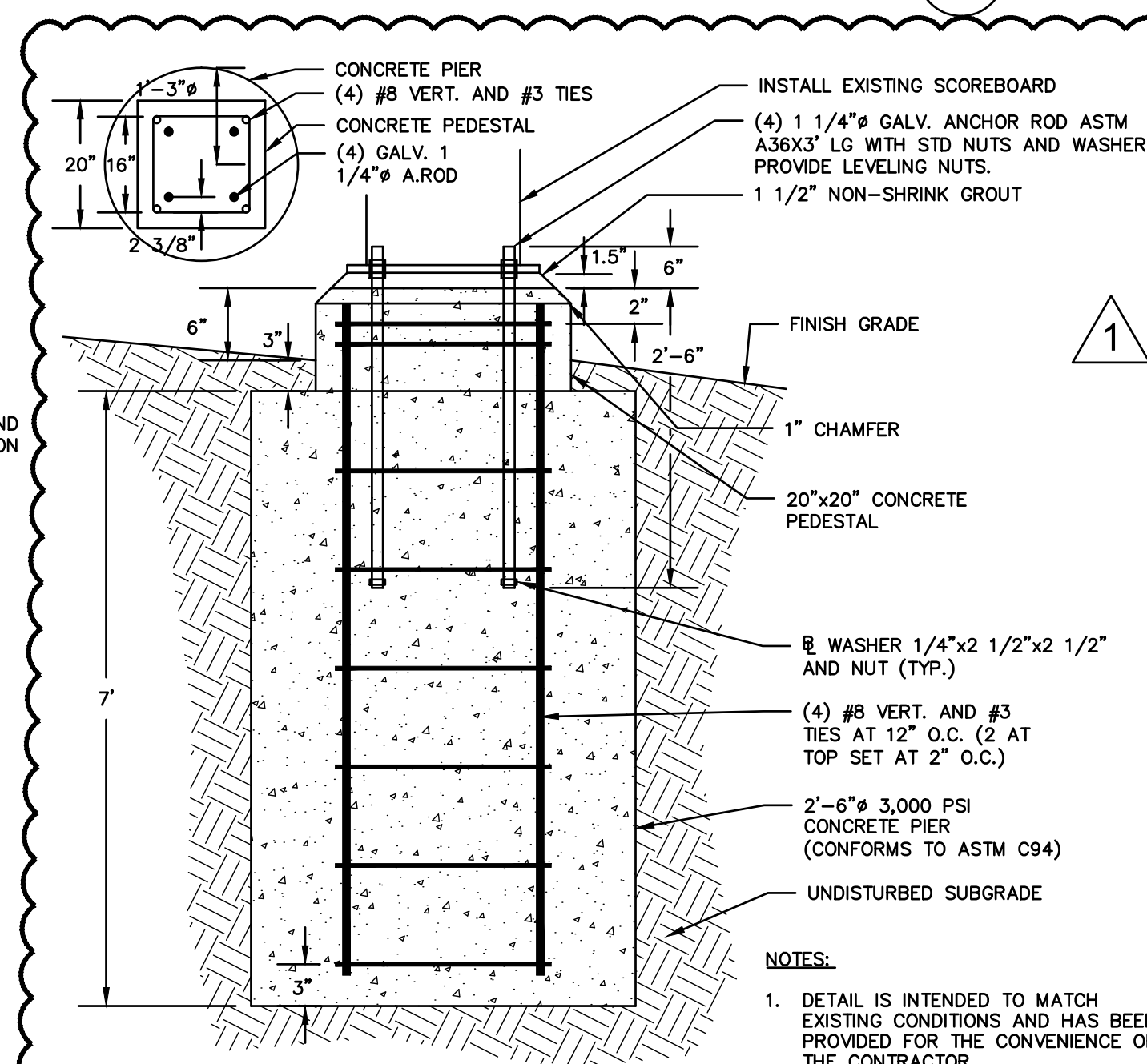
7 DISCUS CIRCLE SECTION
SCALE: NONE



8 DISCUS CAGE LAYOUT
SCALE: NONE



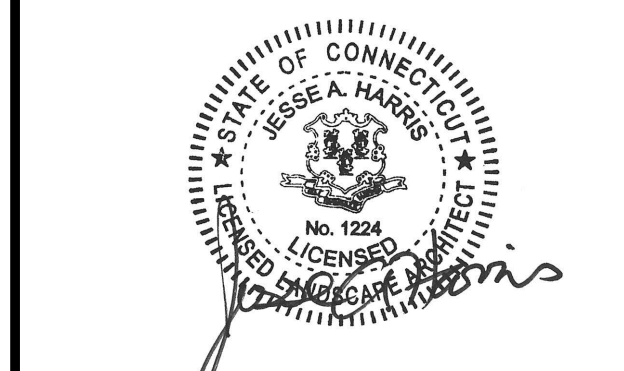
9 DISCUS CAGE
SCALE: NONE



10 SCOREBOARD FOOTING
SCALE: NONE



11 PREFABRICATED STORAGE BUILDING
SCALE: NONE



JESSE A. HARRIS, P.E. No. 1224

ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL

510 WEST AVON ROAD

IN AVON CONNECTICUT

DETAILS

FEBRUARY 22, 2019

REVISIONS:

1	2019/02/22	ADDENDUM 1

PREPARED FOR:
TOWN OF AVON
60 WEST MAIN STREET
AVON, CT 06001

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

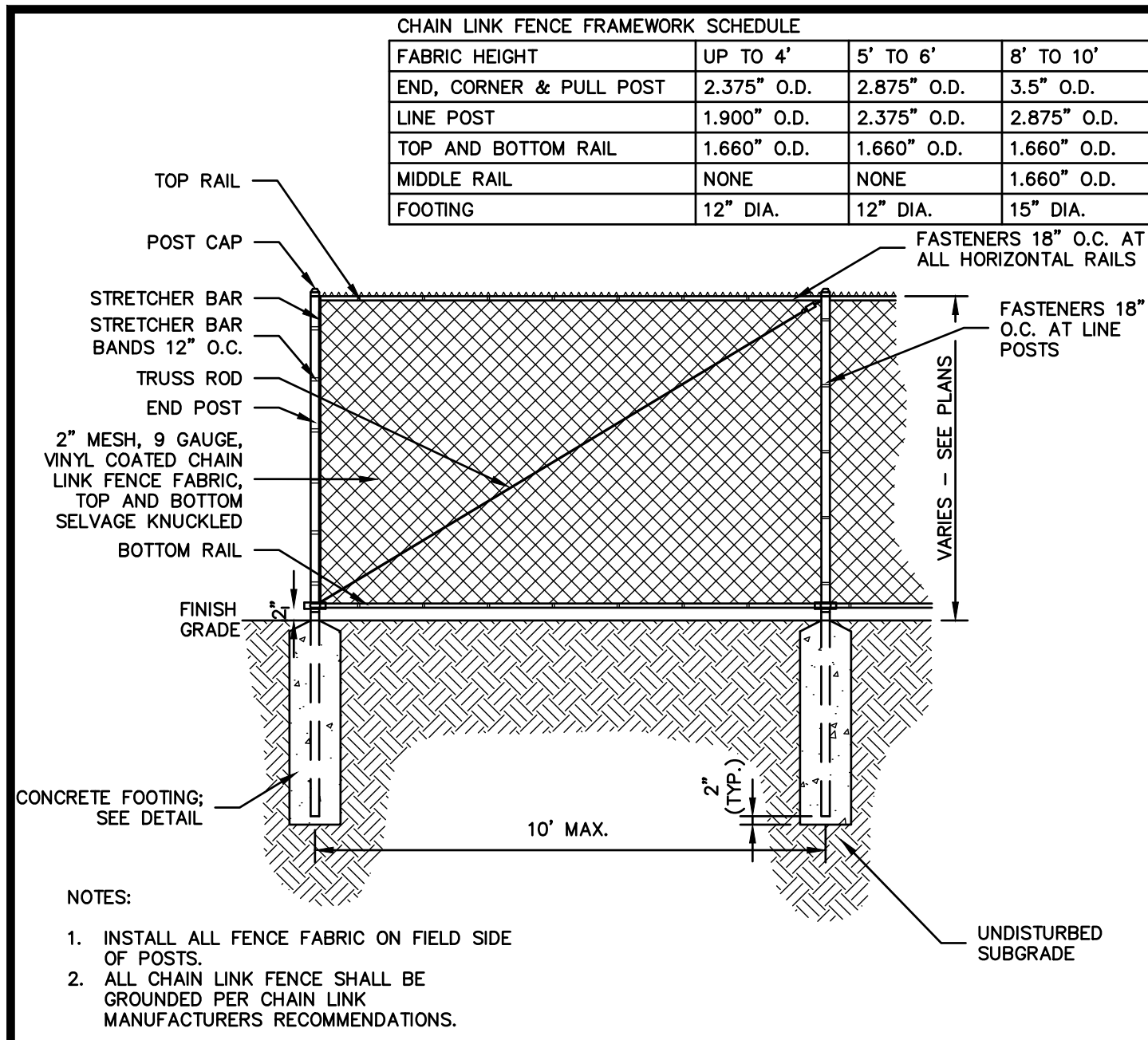
- ALTERNATES:
- ALTERNATE 1 - SPORTS FIELD AND PEDESTRIAN LIGHTING.
 - ALTERNATE 2 - SPORTS FIELD AND PEDESTRIAN LIGHTING, EXTENDED CONSTRUCTION SCHEDULE
 - ALTERNATE 3 - LANDSCAPE PLANT BUFFER, WEST AVON ROAD AND SUDBURY WAY
 - ALTERNATE 4 - LANDSCAPE PLANT BUFFER, SOUTHEAST
 - ALTERNATE 5 - LANDSCAPE PLANT BUFFER, NORTH FIELD

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SCALE: AS SHOWN

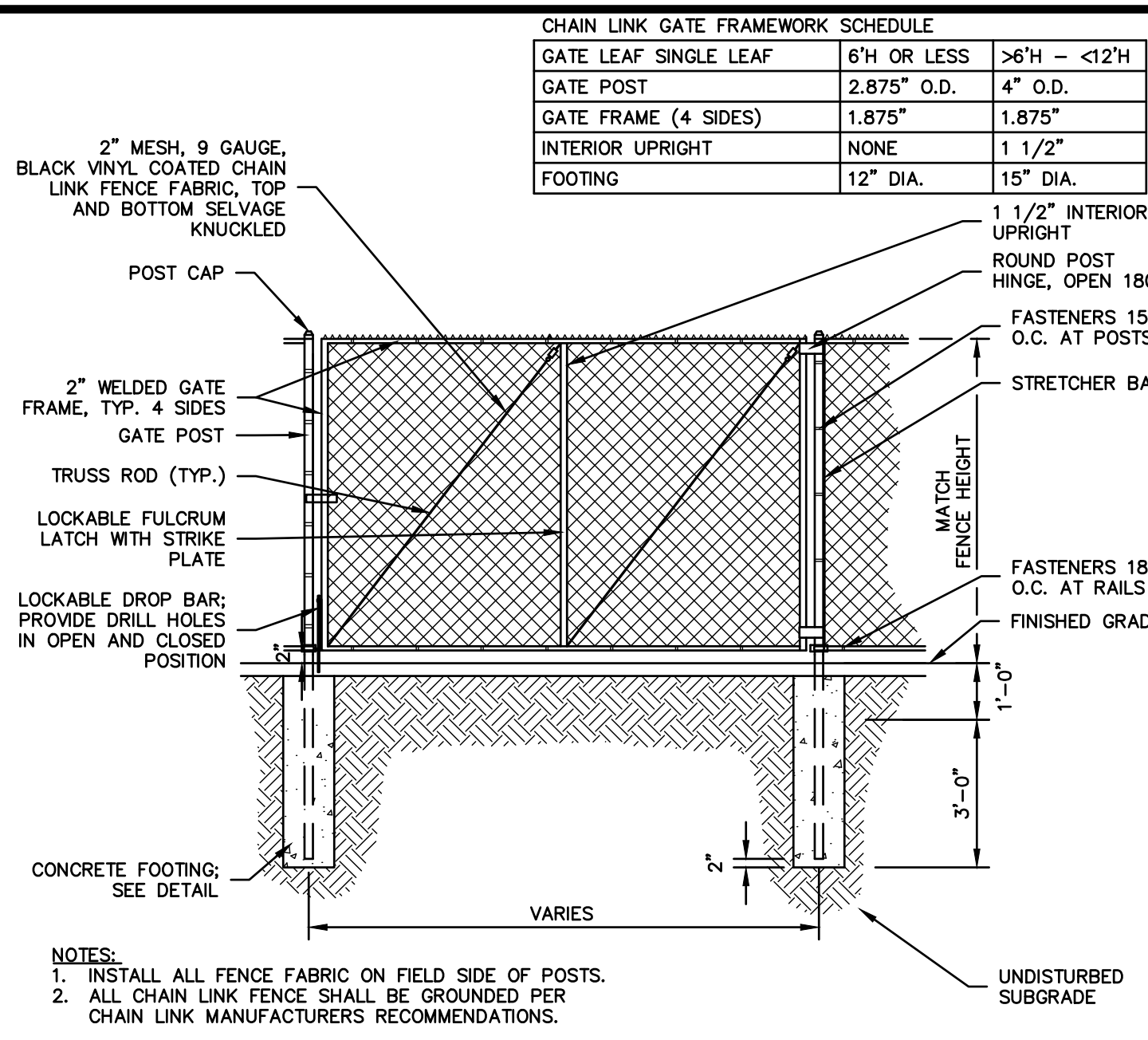
FILE: 8357202 - DET.DWG
DWG. NO:
JOB. NO: 83572.02

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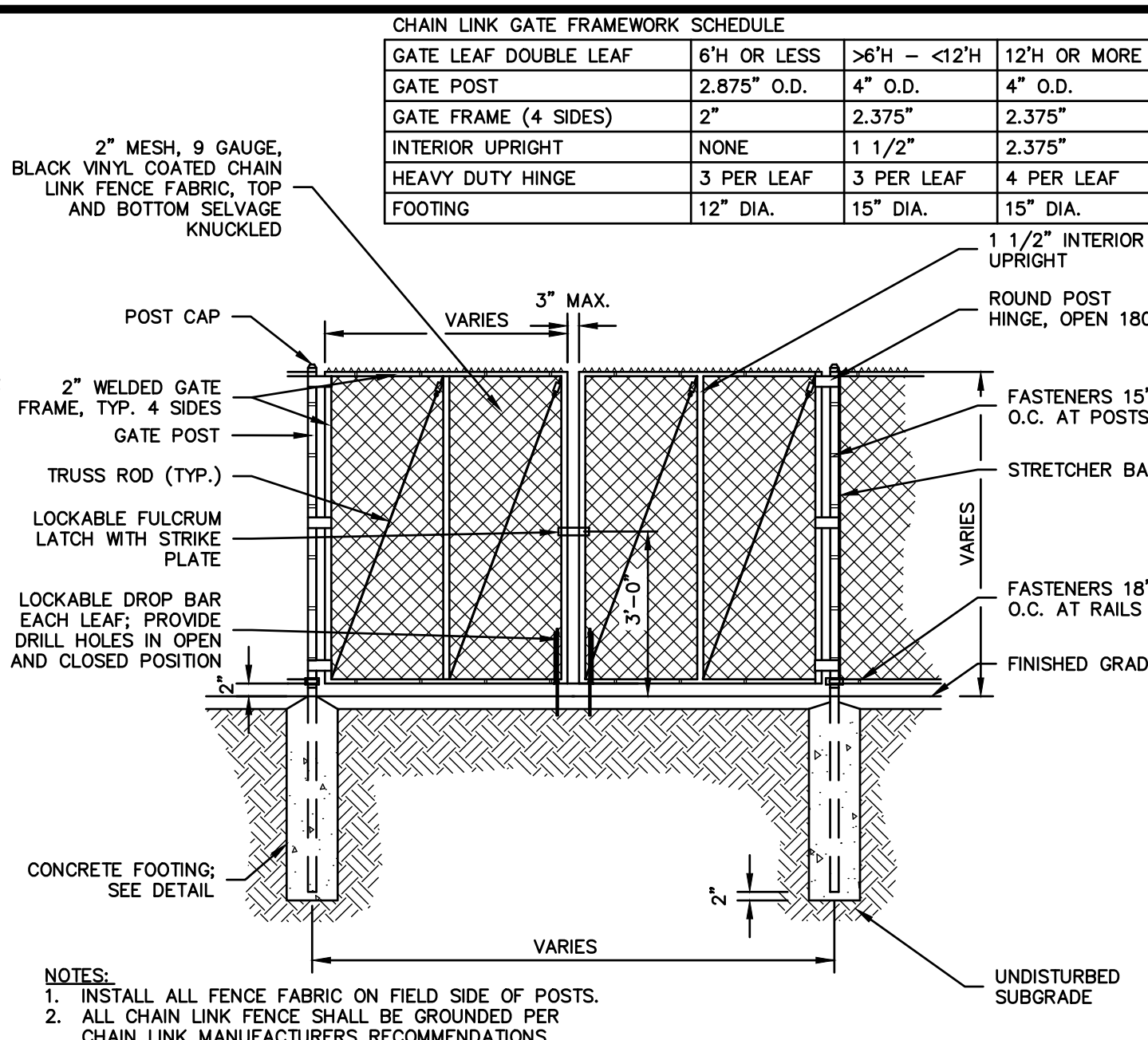
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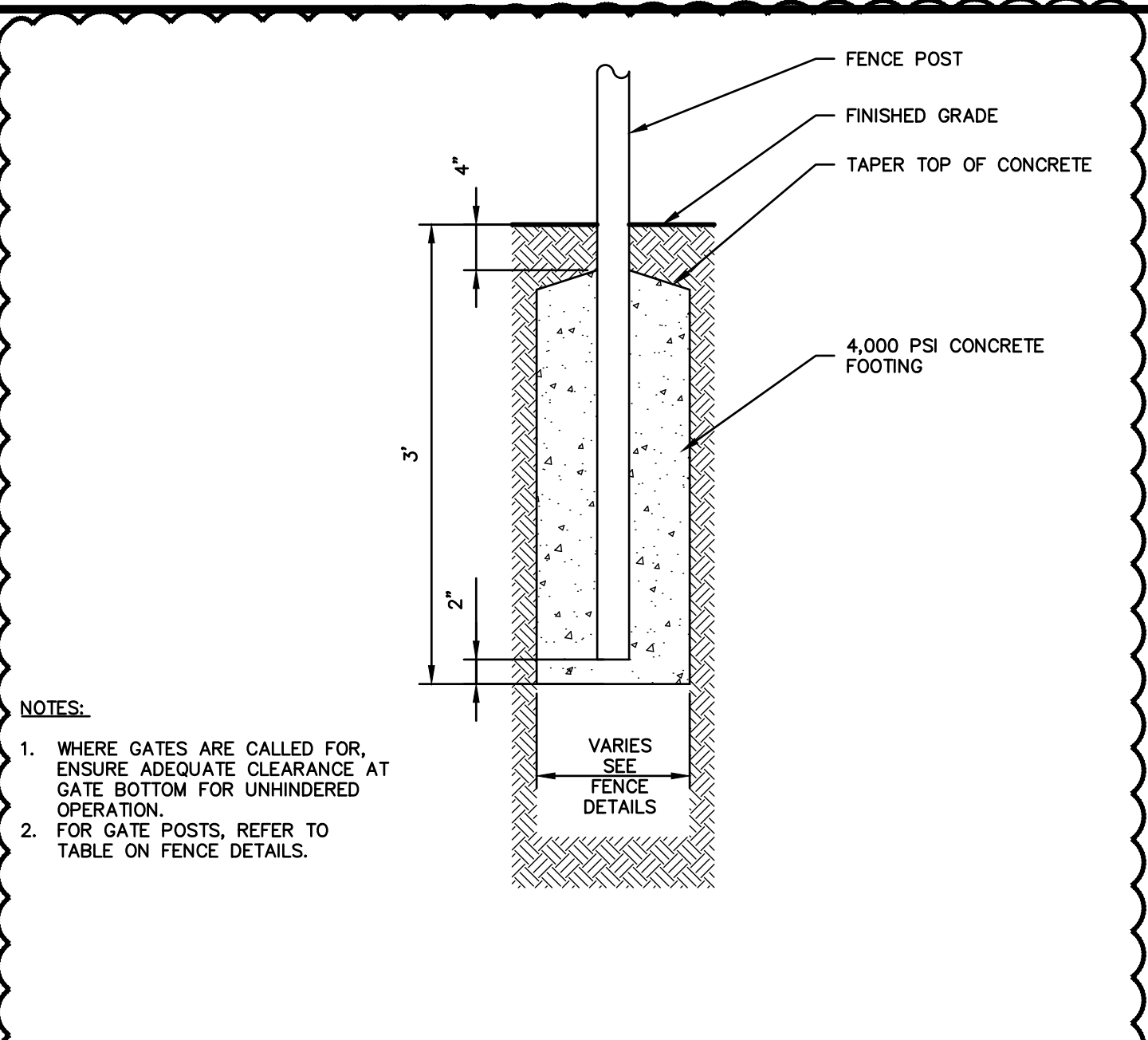
1 CHAIN LINK FENCE
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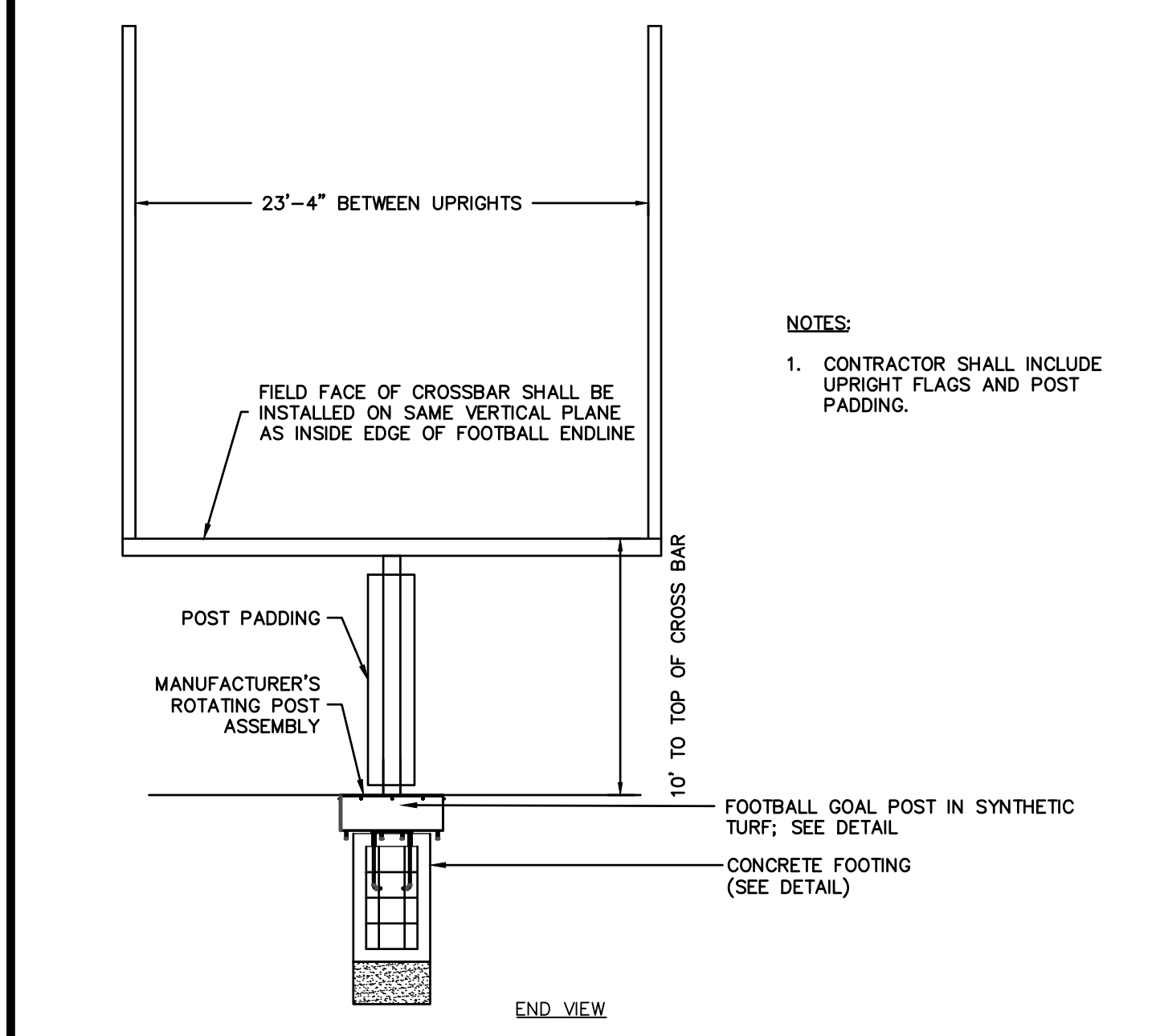
2 CHAIN LINK FENCE GATE
SCALE: NONE



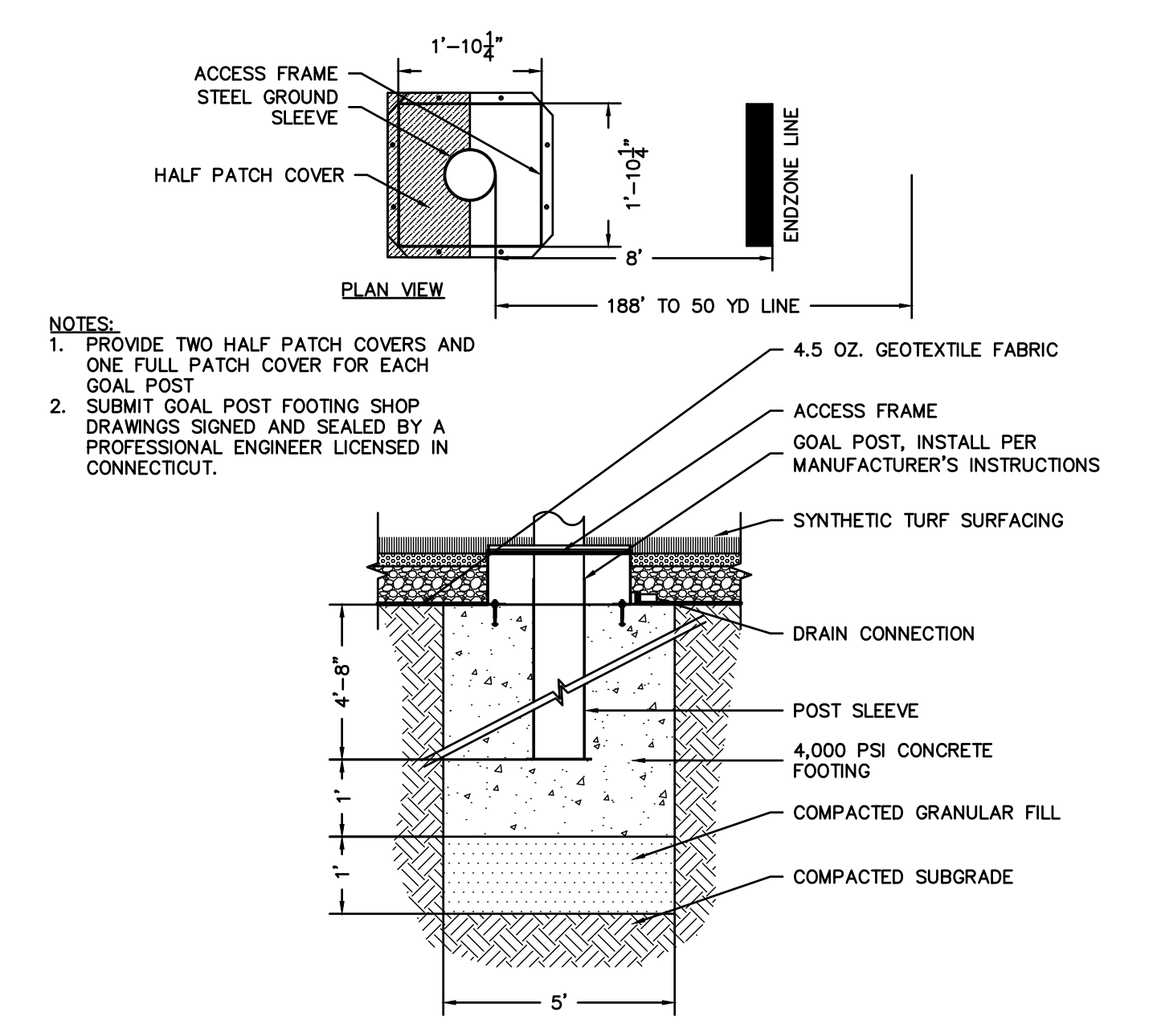
3 CHAIN LINK FENCE GATE - DOUBLE
SCALE: NONE



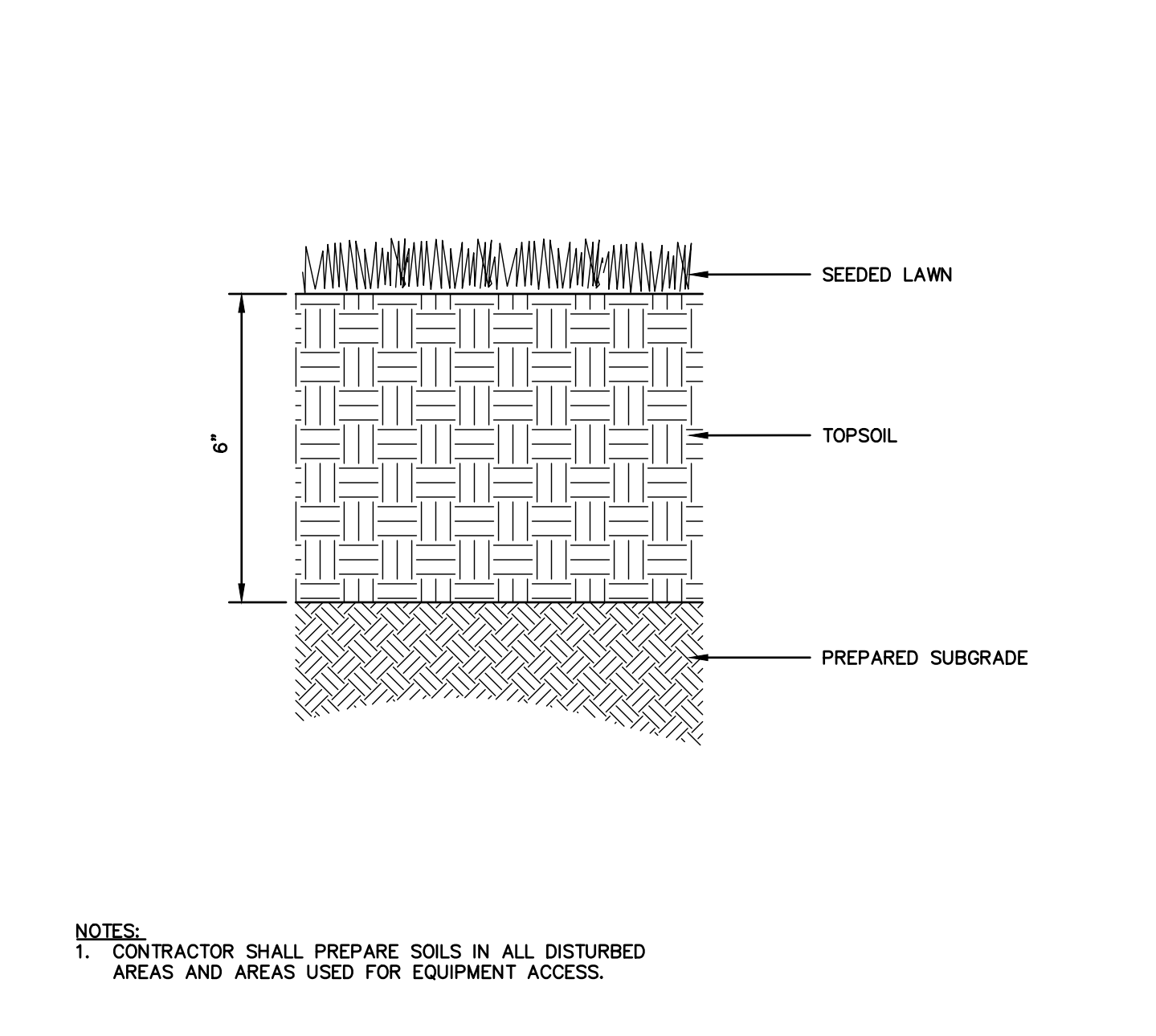
4 TYPICAL FENCE POST FOOTING
SCALE: NONE



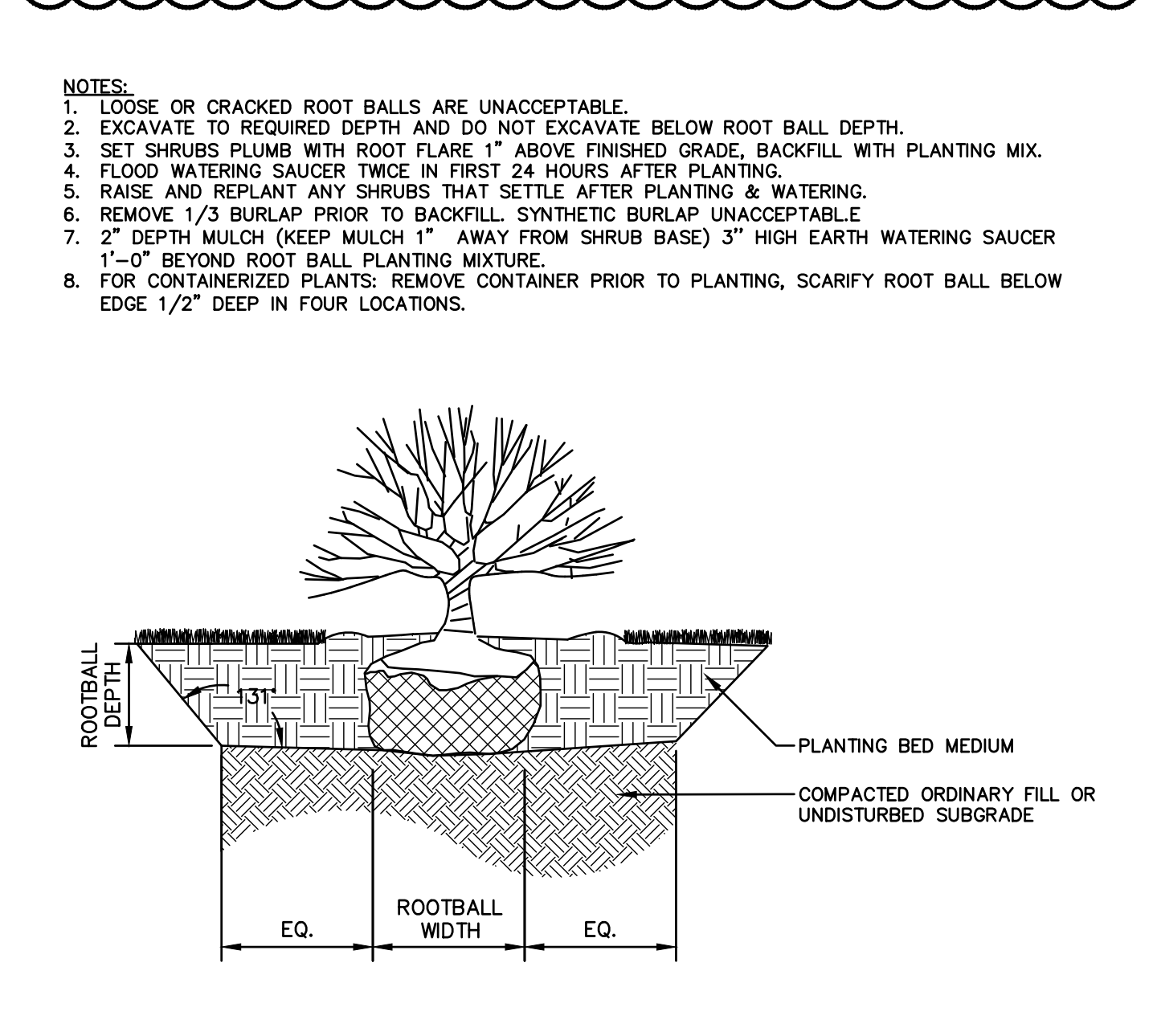
5 FOOTBALL GOAL POST
SCALE: NONE



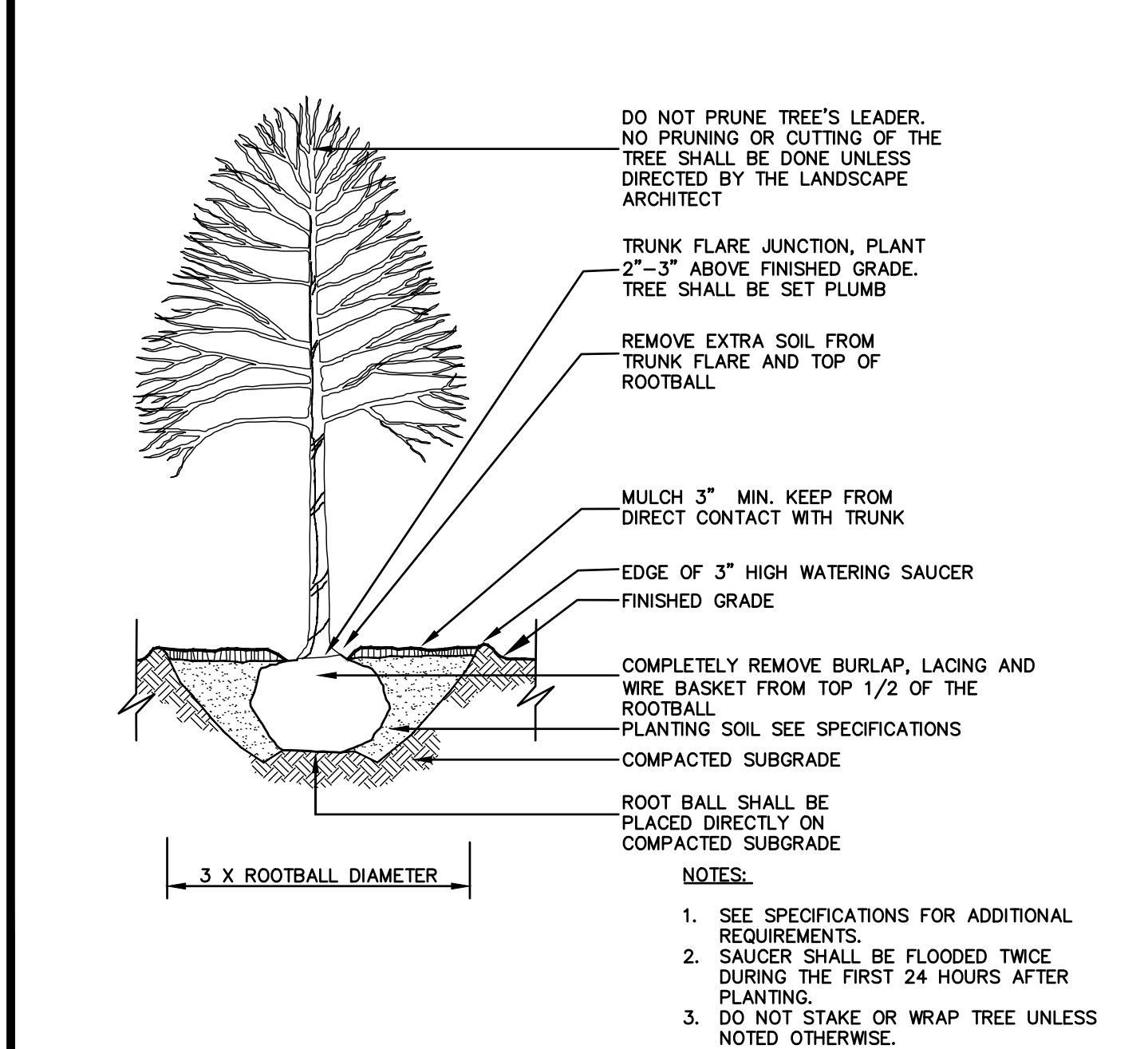
6 FOOTBALL GOAL POST IN SYNTHETIC TURF
SCALE: NONE



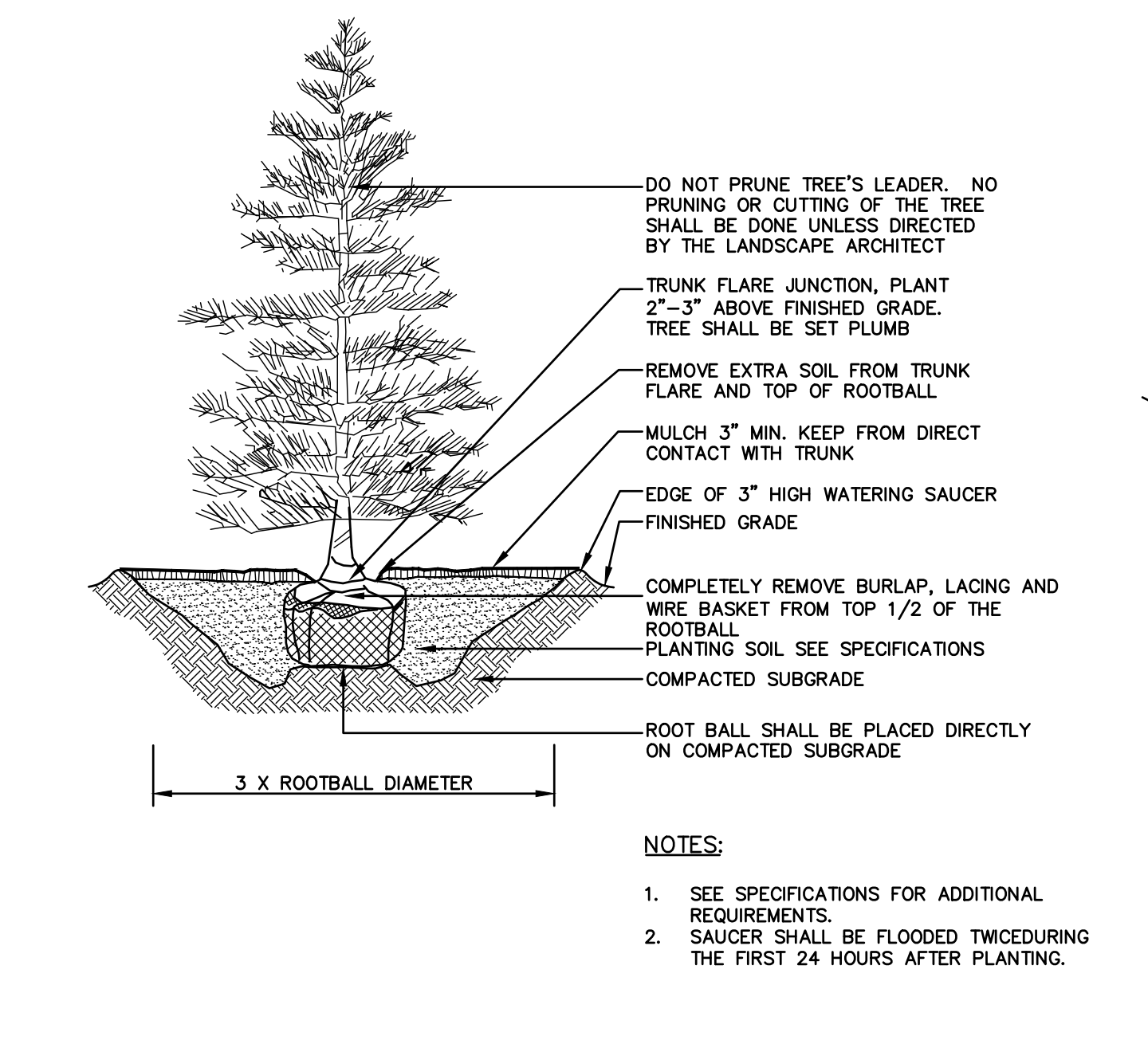
7 LAWN
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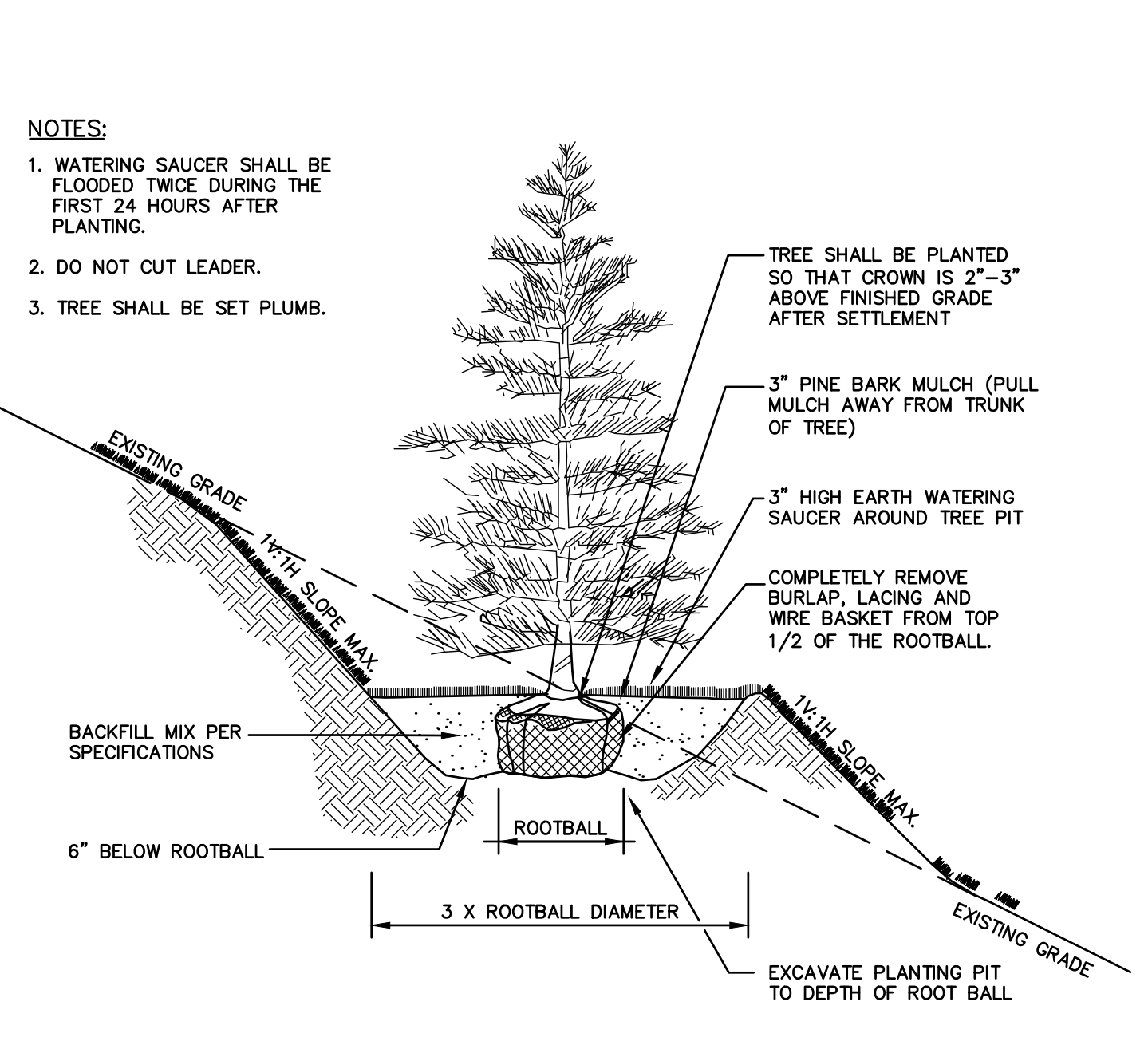
8 SHRUB PLANTING
SCALE: NONE



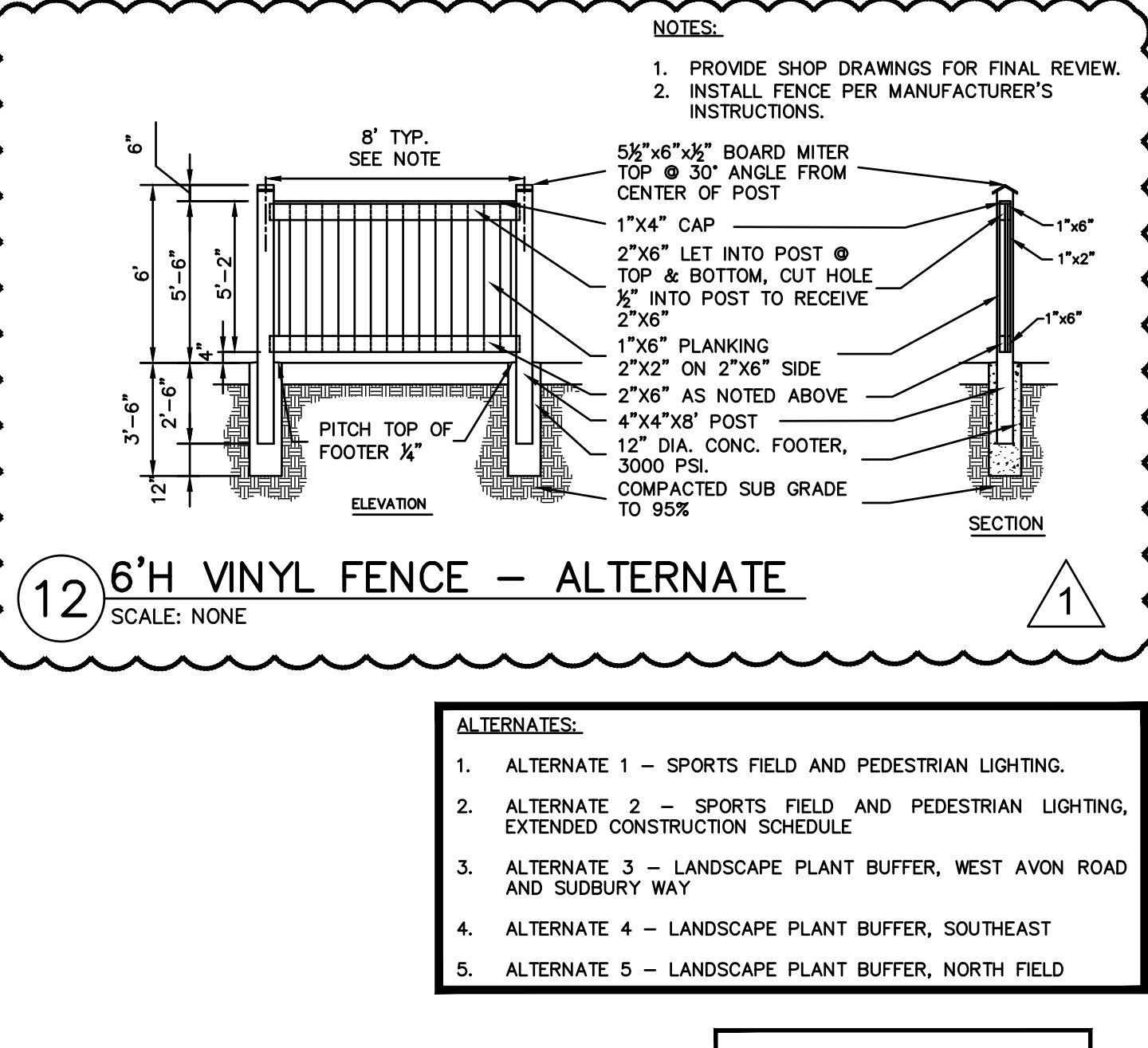
9 DECIDUOUS TREE PLANTING - ALTERNATE
SCALE: NONE



10 EVERGREEN TREE PLANTING - ALTERNATE
SCALE: NONE



11 TREE PLANTING ON SLOPE - ALTERNATE
SCALE: NONE



12 6"H VINYL FENCE - ALTERNATE
SCALE: NONE

- ALTERNATES:**
- ALTERNATE 1 - SPORTS FIELD AND PEDESTRIAN LIGHTING.
 - ALTERNATE 2 - SPORTS FIELD AND PEDESTRIAN LIGHTING, EXTENDED CONSTRUCTION SCHEDULE
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 - ALTERNATE 4 - LANDSCAPE PLANT BUFFER, SOUTHEAST
 - ALTERNATE 5 - LANDSCAPE PLANT BUFFER, NORTH FIELD



JESSE A. HARRIS, P.E. No. 1224

ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL

510 WEST AVON ROAD

IN AVON CONNECTICUT

DETAILS

FEBRUARY 22, 2019

REVISIONS:

1	2019/02/22	ADDENDUM 1
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PREPARED FOR:
TOWN OF AVON
60 WEST MAIN STREET
AVON, CT 06001

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

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FILE: 8357202 - DET.DWG
DWG. NO:
JOB. NO: 83572.02

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L-3.4

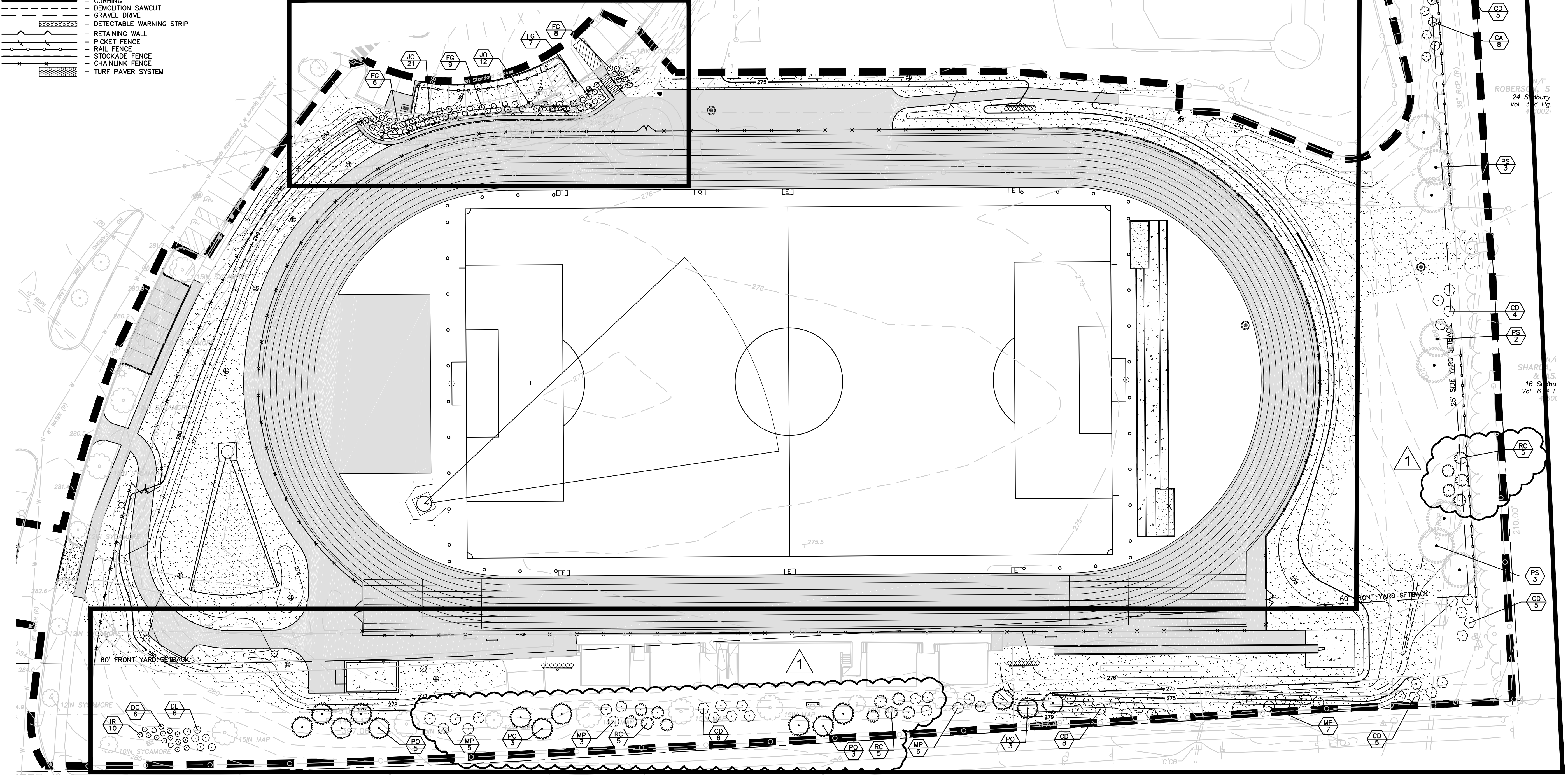
LEGEND

- BIT - BITUMINOUS PAVEMENT
- PRC - POINT OF REVERSE CURVE
- L - LENGTH
- R - RADIUS
- PL - PROPERTY LINE
- CC - CONCRETE CURB
- MCC - MONOLITHIC CONCRETE CURB
- BCLC - BITUMINOUS CONCRETE LIP CURB
- EOP - EDGE OF PAVEMENT
- PROPOSED SIGN
- PROPERTY LINE
- SETBACK LINE
- CURBING
- DEMOLITION SAWCUT
- GRAVEL DRIVE
- DETECTABLE WARNING STRIP
- RETAINING WALL
- PICKET FENCE
- RAIL FENCE
- STOCKADE FENCE
- CHAINLINK FENCE
- TURF PAVER SYSTEM

PLANT SCHEDULE BID ITEM 5 - SITE IMPROVEMENTS

SHRUBS	QTY	BOTANICAL / COMMON NAME	NOTES	SIZE	REMARKS
FG	30	FORSYTHIA X 'GOLD TIDES'	2 GAL	15'-18"	FULL
JO	33	JUNIPERUS VIRGINIANA 'GREY OWL'	15-18" HT		FULL

BID ITEM 5 - SITE IMPROVEMENTS



**ALTERNATE 3 - LANDSCAPE PLANT BUFFER:
WEST AVON ROAD AND SUDBURY ROAD**

PLANT SCHEDULE ALTERNATE 3 - LANDSCAPE PLANT BUFFER: WEST AVON ROAD/SUDBURY WAY

TREES	QTY	BOTANICAL / COMMON NAME	NOTES	SIZE	REMARKS
PO	14	PICEA OMORIKA	B & B	6-7' HT	SEMI-SHEARED
PS	8	SERBIAN SPRUCE	B & B	6-7' HT	SEMI-SHEARED
SHRUBS	QTY	BOTANICAL / COMMON NAME	NOTES	SIZE	REMARKS
CA	8	CLETHRA ALNIFOLIA	2 GAL	2-2.5' HT	FULL
CD	33	SUMMERSWEET CLETHRA	3 GAL	3-4' HT	FULL
DG	6	CORNUS ALBA	2 GAL	18"-24"	FULL
DL	6	TATARIAN DOGWOOD	2 GAL	18"-24"	FULL
IR	10	DEUTZIA GRACILIS	2 GAL	2-2.5' HT	FULL
MP	21	SLENDER DEUTZIA	3 GAL	3-4' HT	FULL
RC	15	DIERVILLA LONICERA	3 GAL	3-4' HT	FULL
		DWARF BUSH HONEYSUCKLE			
		ILEX VERTICILLATA 'RED SPRITE'			
		RED SPRITE WINTERBERRY			
		MYRTICA PENNSYLVANICA			
		NORTHERN BAYBERRY			
		RHODODENDRON CATAWBIENSE			
		CATAWBA RHODODENDRON			

NOTES:

- ALL PLANT MATERIAL SHALL CONFORM TO THE MINIMUM GUIDELINES ESTABLISHED BY THE AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC.
- ANY PROPOSED SUBSTITUTIONS OF PLANT MATERIAL SHALL BE MADE WITH MATERIAL EQUIVALENT TO THE DESIRED MATERIAL IN OVERALL FORM, HEIGHT, BRANCHING HABIT, FLOWER, LEAF, COLOR, FRUIT AND CULTURE. PROPOSED SUBSTITUTIONS WILL ONLY BE CONSIDERED IF SUBMITTED WITH ENUMERATED REASONS WHY SUBSTITUTIONS ARE PROPOSED. NO SUBSTITUTION OF PLANT SPECIES OR VARIETIES WILL BE ACCEPTABLE WITHOUT LANDSCAPE ARCHITECT'S WRITTEN APPROVAL.
- NO PLANTING SHALL OCCUR PRIOR TO FINAL ACCEPTANCE OF GRADES.
- INSTALL PLANTS WITH ROOT FLARES FLUSH WITH GRADE. IMMEDIATELY REPLANT PLANTS WHICH SETTLE OUT OF PLUMB OR BELOW FINISH GRADE.
- ALL CLEARING AND SELECTIVE PRUNING AND THINNING SHALL BE PERFORMED BY A LICENSED ARBORIST.
- ALL TREES TO BE SAVED SHALL BE PROTECTED PER SPECIFICATION.
- THE LANDSCAPE ARCHITECT OR ENGINEER RESERVES THE RIGHT TO ADJUST FINAL GRADES IN THE FIELD TO SAVE EXISTING VEGETATION.
- PLANT QUANTITIES NOTED IN THE PLANT SCHEDULE ARE APPROXIMATE AND ARE PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FURNISHING AND INSTALLATION OF ALL PLANT MATERIALS NOTED ON THE PLANTING PLAN.
- PROVIDE FIVE (5) FOOT DIAMETER MULCH CIRCLE AROUND ALL INDIVIDUAL TREE PLANTINGS AND CONTINUOUS MULCH BED AROUND SHRUB, PERENNIAL AND GROUND COVER PLANTINGS.
- PLANT UNDER FULL SUPERVISION OF CERTIFIED ARBORIST, NURSERYMAN, OR LICENSED LANDSCAPE ARCHITECT. PROVIDE WRITTEN VERIFICATION OF CERTIFICATION AND/OR LICENSE FOR OWNER'S REPRESENTATIVE'S APPROVAL.

- COMPLETE QUANTITIES OF PLANTS FOR EACH AREA TO BE AVAILABLE ON SITE AT THE TIME OF PLANTING FOR FIELD LAYOUT BY OWNER'S REPRESENTATIVE. NO PARTIAL LAYOUT AND PLANTING OF AREAS WILL BE ACCEPTABLE.
- LOOSE OR CRACKED ROOTBALLS ARE UNACCEPTABLE.
- WATER PLANTS THOROUGHLY AFTER INSTALLATION, A MINIMUM OF TWICE WITHIN THE FIRST 24 HOURS.
- PLANTS WITHIN CRITICAL ROOT ZONE OF EXISTING TREES MUST BE HAND DUG. CRITICAL ROOT ZONE = DBH (IN INCHES) X 1.5.

- ALTERNATES:**
- ALTERNATE 1 - SPORTS FIELD AND PEDESTRIAN LIGHTING.
 - ALTERNATE 2 - SPORTS FIELD AND PEDESTRIAN LIGHTING, EXTENDED CONSTRUCTION SCHEDULE
 - ALTERNATE 3 - LANDSCAPE PLANT BUFFER, WEST AVON ROAD AND SUDBURY WAY
 - ALTERNATE 4 - LANDSCAPE PLANT BUFFER, SOUTHEAST
 - ALTERNATE 5 - LANDSCAPE PLANT BUFFER, NORTH FIELD

ISSUED FOR BID

REPRODUCTIONS OF THIS PLAN ARE INVALID UNLESS THEY BEAR THE EMBOSSED SEAL OF THE UNDERSIGNED PROFESSIONAL.



JESSE A. HARRIS, PLA No. 1224

ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL

510 WEST AVON ROAD
IN
AVON
CONNECTICUT

PLANTING PLAN ENLARGMENTS

FEBRUARY 22, 2019

REVISIONS:

NO.	DATE	DESCRIPTION
1	2019/02/22	ADDENDUM 1

PREPARED FOR:
TOWN OF AVON
60 WEST MAIN STREET
AVON, CT 06001

BSC GROUP
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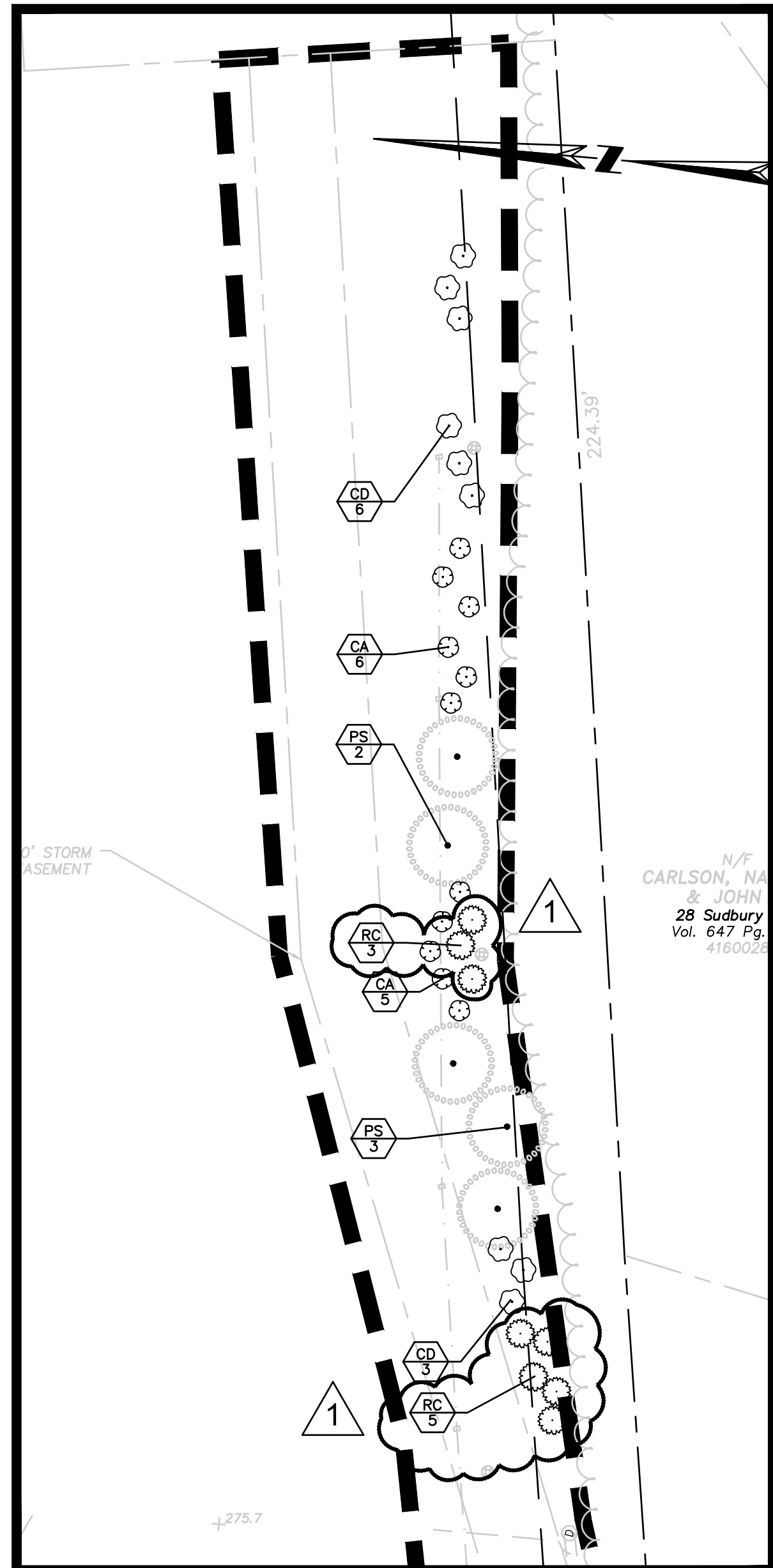
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SCALE: 1" = 30'
0 15 30 60 FEET

FILE: 83572.02 - PLANT.DWG
DWG. NO:
JOB. NO: 83572.02

L-4.1

LEGEND

BIT	- BITUMINOUS PAVEMENT
PRC	- POINT OF REVERSE CURVE
L	- LENGTH
R	- RADIUS
PL	- PROPERTY LINE
CC	- CONCRETE CURB
MCC	- MONOLITHIC CONCRETE CURB
BCLC	- BITUMINOUS CONCRETE LIP CURB
EOP	- EDGE OF PAVEMENT
○	- PROPOSED SIGN
---	- PROPERTY LINE
---	- SETBACK LINE
---	- CURBING
---	- DEMOLITION SAWCUT
---	- GRAVEL DRIVE
---	- DETECTABLE WARNING STRIP
---	- RETAINING WALL
---	- PICKET FENCE
---	- RAIL FENCE
---	- STOCKADE FENCE
---	- CHAINLINK FENCE
---	- TURF PAVER SYSTEM



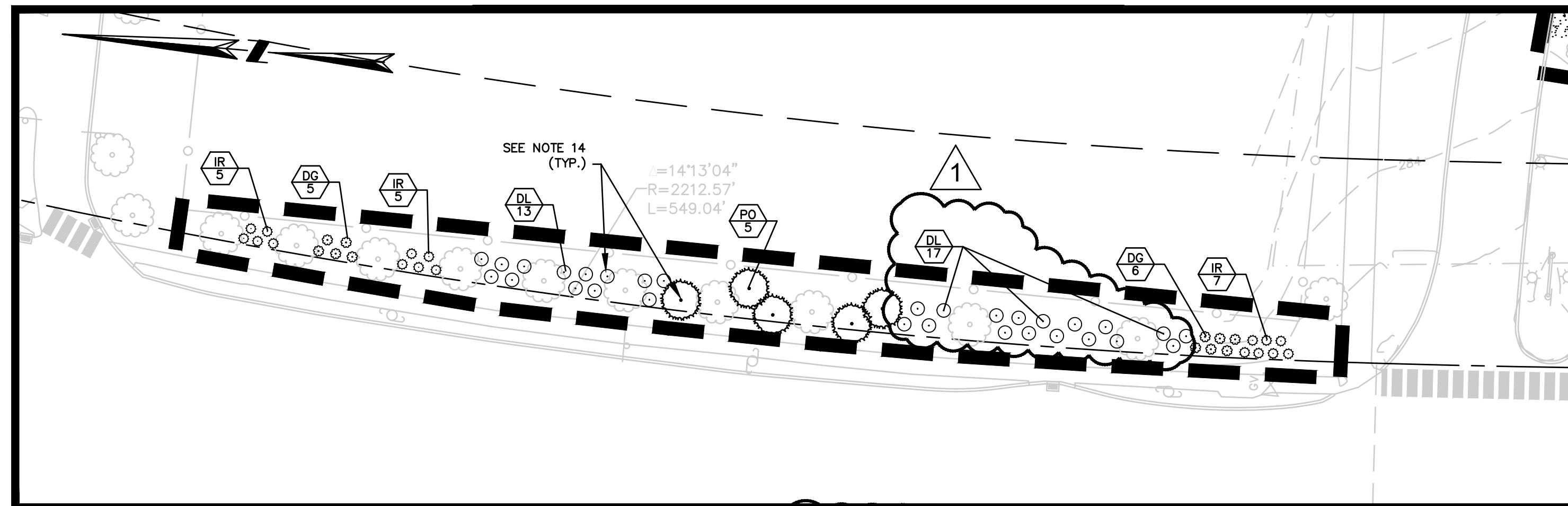
ALTERNATE 4 - LANDSCAPE PLANT BUFFER: SOUTHEAST

1

TREES	QTY	BOTANICAL / COMMON NAME	NOTES	SIZE	REMARKS
PS	5	PINUS STROBUS WHITE PINE	B & B	6-7' HT	SEMI-SHEARED

SHRUBS	QTY	BOTANICAL / COMMON NAME	NOTES	SIZE	REMARKS
CA	11	CLETHRA ALNIFOLIA SUMMERSWEET CLETHRA	2 GAL	2-2.5' HT	FULL
CD	9	CORNUS ALBA TATARIAN DOGWOOD	3 GAL	3-4' HT	FULL
RC	8	RHODODENDRON CATAWBIENSE CATAWBA RHODODENDRON	3 GAL	3-4' HT	FULL

ALTERNATE 5 - LANDSCAPE PLANT BUFFER: NORTH FIELD



NOTES:

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- NO PLANTING SHALL OCCUR PRIOR TO FINAL ACCEPTANCE OF GRADES.
- INSTALL PLANTS WITH ROOT FLARES FLUSH WITH GRADE. IMMEDIATELY REPLANT PLANTS WHICH SETTLE OUT OF PLUMB OR BELOW FINISH GRADE.
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- ALL TREES TO BE SAVED SHALL BE PROTECTED PER SPECIFICATION.
- THE LANDSCAPE ARCHITECT OR ENGINEER RESERVES THE RIGHT TO ADJUST FINAL GRADES IN THE FIELD TO SAVE EXISTING VEGETATION.
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1

TREES	QTY	BOTANICAL / COMMON NAME	NOTES	SIZE	REMARKS
PO	5	PICEA OMORICA SERBIAN SPRUCE	B & B	6-7' HT	SEMI-SHEARED

SHRUBS	QTY	BOTANICAL / COMMON NAME	NOTES	SIZE	REMARKS
DG	11	DEUTZIA GRACILIS SLENDER DEUTZIA	2 GAL	18"-24"	FULL
DL	30	DIERVILLA LONICERA DWARF BUSH HONEYSUCKLE	2 GAL	2-2.5' HT	FULL
IR	17	ILEX VERTICILLATA 'RED SPRITE' RED SPRITE WINTERBERRY	2 GAL	2-2.5' HT	FULL

- ALTERNATES:
- ALTERNATE 1 - SPORTS FIELD AND PEDESTRIAN LIGHTING.
 - ALTERNATE 2 - SPORTS FIELD AND PEDESTRIAN LIGHTING, EXTENDED CONSTRUCTION SCHEDULE
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 - ALTERNATE 5 - LANDSCAPE PLANT BUFFER, NORTH FIELD

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ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL

510 WEST AVON ROAD
IN
AVON
CONNECTICUT

PLANTING PLAN ENLARGEMENTS (CONT.)

FEBRUARY 22, 2019

REVISIONS:

NO.	DATE	DESCRIPTION
1	2019/02/21	ADDENDUM 1

PREPARED FOR:
TOWN OF AVON
60 WEST MAIN STREET
AVON, CT 06001

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

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SCALE: 1" = 30'
0 15 30 60 FEET

FILE: 83572.02 - PLANT.DWG
DWG. NO:
JOB. NO: 83572.02

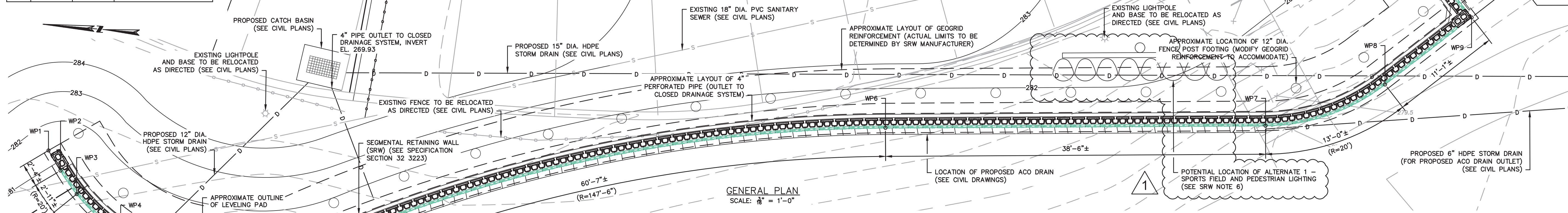
L-4.2

WORKING POINT LOCATION TABLE			
WP	NORTHING	EASTING	DESCRIPTION
WP1	845991.90	969203.03	BEGIN SRW
WP2	845990.51	969201.09	PC
WP3	845988.66	969198.87	LEVELING PAD STEP
WP4	845983.86	969195.20	LEVELING PAD STEP
WP5	845965.02	969195.00	PRC/BEGIN ACO DRAIN
WP6	845907.47	969212.72	PT
WP7	845869.05	969216.30	PC/END ACO DRAIN
WP8	845857.33	969221.53	PT
WP9	845849.17	969229.08	90° OUTSIDE CORNER
WP10	845852.97	969233.19	LEVELING PAD STEP
WP11	845856.19	969236.67	END SRW

SEGMENTAL RETAINING WALL (SRW) NOTES:

- DIMENSIONS AND REPORTED ELEVATIONS SHOWN ON THE PLANS ARE APPROXIMATE AND MAY BE ADJUSTED TO ACCOMMODATE THE SELECTED SRW SYSTEM. THE DESIGN INTENT IS TO PROVIDE A NOMINAL REVEAL ABOVE FINISHED GRADE ALONG THE SRW LENGTH (FAR FACE), A MINIMUM EMBEDMENT OF 6" (MEASURED FROM FINISHED GRADE AT THE NEAR FACE OF THE SRW TO THE TOP OF THE LEVELING PAD), A MINIMUM LEVELING PAD THICKNESS OF 6" AND A MINIMUM STRUCTURAL FILL THICKNESS OF 1'-0".
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND INTERNAL STABILITY OF THE SELECTED SRW SYSTEM. THE DESIGN SHALL BE COMPLETED IN ACCORDANCE WITH THE LATEST NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA) DESIGN MANUAL FOR SEGMENTAL RETAINING WALLS AND SHALL SATISFY THE DESIGN CRITERIA (AND MINIMUM LATERAL EARTH PRESSURE REQUIREMENTS DURING CONSTRUCTION) STIPULATED IN THE GEOTECHNICAL ENGINEERING REPORT INCLUDED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL SUBMIT SRW SHOP DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL IN ACCORDANCE WITH SPECIFICATION SECTION 32.3223. ALL PLANS AND CALCULATIONS SHALL BE PREPARED, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT.
- ALL COST ASSOCIATED WITH THE DESIGN, FABRICATION AND CONSTRUCTION OF THE SRW SYSTEM INCLUDING THE EXCAVATION, STRUCTURAL FILL, LEVELING PAD, GRANULAR BACKFILL FOR SRW, GEOTEXTILE FABRIC, GEOMEMBRANE, FACING SEALER, AND PERFORATED PIPE SHALL BE CONSIDERED INCIDENTAL TO THE SRW SYSTEM.

- IMPERVIOUS MEMBRANE SHALL BE PROVIDED WITHIN THE LIMITS OF GRANULAR BACKFILL FOR SRW AS DETAILED ON THE PLANS. THE SUBGRADE SHALL BE GRADED SMOOTH WITH NO IRREGULARITIES OR STONE PROTRUSIONS. LIMITS OF IMPERVIOUS MEMBRANE SHALL EXTEND APPROXIMATELY 5'-0" BEYOND THE ENDS OF THE SRW.
- A MANUFACTURER APPROVED FACING SEALER SHALL BE APPLIED TO ALL EXPOSED SRW SURFACES TO APPROXIMATELY 1'-0" BELOW FINISHED GRADE.
- FINAL INCORPORATION AND LOCATION OF ALTERNATE 1 - SPORTS FIELD AND PEDESTRIAN LIGHTING (AND ASSOCIATED PRECAST CONCRETE BASE) IS UNKNOWN AT THIS TIME AND WILL REQUIRE COORDINATION DURING PREPARATION OF THE SRW SHOP DRAWINGS. THE CONTRACTOR SHALL DEVELOP THE OVERALL CONSTRUCTION SEQUENCE TO ENSURE THAT THE SRW IS NOT UNDERMINED, OR DAMAGED (INCLUDING ANY DAMAGE TO THE GEOTEXTILE WITHIN THE REINFORCED SOIL ZONE) DURING INSTALLATION OF ALTERNATE 1, SHOULD THIS ALTERNATE BID ITEM BE INCORPORATED INTO THE CONTRACT. THE CONTRACTOR IS NOTIFIED THAT THE INSTALLATION OF TEMPORARY EXCAVATION SUPPORT/CASING, OR MODIFICATION OF THE GEOTEXTILE LAYOUT MAY BE REQUIRED, DEPENDING ON THE FINAL LOCATION AND SELECTED CONSTRUCTION SEQUENCE.



FOUNDATION NOTES:

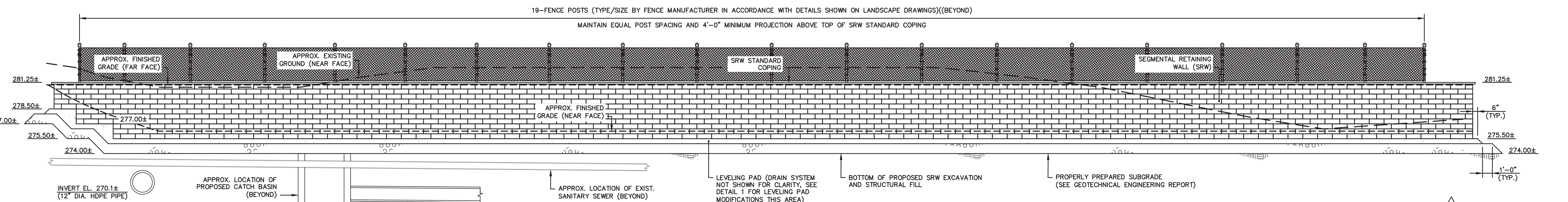
- FOUNDATIONS SHALL BE PREPARED IN ACCORDANCE WITH THE MATERIAL AND CONSTRUCTION RECOMMENDATIONS CONTAINED IN SECTION 4.0 OF THE GEOTECHNICAL ENGINEERING REPORT INCLUDED IN THE CONTRACT DOCUMENTS.
- UNLESS OTHERWISE NOTED ON THE SUBMITTED SRW SHOP DRAWINGS, MATERIAL USED AS GRANULAR BACKFILL FOR SRW SHALL BE FREE OF DEBRIS AND SHALL CONSIST OF INORGANIC, UNIFIED SOIL CLASSIFICATION SYSTEM TYPES GP, GW, SW, SP AND SM, MEETING THE FOLLOWING GRADATION:

SIEVE SIZE	PERCENT PASSING
1 INCH	100
NO. 4	20-100
NO. 40	0-50
NO. 200	0-10

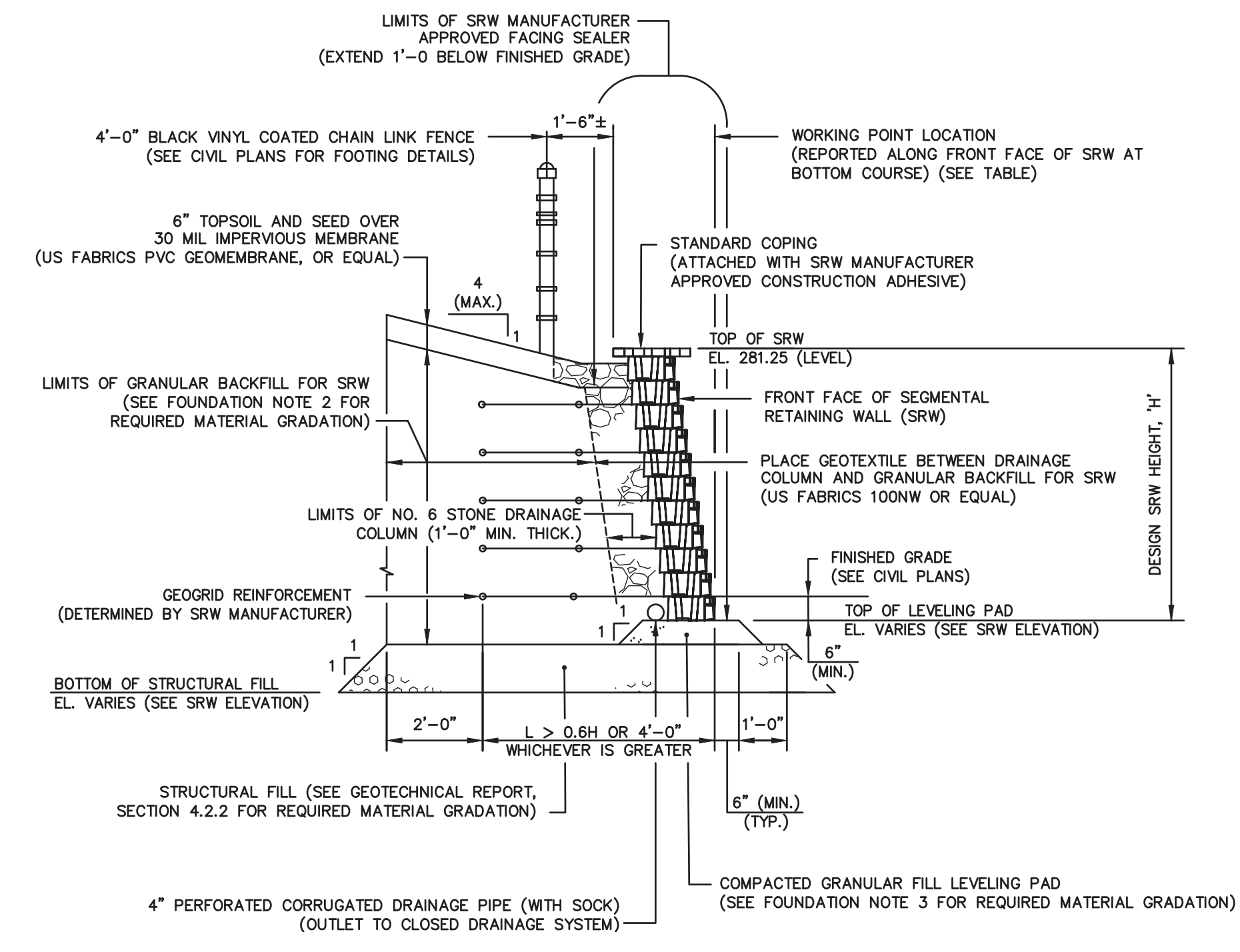
- UNLESS OTHERWISE NOTED ON THE SUBMITTED SRW SHOP DRAWINGS, MATERIAL USED FOR THE COMPACTED GRANULAR FILL LEVELING PAD SHALL MEET THE FOLLOWING GRADATION:

SIEVE SIZE	PERCENT PASSING
5 INCH	100
3/4 INCH	90-100
1/2 INCH	55-95
3/8 INCH	25-60
NO. 10	15-45
NO. 40	5-25
NO. 100	0-10
NO. 200	0-5

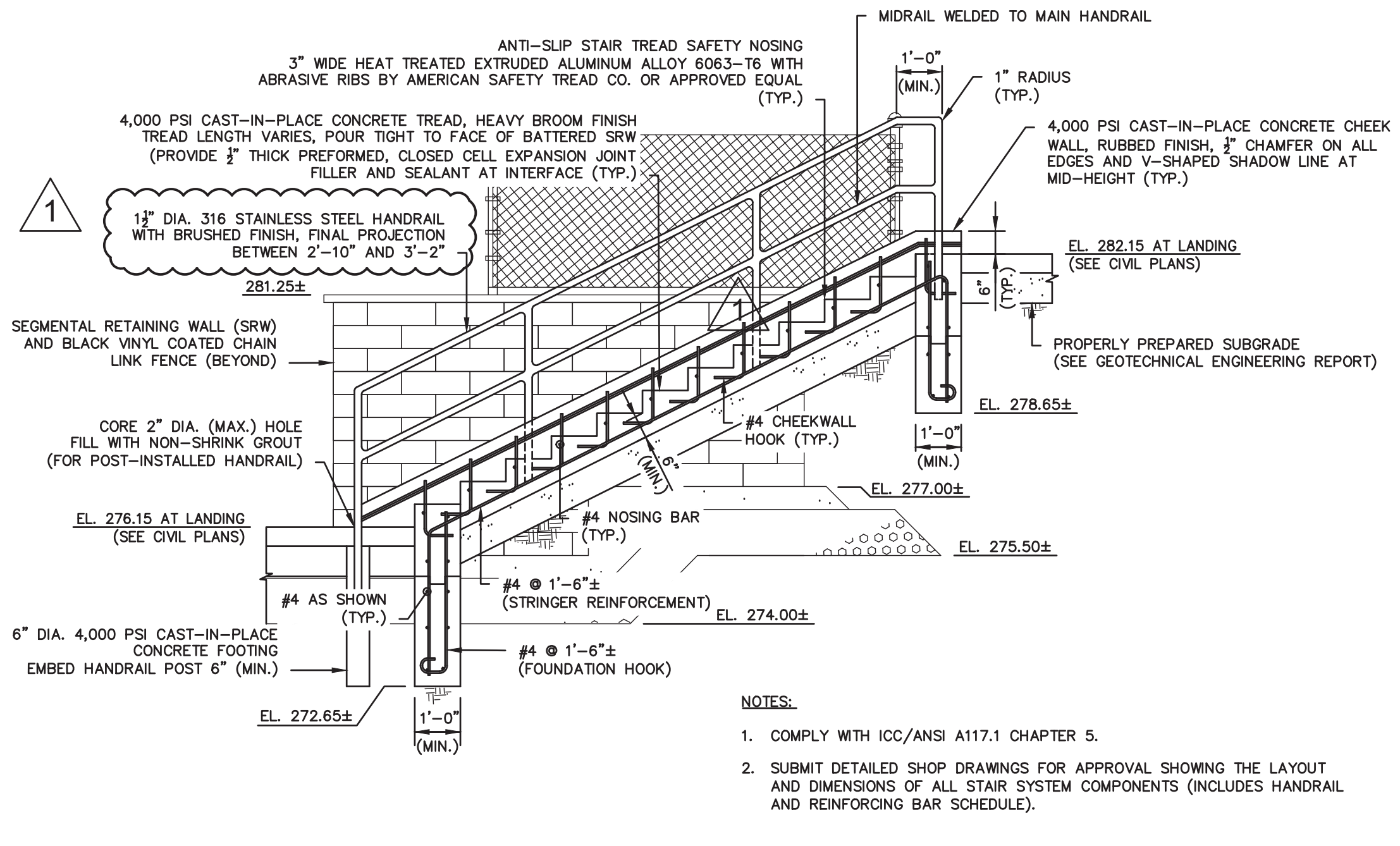
- ALTERNATES:**
- ALTERNATE 1 - SPORTS FIELD AND PEDESTRIAN LIGHTING.
 - ALTERNATE 2 - SPORTS FIELD AND PEDESTRIAN LIGHTING, EXTENDED CONSTRUCTION SCHEDULE
 - ALTERNATE 3 - LANDSCAPE PLANT BUFFER, WEST AVON ROAD AND SUDBURY WAY
 - ALTERNATE 4 - LANDSCAPE PLANT BUFFER, SOUTHEAST
 - ALTERNATE 5 - LANDSCAPE PLANT BUFFER, NORTH FIELD



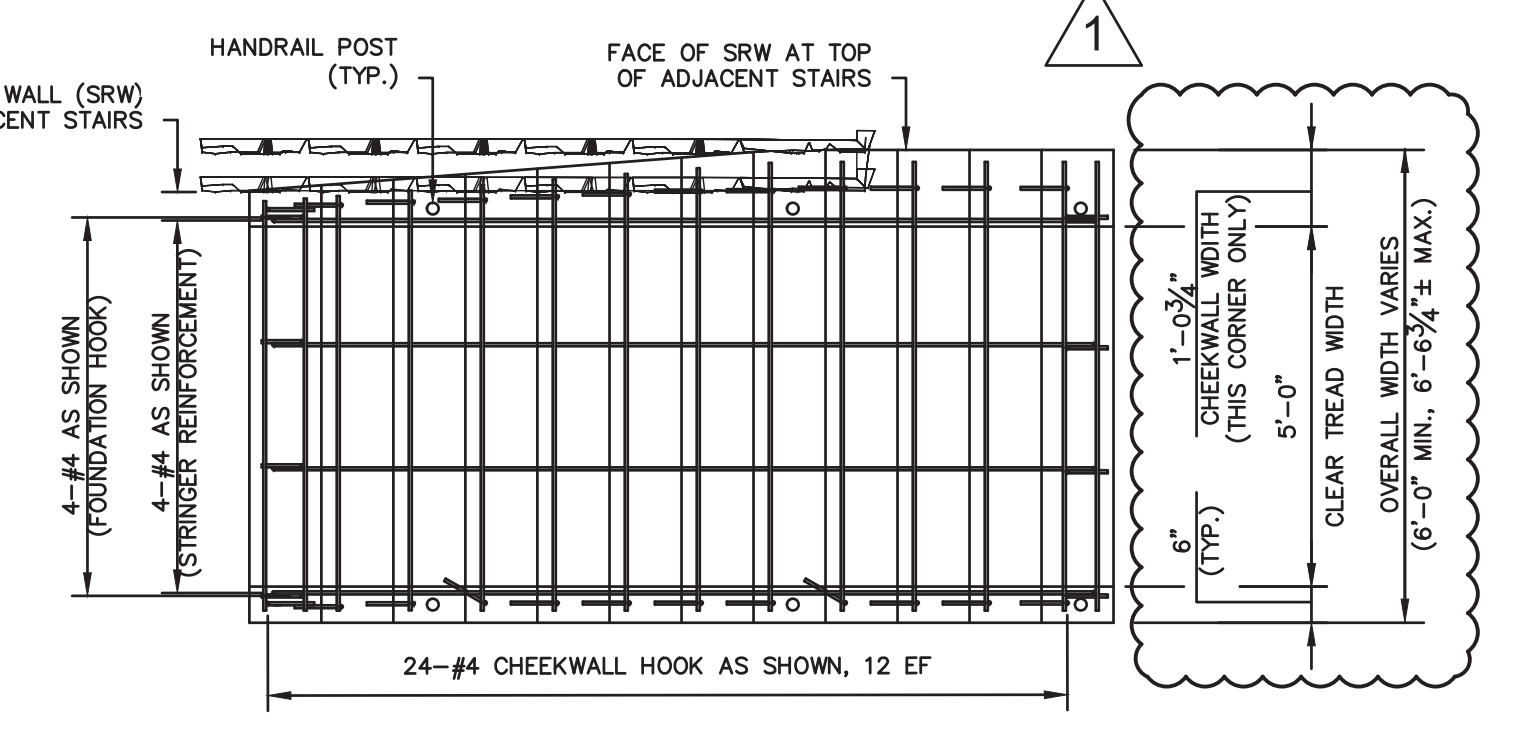
SEGMENTAL RETAINING WALL (SRW) ELEVATION
SCALE: 1/8" = 1'-0"



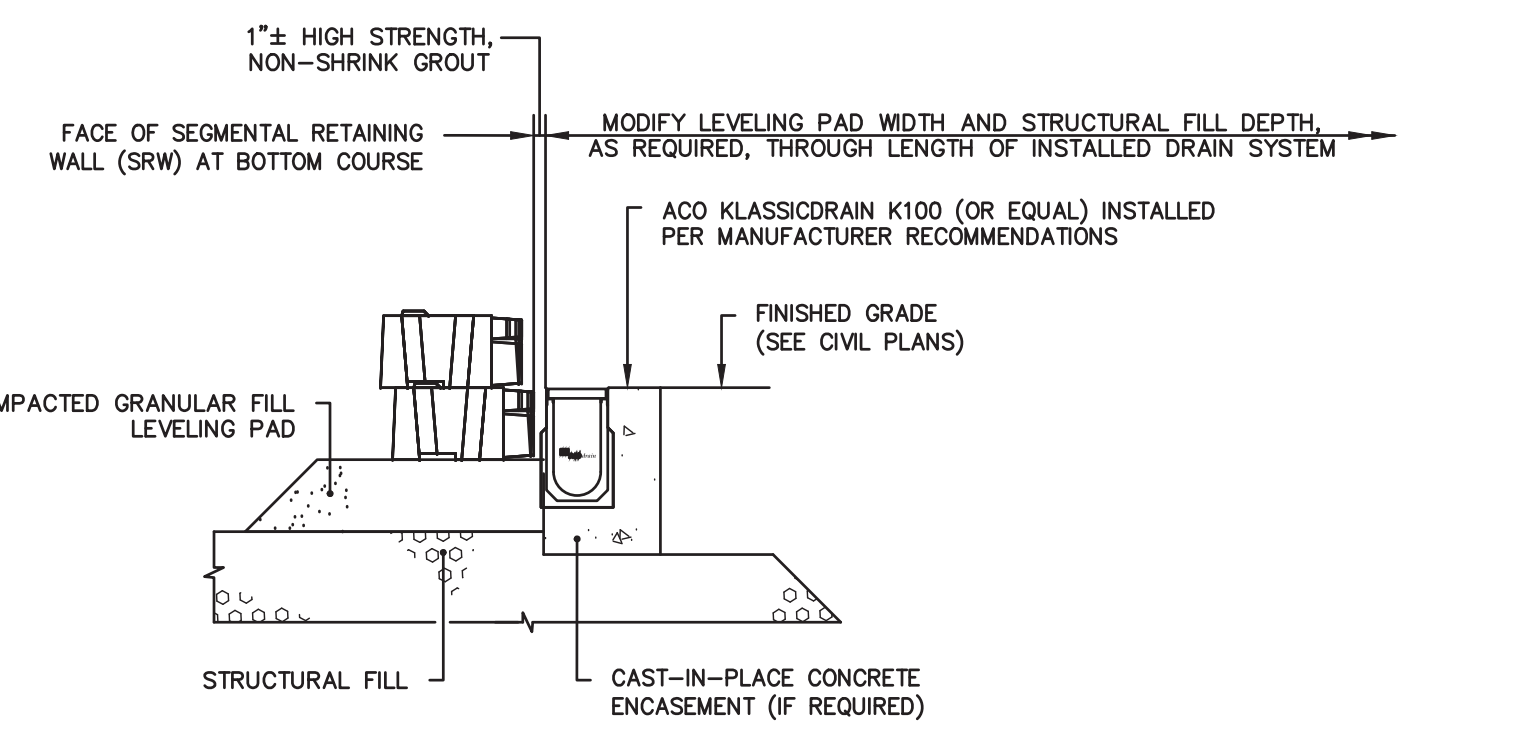
TYPICAL SEGMENTAL RETAINING WALL (SRW) SECTION
SCALE: 1/8" = 1'-0"



CAST-IN-PLACE CONCRETE STAIR ELEVATION
SCALE: 1/8" = 1'-0"



CAST-IN-PLACE CONCRETE STAIR PLAN
SCALE: 1/8" = 1'-0"



DETAIL 1
SCALE: 1/8" = 1'-0"

- NOTES:**
- COMPLY WITH ICC/ANSI A117.1 CHAPTER 5.
 - SUBMIT DETAILED SHOP DRAWINGS FOR APPROVAL SHOWING THE LAYOUT AND DIMENSIONS OF ALL STAIR SYSTEM COMPONENTS (INCLUDES HANDRAIL AND REINFORCING BAR SCHEDULE).



DAVID D'AMATO, PE No. 24227

ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL

510 WEST AVON ROAD
IN
AVON CONNECTICUT

SEGMENTAL RETAINING WALL PLAN, ELEVATION AND DETAILS

FEBRUARY 22, 2019

REVISIONS:

NO.	DATE	DESCRIPTION
1	2019/02/21	ADDENDUM 1

PREPARED FOR:
TOWN OF AVON
60 WEST MAIN STREET
AVON, CT 06001

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

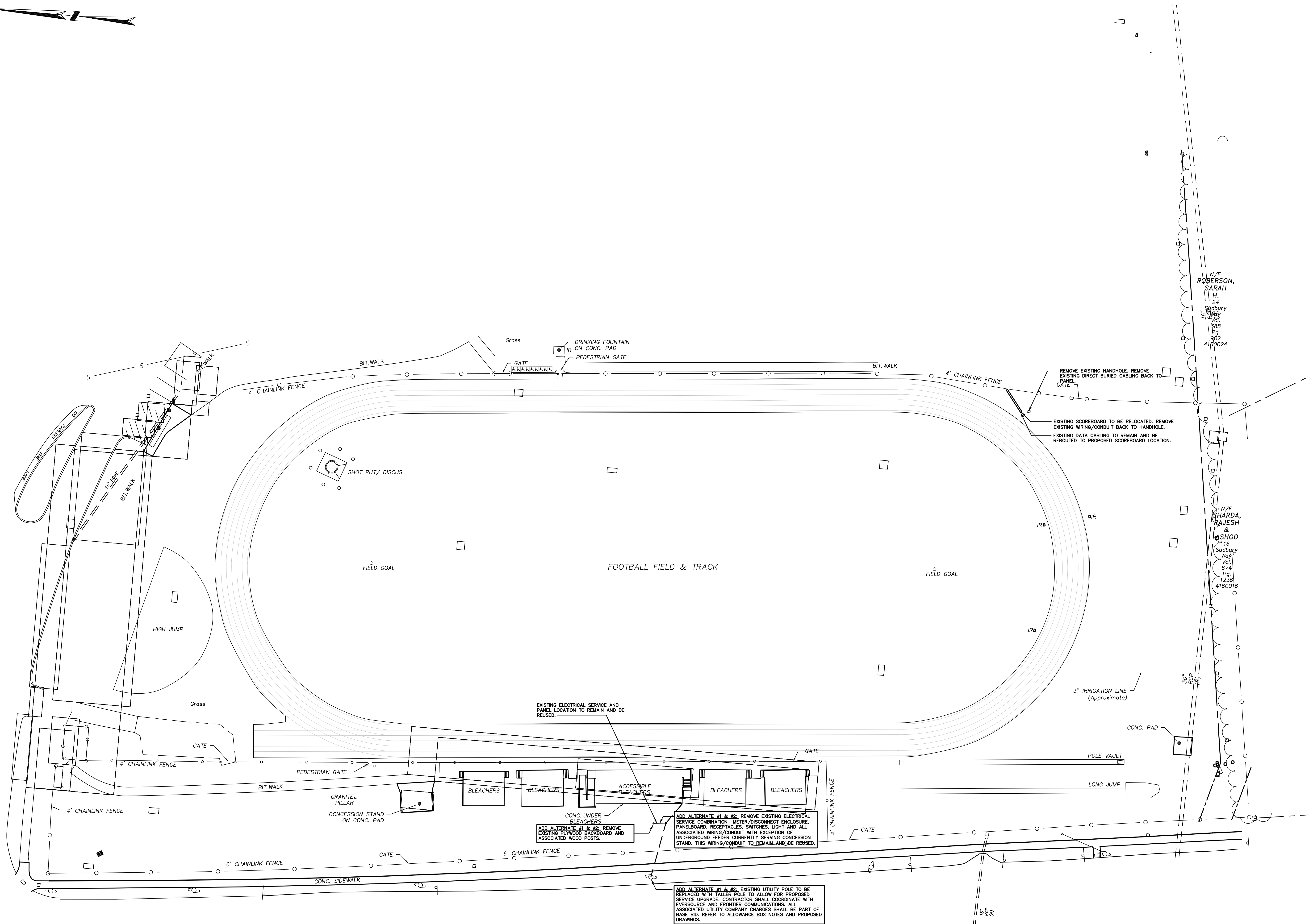
© 2018 BSC GROUP, INC.
SCALE: AS NOTED

FILE: 8357202-WALL.DWG
DWG. NO:
JOB. NO: 83572.02

ISSUED FOR BID

S-1.0

ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL - FEBRUARY 22, 2019



SITE LIGHTING DEMOLITION PLAN
SCALE: 1"=30'-0"

CONSULTANT:
SALAMONE & ASSOCIATES, P.C.
CONSULTING ENGINEERS
116 North Plains Industrial Road
Wallingford, Connecticut 06492
Phone: (203) 281-8895 Fax: (203) 287-8728

ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL

510 WEST AVON ROAD
IN AVON CONNECTICUT

SITE LIGHTING DEMOLITION PLAN

FEBRUARY 22, 2019

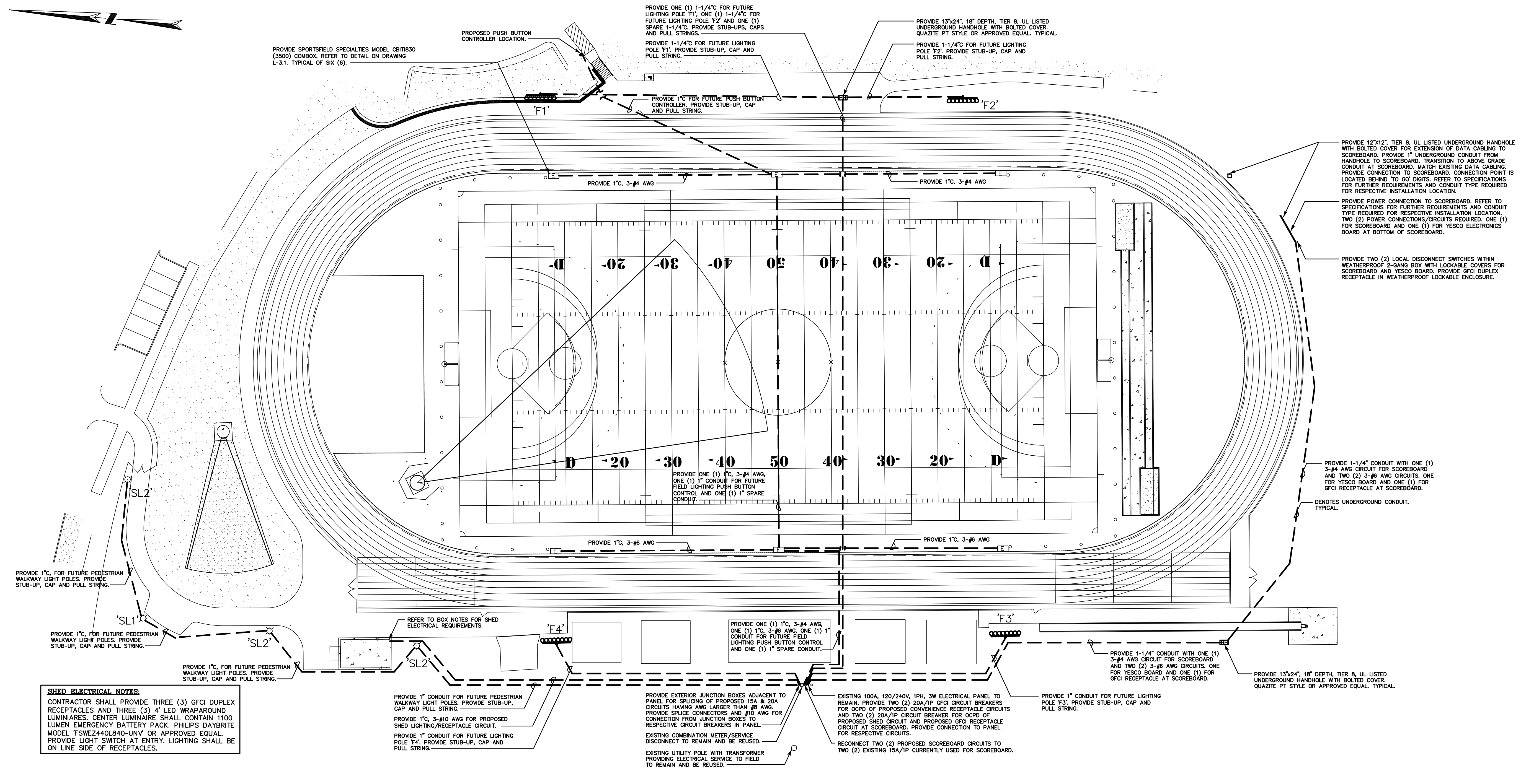
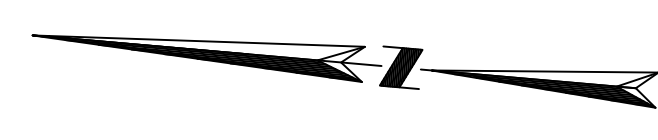
REVISIONS:
2/22/19 ADDENDUM NO. 1

PREPARED FOR:
TOWN OF AVON
80 WEST MAIN STREET
AVON CT 06001

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

© 2019 BSC GROUP, INC.
SCALE: 1" = 30'
0 15 30 60 FEET

FILE: AVON HS FIELD LIGHTING
DWG. NO:
JOB. NO: DSE-1



SHED ELECTRICAL NOTES:
 CONTRACTOR SHALL PROVIDE THREE (3) GFCI DUPLEX RECEPTACLES AND THREE (3) 4' LED WRAPAROUND LUMINAIRES. CENTER LUMINAIRE SHALL CONTAIN 1100 LUMEN EMERGENCY BATTERY PACK, PHILIPS DAYBRITE MODEL TSWZ440L840-UNV OR APPROVED EQUAL. PROVIDE LIGHT SWITCH AT ENTRY. LIGHTING SHALL BE ON LINE SIDE OF RECEPTACLES.

SITE LIGHTING PLAN
 SCALE: 1"=30'-0"

CONSULTANT:
SALAMONE & ASSOCIATES, P.C.
 CONSULTING ENGINEERS
 116 North Plains Industrial Road
 Wallingford, Connecticut 06492
 Phone: (203) 281-8895 Fax: (203) 287-8728

ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL

510 WEST AVON ROAD
 IN
 AVON CONNECTICUT

SITE LIGHTING PLAN

FEBRUARY 22, 2019

REVISIONS:

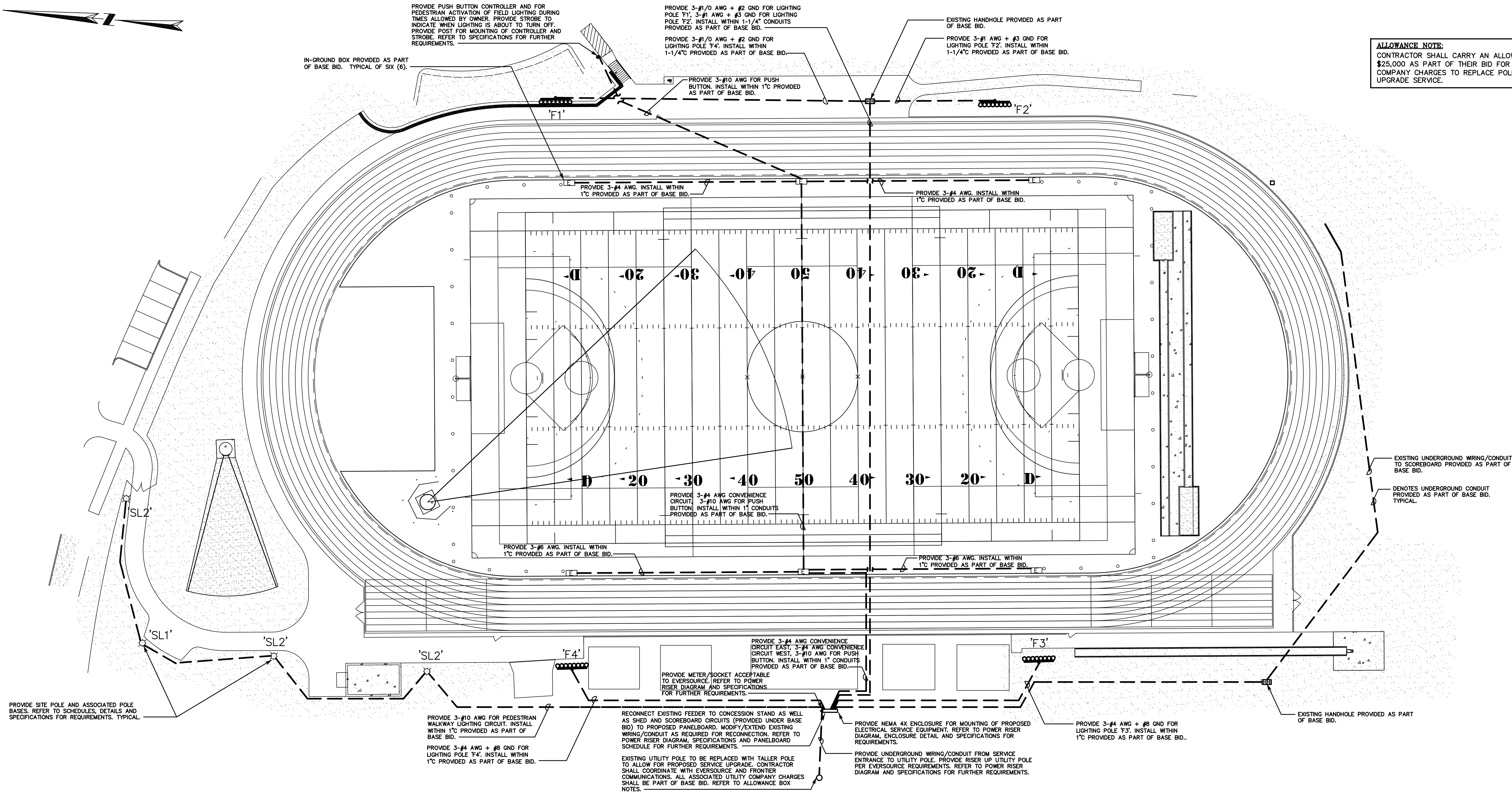
2/22/19	ADDENDUM NO. 1

PREPARED FOR:
 TOWN OF AVON
 80 WEST MAIN STREET
 AVON CT 06001

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 300 Winding Brook Drive
 Glastonbury, Connecticut 06033
 860 652 8227

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 SCALE: 1" = 30'

FILE: AVON HS FIELD LIGHTING
 DWG. NO:
 JOB. NO: SE-1



ALLOWANCE NOTE:
 CONTRACTOR SHALL CARRY AN ALLOWANCE OF \$25,000 AS PART OF THEIR BID FOR UTILITY COMPANY CHARGES TO REPLACE POLE(S) AND UPGRADE SERVICE.

**ADD ALTERNATE #1 & #2
 SITE LIGHTING PLAN**
 SCALE: 1" = 30'-0"

CONSULTANT:
SALAMONE & ASSOCIATES, P.C.
 CONSULTING ENGINEERS
 116 North Plains Industrial Road
 Wallingford, Connecticut 06492
 Phone: (203) 281-8895 Fax: (203) 287-8728

**ATHLETIC FACILITY
 IMPROVEMENTS AT
 AVON HIGH SCHOOL**

510 WEST AVON ROAD
 IN
 AVON
 CONNECTICUT
 ADD ALTERNATE #1 & #2
 SITE
 LIGHTING
 PLAN

FEBRUARY 22, 2019

REVISIONS:

2/22/19	ADDENDUM NO. 1

PREPARED FOR:
 TOWN OF AVON
 80 WEST MAIN STREET
 AVON CT 06001

BSC GROUP
 300 Winding Brook Drive
 Glastonbury, Connecticut 06033
 860 652 8227

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 SCALE: 1" = 30'

FILE: AVON HS FIELD LIGHTING
 DWG. NO:
 JOB. NO: SE-1ALT

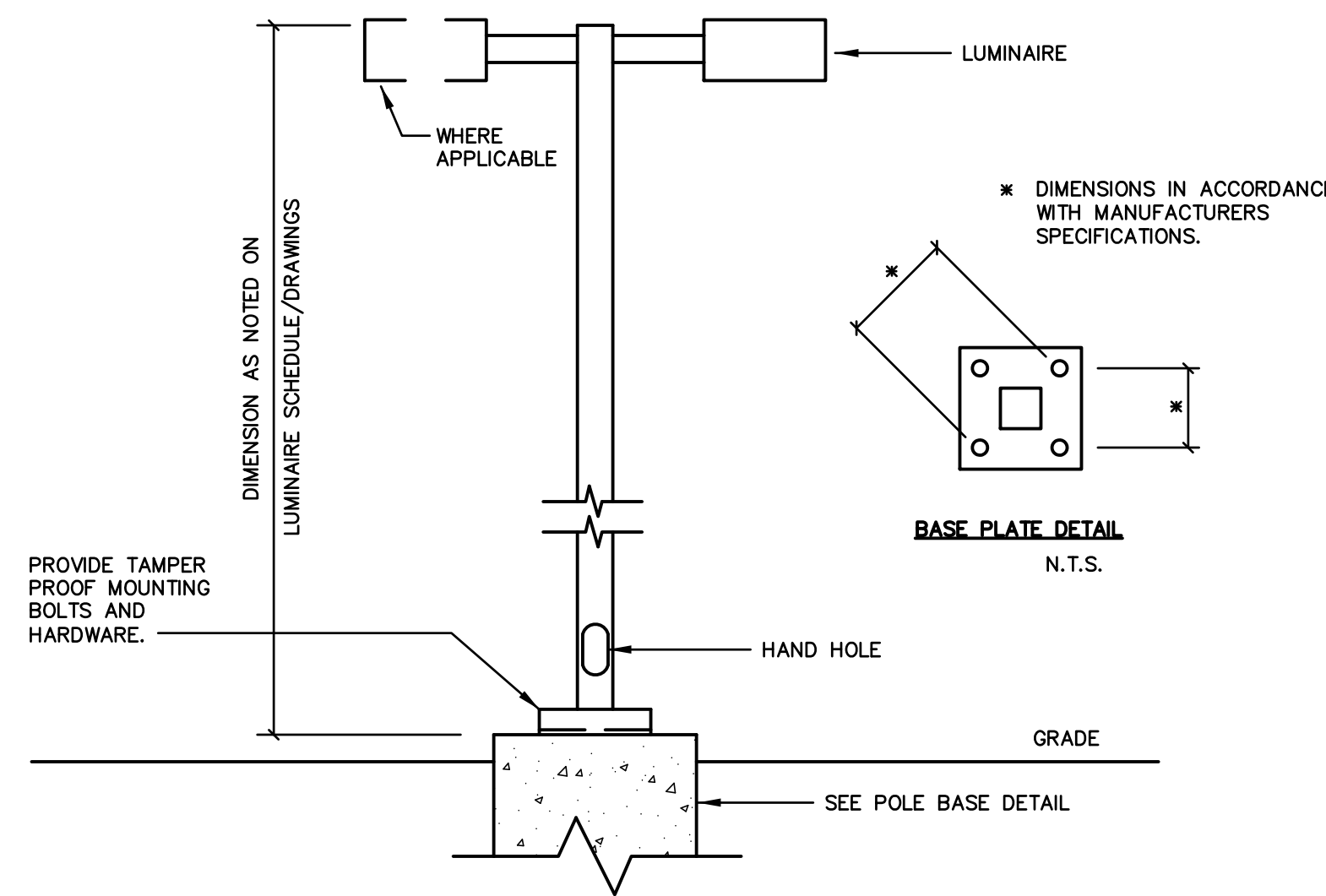
PANELBOARD		Class:		Short Circuit Rating (Min.): 65 K.A.I.C.			
DP-FIELD		Type:		Remark:			
SERVICE		120/208 Volts	3 Phase	4 Wire	S/E Label: YES		
PANELBOARD CONFIGURATION		400 AMPERE MAIN BUS		Entrance: TOP/BOTTOM			
MAIN		Type: 400A MAIN CIRCUIT BREAKER		Enclosure: NEMA 1, LOCKABLE COVER			
BRANCH CIRCUITS		Branch Protective Devices: (MOLDED CASE CIRCUIT BREAKERS)					
Circ No	Circuit Designation	KVA Load	Pole	Trip Amps	Frame Amps	Wire (min.)	See Remark
1	LIGHT POLE F1	23.5	3	70	100	SEE DRAWINGS	
2	LIGHT POLE F2	23.5	3	70	100	SEE DRAWINGS	
3	---	---	---	---	---	---	
4	---	---	---	---	---	---	
5	---	---	---	---	---	---	
6	---	---	---	---	---	---	
7	LIGHT POLE F3	23.5	3	70	100	SEE DRAWINGS	
8	LIGHT POLE F4	23.5	3	70	100	SEE DRAWINGS	
9	---	---	---	---	---	---	
10	---	---	---	---	---	---	
11	---	---	---	---	---	---	
12	---	---	---	---	---	---	
13	EXIST CONCESSION PANEL	10.0	2	90	100	EXISTING	
14	SCOREBOARD	1.6	1	20	100	SEE DRAWINGS	
15	---	---	---	---	---	---	
16	SCOREBOARD	1.6	1	20	100	SEE DRAWINGS	
17	---	---	---	---	---	---	
18	RECEPT - SCOREBOARD	0.2	1	20	100	SEE DRAWINGS	
19	PATHWAY LIGHTING	0.3	1	20	100	1" C, 3-#10 AWG	
20	SHED LIGHTING & RECEPT	0.5	1	20	100	1" C, 3-#10 AWG	
21	GFCI QUAD RECEPT	0.4	1	20	100	1/2" C, 3-#12 AWG	
22	GFCI QUAD RECEPT	0.4	1	20	100	1/2" C, 3-#12 AWG	
23	GFCI QUAD RECEPT	0.4	1	20	100	1/2" C, 3-#12 AWG	
24	GFCI QUAD RECEPT	0.4	1	20	100	1/2" C, 3-#12 AWG	
25	CONV RECEPT FIELD EAST	1.2	1	20	100	SEE DRAWINGS	
26	CONV RECEPT FIELD WEST	1.2	1	20	100	SEE DRAWINGS	
27	LTG PANEL CONTROL CIRC	1.6	1	20	100	1/2" C, 3-#12 AWG	
28	PREPARED SPACE	---	---	---	---	---	
29	PREPARED SPACE	---	---	---	---	---	
30	PREPARED SPACE	---	---	---	---	---	
31	PREPARED SPACE	---	---	---	---	---	
32	SPD	---	---	---	---	---	
33	PREPARED SPACE	---	---	---	---	---	
34	---	---	---	---	---	---	
35	PREPARED SPACE	---	---	---	---	---	
36	---	---	---	---	---	---	
TOTAL		113.8					

PROVIDE PANEL WITH SURGE PROTECTION DEVICE (SPD), LEVITON MODEL "55208-ASA" OR APPROVED EQUAL.

ADD ALTERNATE #1 & #2

SITE PATHWAY LUMINAIRE SCHEDULE					
LTG. CODE	DESCRIPTIONS	VOLTS	CATALOG NO. / MANUFACTURER	MOUNTING	LAMP
'SL1'	27.5"x15" LOW PROFILE LED SITE LUMINAIRE FIXTURE AND 14'-0" HIGH 4" STRAIGHT ROUND STEEL POLE. TYPE III DISTRIBUTION, 6,040 LUMENS, 4000K COLOR. COLOR BY ARCHITECT. PHOTOCELL. UL LISTED WET LOCATIONS.	120	ECF-S-32L-530-NW-G2-AR-3-120-XXX-PCB POLE: SRS-14-4-D1-XX PHILIPS GARDCO	SITE/POLE	LED
'SL2'	27.5"x15" LOW PROFILE LED SITE LUMINAIRE FIXTURE AND 14'-0" HIGH 4" STRAIGHT ROUND ALUMINUM POLE. TYPE II DISTRIBUTION, 6,170 LUMENS, 4000K COLOR. COLOR BY ARCHITECT. PHOTOCELL. UL LISTED WET LOCATIONS.	120	ECF-S-32L-530-NW-G2-AR-2-120-XXX-PCB POLE: SRS-14-4-D1-XX PHILIPS GARDCO	SITE/POLE	LED

ADD ALTERNATE #1 & #2



ADD ALTERNATE #1 & #2
TYP. PATHWAY LIGHT POLE AND LUMINAIRE DETAIL
SCALE: N.T.S.

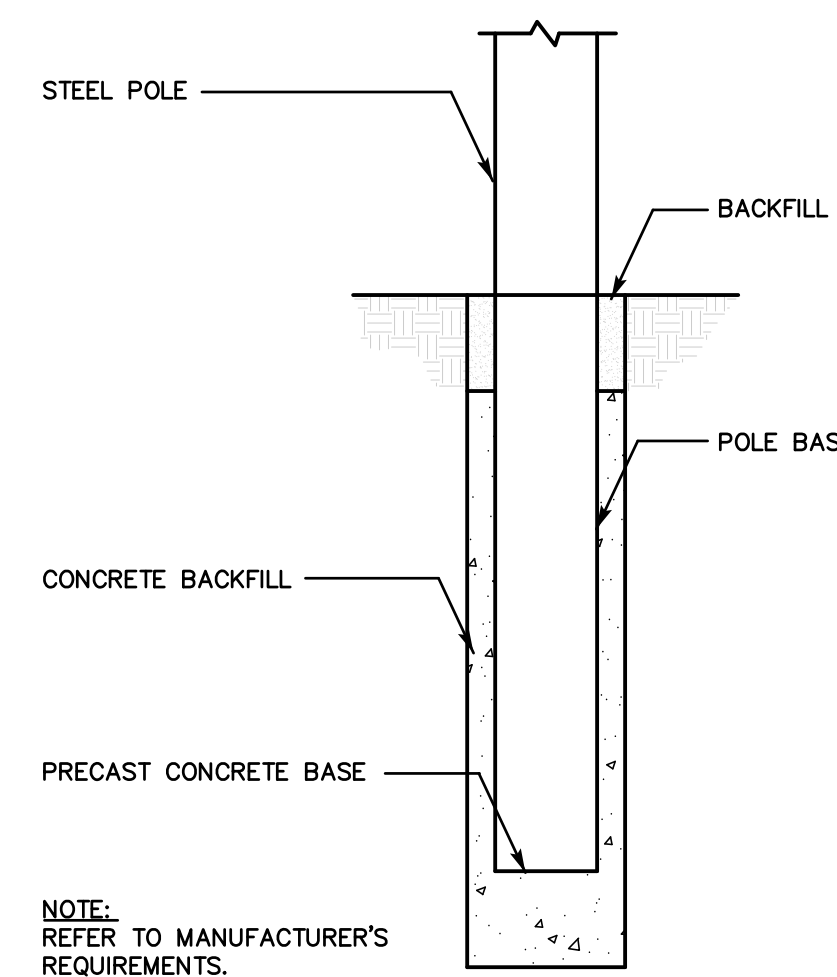
WARNING

**"CALL BEFORE YOU DIG"
1-800-922-4455"**

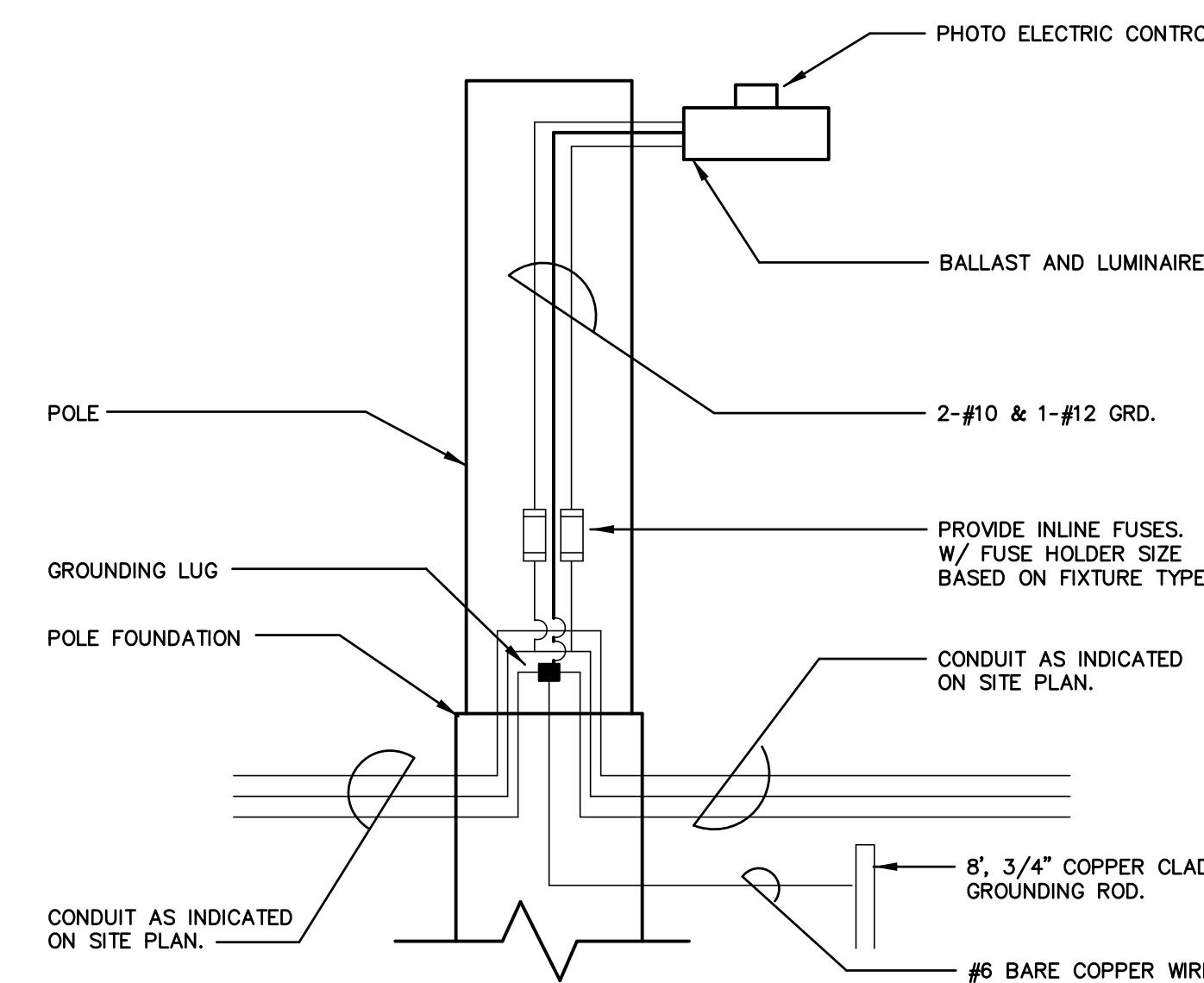
CONTRACTOR SHALL REGISTER HIS INTENTION TO START EXCAVATIONS AT OR NEAR A PUBLIC UTILITY AT LEAST TWO FULL WORKING DAYS PRIOR TO THE ACTIVITY.

NOTES:

- CONTRACTOR IS RESPONSIBLE FOR REPAIR AND PAYMENT FOR ALL UTILITIES DAMAGED DURING CONSTRUCTION.
- THE LOCATION OF ALL UNDERGROUND UTILITIES IS BASED UPON THE BEST AVAILABLE INFORMATION. CONTRACTOR TO CONFIRM LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO COMMENCEMENT OF ANY EXCAVATION.
- CONTRACTOR TO RETURN SITE TO ORIGINAL CONDITION AFTER INSTALLATION OF UNDERGROUND UTILITIES.

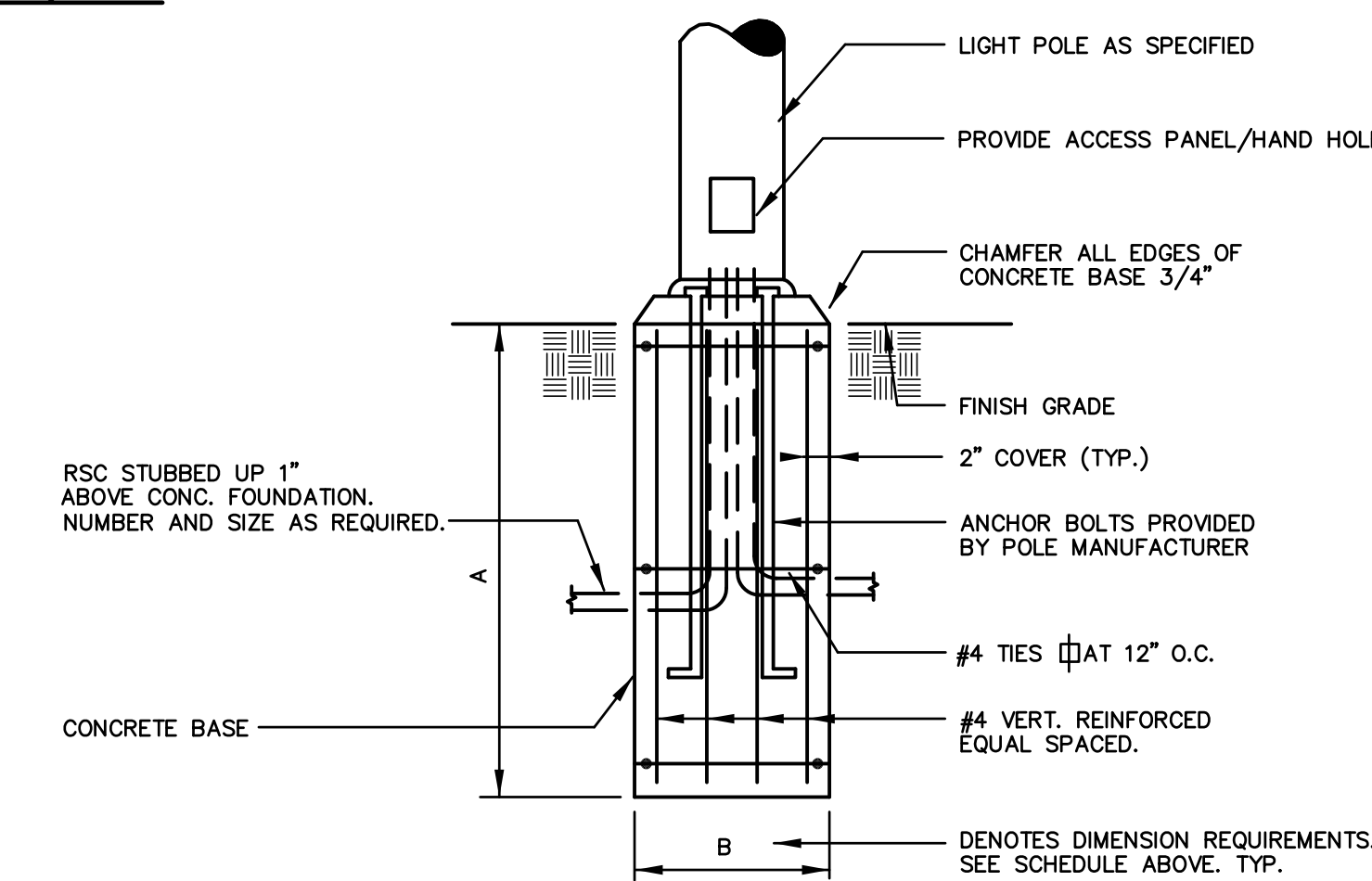


ADD ALTERNATE #1 & #2
TYPICAL POLE FOUNDATION DETAIL
POLES F1, F2, F3, F4
SCALE: N.T.S.



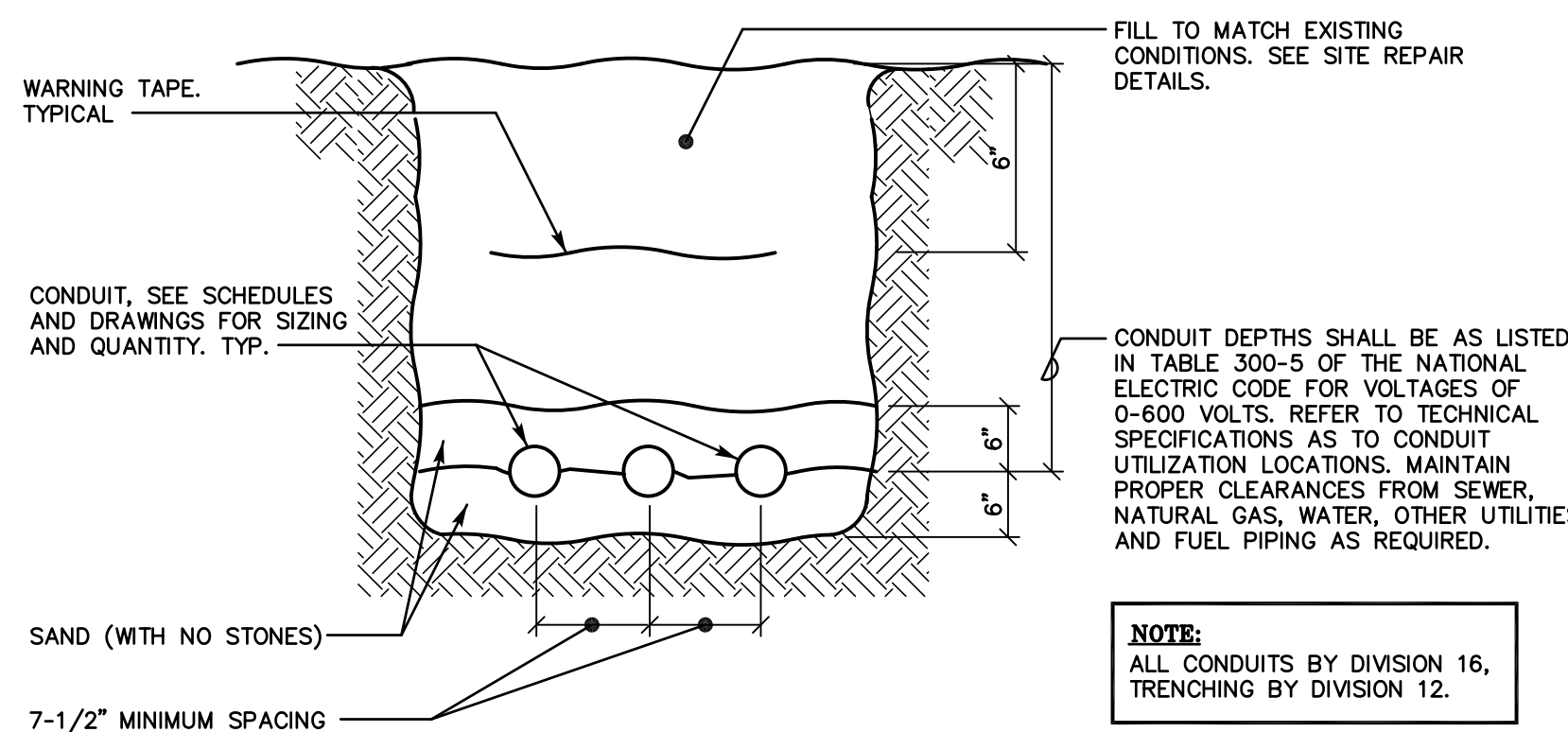
ADD ALTERNATE #1 & #2
TYPICAL PATHWAY LIGHTING POLE WIRING SCHEMATIC
SCALE: N.T.S.

- ### ELECTRICAL GENERAL NOTES
- SEE SPECIFICATIONS, DIVISION 26 ELECTRICAL.
 - PROVIDE A COMPLETE AND OPERATIONAL ELECTRICAL SYSTEM INCLUDING ALL NECESSARY MATERIAL, LABOR AND EQUIPMENT.
 - ELECTRICAL PLANS AND DETAILS AND ONE LINE DIAGRAMS SHOW THE GENERAL LOCATION AND ARRANGEMENT OF THE ELECTRICAL SYSTEM. THEY ARE DIAGRAMMATIC AND DO NOT SHOW ALL CONDUIT BODIES, CONNECTORS, BENDS, FITTINGS, HANGERS AND ADDITIONAL PULL AND JUNCTION BOXES.
 - ALL EQUIPMENT AND MATERIAL SHALL BE LABELED, LISTED AND INSTALLED IN ACCORDANCE WITH THEIR LISTING.
 - THE CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS AND ARRANGE FOR ALL REQUIRED INSPECTIONS IN ACCORDANCE WITH STATE AND LOCAL GOVERNING AUTHORITIES.
 - ALL WORK SHALL BE DONE WITH LICENSED WORKMEN IN ACCORDANCE WITH STATE AND LOCAL GOVERNING AUTHORITIES.
 - THE DEFINITION OF ELECTRICAL TERMS USED SHALL BE AS DEFINED IN THE 2017 EDITION OF THE NATIONAL ELECTRICAL CODE (NEC).
 - THE TERM "INDICATED" SHALL MEAN "AS SHOWN ON CONTRACT DOCUMENTS (SPECIFICATIONS, DRAWINGS AND RELATED ATTACHMENTS)".
 - THE TERM "PROVIDE" SHALL MEAN "TO FURNISH, INSTALL AND CONNECT COMPLETELY".
 - THE TERM "SIZE" SHALL MEAN ONE OR MORE OF THE FOLLOWING: "LENGTH, CURRENT AND VOLTAGE RATING, NUMBER OF POLES, NEMA SIZE AND OTHER SIMILAR ELECTRICAL CHARACTERISTICS".
 - THE TERM "SPACE" ON PANELBOARD AND SWITCHBOARD SCHEDULES SHALL MEAN "PROVIDE SPACE TO INSTALL THE NUMBER OF POLES AND SIZE OF THE PROTECTIVE DEVICE INDICATED WITH ALL NECESSARY BUS AND FITTINGS TO INSTALL THE DEVICE AT SOME FUTURE DATE".
 - ELECTRICAL PLANS AND DETAILS DO NOT SHOW ALL INTERFERENCES AND CONDITIONS, VISIBLE AND/OR HIDDEN, THAT MAY EXIST. THIS REQUIRING THE CONTRACTOR TO INSPECT AND SURVEY THE SPACE BEFORE PERFORMING THE WORK.
 - COORDINATE ELECTRICAL WORK WITH OTHER DIVISIONS OF THIS PROJECT.
 - TURN OVER TO THE OWNER ALL MANUFACTURERS WARRANTIES FOR EQUIPMENT AND MATERIAL PROVIDED.
 - UNLESS OTHERWISE INDICATED, ALL ENCLOSURES FOR EQUIPMENT PROVIDED SHALL BE NEMA TYPE 1.
 - UNLESS OTHERWISE INDICATED, ALL CONDUCTORS TO BE COPPER THHN/THWN-2.
 - UNLESS OTHERWISE INDICATED, ALL OUTLET AND SWITCH BOXES TO BE CAST IRON WITH THREADED HUBS.
 - IN INTERIOR PROTECTED LOCATIONS, OUTLET AND SWITCH BOXES MAY BE STEEL.
 - UNLESS OTHERWISE INDICATED, PROVIDE HEAVY-DUTY GRADE, 20 AMPERE RECEPTACLES AND SWITCHES. PROVIDE COVER PLATES. COLOR BY ARCHITECT.
 - BEFORE SELECTING MATERIAL AND EQUIPMENT, AND PROCEEDING WITH WORK, INSPECT AREAS WHERE MATERIAL AND EQUIPMENT ARE TO BE INSTALLED TO INSURE SUITABILITY, AND CHECK NEEDED SPACE FOR PLACEMENT, CLEARANCES AND INTERCONNECTIONS.
 - BEFORE CUTTING OR DRILLING INTO BUILDING ELEMENTS, INSPECT AND LAYOUT WORK TO AVOID DAMAGING STRUCTURAL ELEMENTS AND BUILDING UTILITIES.
 - ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE 2017 EDITION OF THE NATIONAL ELECTRICAL CODE (NEC) ANSI/NFPA 70 WITH CT AMENDMENTS.
 - THE MEASUREMENT FROM ABOVE FINISHED FLOOR (AFF) SHALL BE TAKEN FROM THE FINISHED FLOOR SURFACE TO THE TOP OF WALL RECEPTACLES AND SWITCH BOXES, TO THE CENTER LINE OF WALL LIGHTING OUTLET BOXES, TO THE TOP OF WALL MOUNTED EQUIPMENT ENCLOSURES, TO THE CENTER LINE OF THE TOP MOST SWITCH HANDLE, OR TO THE LOWEST SURFACE OF CEILING LIGHTING FIXTURES OTHER CEILING MOUNTED EQUIPMENT.
 - UNLESS OTHERWISE INDICATED, ALL CONDUCTORS ARE NO. 12 AWG.
 - CONDUIT SIZE FOR INDICATED CONDUCTORS SHALL BE BASED ON CHAPTER 9 OF NEC.
 - OBTAIN AND PAY FOR ALL UTILITY COMPANY CHARGES FOR UPGRADING ELECTRICAL SERVICE.



BOLT-DOWN POLE FOUNDATION SCHEDULE		
POLE HEIGHT	A	B
14 FT.	60"	24"
	VERTICAL REINFORCEMENT 12-#4	

ADD ALTERNATE #1 & #2
TYPICAL PATHWAY LIGHTING CAST-IN-PLACE POLE BASE DETAIL
SCALE: N.T.S.



ADD ALTERNATE #1 & #2
TYPICAL TRENCH DETAIL
SCALE: N.T.S.

CONSULTANT:
SALAMONE & ASSOCIATES, P.C.
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ATHLETIC FACILITY IMPROVEMENTS AT AVON HIGH SCHOOL

510 WEST AVON ROAD
IN
AVON CONNECTICUT
ELECTRICAL DETAILS, SYMBOLS NOTES AND ABBREVIATIONS

FEBRUARY 22, 2019

REVISIONS:
2/22/19 ADDENDUM NO. 1

PREPARED FOR:
TOWN OF AVON
80 WEST MAIN STREET
AVON CT 06001

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

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SCALE: N.T.S.

FILE: AVON HS FIELD LIGHTING
DWG. NO:
JOB. NO: SE-3

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

1.2 SUMMARY

- A. This Section includes general administrative, procedural, and other requirements for electrical installations. The following requirements are included in this Section to expand the requirements specified in other Divisions.
 - 1. Submittals.
 - 2. Quality control.
 - 3. Definitions and abbreviations.
 - 4. Scheduling.
 - 5. Coordination drawings.
 - 6. Record documents.
 - 7. Maintenance manuals.
 - 8. Delivery, storage, and handling.
 - 9. Products.
 - 10. Rough ins.
 - 11. Electrical installations.
 - 12. Permits and instructions.
 - 13. Field quality control.
 - 14. Protection.
 - 15. Additional work.
 - 16. Electrical schedules.
 - 17. Cutting and patching.

1.3 SUBMITTALS

- A. General: Follow the procedures specified in Division 1.
- B. Increase, by the quantity listed below, the number of electrical related shop drawings, product data, and samples submitted, to allow for required distribution plus two copies of each submittal required, which will be retained by the Electrical Consulting Engineer.
 - 1. Shop Drawings Initial Submittal: 1 additional blue or black line prints.
 - 2. Shop Drawings Final Submittal: 1 additional blue or black line prints.
 - 3. Product Data: 1 additional copy of each item.
 - 4. Samples: 1 addition as set.
- C. Additional copies may be required by individual sections of these Specifications.

1.4 QUALITY CONTROL

- A. Functional and Operational Test Procedure:
 - 1. Test procedure to completely test all systems as to their functional and sequential operation.
 - 2. Submit two (2) draft copies for review before conducting test.
 - 3. Certify that the test procedure was used and testing completed, and that all systems are operational and functioning properly.
 - 4. Submit certified Test Procedure for review prior to the date of final inspection.
 - 5. Systems to be covered by test procedure:
 - a. Power Distribution
 - b. Lighting systems including general lighting
 - c. Emergency lighting systems
- B. Other Tests and Certifications for:
 - 1. Grounding System: As specified under Section 260526.

1.5 DEFINITIONS AND ABBREVIATIONS

- A. Electrical Definitions: As defined by NEC, Article 100.
- B. The term "indicated" shall mean "as shown on contract documents (specifications, drawings, and related attachments)".
- C. The term "provide" shall mean "to furnish, install and connect completely".
- D. The term "size" shall mean one or more of the following: "length, current and voltage rating, number of poles, NEMA size, and other similar electrical characteristics".
- E. The term "space" on panelboard and switchboard schedules shall mean "provide space to install the number of poles and size of the protective device indicated with all the necessary buss and fittings to install the device at some future date".

1.6 SCHEDULING

- A. Coordinate electrical work with other divisions of this project.
- B. Coordinate electrical work with Owner.
- C. The building shall be continuously occupied during construction and the Contractor shall not cause any interruption of electrical services without prior authorization from the Owner. Written requests for approval for planned shutdowns or interruption of Owner's electrical services or equipment shall be made a minimum of seven (7) days prior to the start of the requested shut periods.
- D. Written notification for on site training of Owner's personnel shall be made one (1) week prior to the start of the requested training period.

1.7 COORDINATION DRAWINGS

- A. Prepare coordination drawings in accordance with Division 1 to a scale of 1/4"=1' 0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
1. Indicate the proposed locations of major raceway systems, equipment, and materials. Include the following:
 - a. Clearances for servicing equipment, including space for equipment disassembly required for periodic maintenance.
 - b. Fire rated wall and floor penetrations.
 - c. Equipment connections and support details.
 2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
 3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

1.8 RECORD DOCUMENTS

- A. Prepare record documents in accordance with the requirements in Division 1. In addition to the requirements specified in Division 1, indicate installed conditions for:
1. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
 2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

1.9 MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 1. In addition to the requirements specified in Division 1, include the following information for equipment items:
1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 2. Manufacturer's printed operating procedures to include start up, break in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 4. Servicing instructions and lubrication charts and schedules.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include the following:
 - 1. Eaton Corp.
 - 2. General Electric Co.
 - 3. Siemens
 - 4. Schneider Electric, Square D
- B. As specified on Drawings.

2.2 MATERIAL

- A. General:
 - 1. Unless otherwise indicated, all raceways for service, feeders, branch and control wiring are RSC or IMC. See Section 260533.
 - 2. Unless otherwise indicated, wiring to equipment and motors shall be installed in liquid tight flexible conduit, or in interior locations in flexible metal conduit, with a maximum length of six (6) feet.
 - 3. Unless otherwise indicated, all conductors to be copper THHN/THWN-2.
 - 4. Unless otherwise indicated, all outlet and switch boxes to be cast iron with threaded hubs.
 - 5. In interior protected locations, where recessed in ceiling and walls, outlet and switch boxes may be stamped steel.
 - 6. Unless otherwise indicated, provide heavy duty grade, 20 ampere, receptacles and switches. Plates shall be 302 stainless steel, satin finish. Plates for surface mounted interior boxes may be stamped steel. Plates exposed to weather or water to be metal, weatherproof type. Receptacles, switches and associated cover plates color by Architect/Owner.
- B. As specified under RELATED SECTIONS.
- C. As specified on Drawings.

2.3 EQUIPMENT

- A. General:
 - 1. Unless otherwise indicated, externally operated safety switches are unfused, solid neutral, heavy duty, and selected to meet the load requirements.
- B. As specified under RELATED SECTIONS.

- C. As specified on Drawings.

2.4 FABRICATION

- A. General:
 - 1. Unless otherwise indicated, all enclosures are NEMA Type 1. NEMA Type 3R shall be used for wet/damp locations.
- B. As specified under RELATED SECTIONS.
- C. As specified on Drawings.

PART 3 EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 2 through 26 for rough in requirements.

3.2 ELECTRICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate electrical systems, equipment, and materials installation with other building components. Electrical plans and details do not show all interferences and conditions, visible and/or hidden, that may exist. Before selecting material and equipment, and proceeding with work, inspect areas where material and equipment are to be installed to insure suitability, and check needed space for placements, clearances and interconnections. Before cutting or drilling into building elements inspect and layout work to avoid damaging structural elements or building utilities.
 - 2. Electrical plans, details, and diagrams show the general location and arrangement of electrical systems. They are diagrammatic and do not show all conduit bodies, connectors, bends, fittings, hangers, and additional pull and junction boxes which the Contractor must provide to complete the electrical system.
 - 3. Verify all dimensions by field measurements.
 - 4. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
 - 5. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.
 - 6. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building. Verify dimensional constraints of building door openings and passageways, and the maximum floor loadings, for the movement of selected material and equipment. Order equipment and material, broken down as may be required, to meet these constraints.

7. Measurement from above finished floor (AFF) shall be taken from the finished floor surface to the top of wall receptacles and switch boxes, to the centerline of wall lighting outlet boxes, to the top of wall mounted equipment enclosures, to the centerline of top most switch handle, or to the lowest surface of ceiling lighting fixtures and other ceiling mounted equipment.
 - a. Unless otherwise indicated, wall switch boxes shall be 44 inches AFF. Refer to Architectural drawings.
 - b. Unless otherwise indicated, receptacle boxes shall be 18 inches AFF. Receptacle mounted above counter and at furniture locations shall be coordinated with architectural elements. Coordinate with Architect. Refer to Architectural drawings.
 - c. Verify connection mounting heights with kitchen equipment.
 - d. Surface raceway heights shall be coordinated with Architectural requirements.
8. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible. Switch and receptacle heights shall meet handicap accessible code requirements.
9. Coordinate connection of electrical systems with incoming utilities and services. Comply with requirements of governing regulations, power, telephone, and data service companies, and controlling agencies. Provide required connection for each service. Provide power connection to equipment. Coordinate with other Divisions.
10. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.
11. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
12. Conduit Sizing:
 - a. Unless otherwise indicated, conduit size for indicated conductor shall be based on Chapter 9 of NEC.
 - b. Conduit: 1/2 inch minimum size.
13. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Measure and locate placement of equipment and materials in relation to building structure and surfaces, and between equipment to be installed and wired. Maintain required minimum access spacing for equipment and enclosures.
14. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified elsewhere.
15. Install systems, materials, and equipment giving right of way priority to systems required to be installed at a specified slope.
16. Unless otherwise noted, individual raceway runs are required for each kitchen equipment component. Connection shall be routed down existing walls exposed, concealed in new walls, and/or under slab to the respective area as noted.

3.3 PERMITS AND INSPECTIONS

- A. Obtain and pay for all required permits and arrange for all required inspections in accordance with state and local governing authorities.
- B. Final Electrical Inspection Certificate from inspection agency or governing authority.

3.4 FIELD QUALITY CONTROL

- A. Perform field tests as specified under other electrical sections.
- B. Arrange for local Inspection Authorities to inspect work performed prior to burial, closing-in behind wall and above ceiling, or encased in concrete. Also arrange for final inspection of work and obtain Final Inspection Certificate before final inspection of work by Owner or his representative.

3.5 PROTECTION

- A. Protect personnel from coming in contact with live parts.
- B. During remodeling or alteration work, maintain fire ratings of walls, floors and ceilings when work is left unattended.
- C. Protect from damage and theft equipment and materials provided or supplied by others in accordance with manufacturer's recommendation and warranties, and with electrical standards and practices.

3.8 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with Division 1. In addition to the requirements specified in Division 1, the following requirements apply:
 - 1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
 - a. Uncover Work to provide for installation of ill timed Work.
 - b. Remove and replace defective Work.
 - c. Remove and replace Work not conforming to requirements of the Contract Documents.
 - d. Remove samples of installed Work as specified for testing.
 - e. Install equipment and materials in existing structures.
 - f. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer observation of concealed Work.
 - 2. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new Work.
 - 3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
 - 4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

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5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
6. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
7. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

END OF SECTION

SECTION 26 05 19
LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division Specification Sections, apply to this Section.
- B. Requirements of other specified Division 26 Sections apply to this section.

1.2 SUMMARY

- A. This Section includes wires, cables, and connectors for power, lighting, signal, control and related systems rated 600 volts and less.

1.3 SUBMITTALS

- A. Product Data for electrical wires, cables and connectors.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with provisions of the following code:
- B. NFPA 70 "National Electrical Code."
 - 1. Conform to applicable codes and regulations regarding toxicity of combustion products of insulating materials.
- C. UL Compliance: Provide components which are listed and labeled by UL under the following standards.
 - 1. UL Std. 83 Thermoplastic-Insulated Wires and Cables.
 - 2. UL Std. 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors.
 - 3. UL Std. 1569 Metal Clad Cable.
- D. NEMA/ICEA Compliance: Provide components which comply with the following standards:
 - 1. WC-5 Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- E. IEEE Compliance: Provide components which comply with the following standard.
 - 1. Std. 82 Test procedures for Impulse Voltage Tests on Insulated Conductors.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - 1. Wire and Cable:
 - a. American Insulated Wire Corp.
 - b. Republic Wire Inc.
 - c. Southwire Company.
 - 2. Connectors for Wires and Cable Conductors:
 - a. AMP
 - b. 3M Company
 - c. O-Z/Gedney Co.
 - d. Square D Company.

2.2 WIRES AND CABLES

- A. General: Provide wire and cable suitable for the temperature, conditions and location where installed.
- B. Conductors: Provide stranded conductors for power and lighting circuits no. 10 AWG and smaller. Provide stranded conductors for sizes no. 8 AWG and larger.
- C. Conductor Material: copper for all wires and cables.
- D. Conductor sizes indicated are based on copper.
- E. Insulation: Provide THHN/THWN-2 insulation for all conductors size 500MCM and larger, and no. 8 AWG and smaller. For all other sizes provide, THHN/THWN-2 or XHHW-2 insulation as appropriate for the locations where installed.
- F. Color Coding for phase identification in accordance with Table 1 in Part 3 below.
- G. Jackets: Factory-applied nylon or PVC external jacketed wires and cables for pulls in raceways over 100-feet in length, for pulls in raceways with more than three equivalent 90 deg. bends, for pulls in conduits underground or under slabs on grade, and where indicated.

2.3 CONNECTORS FOR CONDUCTORS

- A. Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

PART 3 EXECUTION

3.1 WIRING METHOD

- A. Use the following wiring methods as indicated:
 - 1. Wire: install all wire in raceway.

3.2 INSTALLATION OF WIRES AND CABLES

- A. General: Install electrical cables, wires, and connectors in compliance with NEC.
- B. Coordinate cable installation with other Work.
- C. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.
- D. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.
- E. Conceal all cable in finished spaces.
- F. Keep conductor splices to minimum.
- G. Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced.
- H. Use splice and tap connectors which are compatible with conductor material.
- I. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than no 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.
- J. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

- A. Prior to energizing, check installed wires and cables with megohm meter to determine insulation resistance levels to assure requirements are fulfilled.
- B. Prior to energizing, test wires and cables for electrical continuity and for short-circuits.
- C. Subsequent to wire and cable hook-ups, energize circuits and demonstrate proper functioning. Correct malfunctioning units, and retest to demonstrate compliance.

D. TABLE 1: Color Coding for Phase Identification:

1. Color code secondary service, feeder, and branch circuit conductors with factory applied color as follows:

<u>208Y/120Volts</u>	<u>Phase</u>	480/277Volts
Black	A	Yellow
Red	B	Brown
Blue	C	Orange
White	Neutral	White
Green	Ground	Green

END OF SECTION

SECTION 26 05 26
GROUNDING

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes solid grounding of electrical systems and equipment. It includes basic requirements for grounding for protection of life, equipment, circuits, and systems. Grounding requirements specified in this Section may be supplemented in other sections of these Specifications.
- B. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Division 26 Section "low voltage electrical power conductors and cables."

1.2 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for ground rods, connectors and connection materials, and grounding fittings.
- C. Field-testing organization certificate, signed by the Contractor, certifying that the organization performing field tests complies with the requirements specified in Quality Assurance below.
- D. Report of field tests and observations certified by the testing organization.

1.3 QUALITY ASSURANCE

- A. Listing and Labeling: Provide products specified in this Section that are listed and labeled. The terms "listed" and "labeled" shall be defined as they are in the National Electrical Code, Article 100.
 - 1. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- B. Field-Testing Organization Qualifications: To qualify for acceptance, the independent testing organization must demonstrate, based on evaluation of organization-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct satisfactorily the testing indicated.
- C. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code" (NEC).
- D. UL Standard: Comply with UL 467, "Grounding and Bonding Equipment."

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Anixter Bros., Inc.
2. Bashlin Industries, Inc.
3. Erico Products, Inc.
4. GB Electrical, Inc.
5. Ideal Industries, Inc.
6. O-Z/Gedney Co.
7. Raco, Inc.
8. Thomas & Betts Corp.
9. Utilco Co.

2.2 GROUNDING AND BONDING PRODUCTS

- A. Products: Of types indicated and of sizes and ratings to comply with NEC. Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.
- B. Conductor Materials: Copper.

2.3 WIRE AND CABLE CONDUCTORS

- A. General: Comply with Division 26 Section "low voltage electrical power conductors and cables." Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.
- B. Equipment Grounding Conductor: Green insulated.
- C. Grounding Electrode Conductor: Stranded cable.
- D. Bare Copper Conductors: Conform to the following:
 1. Assembly of Stranded Conductors: ASTM B-8.

2.4 MISCELLANEOUS CONDUCTORS

- A. Ground Bus: Bare annealed copper bars of rectangular cross section.
- B. Braided Bonding Jumpers: Copper tape, braided No. 30 gage bare copper wire, terminated with copper ferrules.
- C. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

2.5 CONNECTOR PRODUCTS

- A. General: Listed and labeled as grounding connectors for the materials used.
- B. Pressure Connectors: High-conductivity-plated units.
- C. Bolted Clamps: Heavy-duty units listed for the application.

- D. Exothermic Welded Connections: Provided in kit form and selected for the specific types, sizes, and combinations of conductors and other items to be connected.
- E. Aluminum-To-Copper Connections: Bimetallic type, conforming to UL 96, "Lighting Protection Components," or UL 467.

2.6 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel with high-strength steel core and electrolytic-grade copper outer sheath, molten welded to core.
 - 1. Size: 3/4 inch by 10 feet.
 - 2. Size: 5/8 inch by 8 feet.
- B. Plate Electrodes: Copper plates, minimum 0.10 inch thick, size as required per N.E.C. indicated.

PART 3 EXECUTION

3.1 APPLICATIONS

- A. Equipment Grounding Conductor Application: Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except where larger sizes or more conductors are indicated.
 - 1. Install separate insulated equipment grounding conductors with circuit conductors for the following in addition to those locations where required by Code:
 - a. Lighting circuits.
 - b. Feeders and branch circuits.
 - c. Receptacle Circuits.
 - d. Single-phase motor or appliance circuits.
 - e. Three-phase motor or appliance branch circuits.
 - 2. Busway Circuits: Install separate insulated equipment ground conductor from the ground bus in the switchgear, switchboard, or distribution panel to the equipment ground terminal on the busway.
 - 3. Elevator Equipment Circuits: Install an insulated equipment grounding conductor to electrical devices operating at 120-V and above including hard-wired and plug-cord assemblies. Bond the conductor to each such unit and in accordance with manufacturer's requirements.
 - 4. Special systems: Provide isolated ground feeder back through each IDF & MDF room. Bond conductor back to building ground.
 - 5. Nonmetallic Raceways: Install an insulated equipment ground conductor in nonmetallic raceways.
- B. Underground Conductors: Bare, stranded copper except as otherwise indicated.

3.2 INSTALLATION

- A. General: Ground electrical systems and equipment in accordance with NEC requirements except where the Drawings or Specifications exceed NEC requirements.

- B. Ground Rods: Locate a minimum of one rod length from each other and at least the same distance from any other grounding electrode, or as indicated otherwise on the drawings. Interconnect ground rods with bare conductors buried at least 24 inches below grade. Connect bare cable ground conductors to ground rods by means of exothermic welds except as otherwise indicated. Make these connections without damaging the copper coating or exposing the steel. Use 3/4 inch by 10 ft. ground rods except as otherwise indicated. Drive rods until tops are 6 inches below finished floor or final grade except as otherwise indicated.
- C. Metallic Water Service Pipe: Provide insulated copper ground conductors, sized as indicated, in conduit from the building main service equipment, or the ground bus, to main metallic water service entrances to the building. Connect ground conductors to the main metallic water service pipes by means of ground clamps. Do not install a grounding jumper around dielectric fittings. Connect the ground conductor to the street side of the fitting. Bond the ground conductor conduit to the conductor at each end.
- D. Braided Type Bonding Jumpers: Install to connect ground clamps on water meter piping to bypass water meters electrically. Use elsewhere for flexible bonding and grounding connections.
- E. Route grounding conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain.
- F. Test Wells: Locate as indicated, and as required.
- G. Grounding connections should conform to NEC in addition to local requirements.
- H. Neutral Ground Resistor (NGR) shall be installed within walkin style generator enclosure. The NGR shall be mounted above the generator assembly and will be either supported from the floor or ceiling of said assembly. Coordinate installation location and requirements with generator manufacturer. Install per manufacturer's installation requirements.

3.3 CONNECTIONS

- A. General: Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot tin coated materials to assure high conductivity and make contact points closer in order of galvanic series.
 - 2. Make connections with clean bare metal at points of contact.
 - 3. Aluminum to steel connections shall be with stainless steel separators and mechanical clamps.
 - 4. Aluminum to galvanized steel connections shall be with tin plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections involving dissimilar metals with inert material such as red lead paint to prevent future penetration of moisture to contact surfaces.
- B. Exothermic Welded Connections: Use for connections to structural steel and for underground connections except those at test wells. Install at connections to ground rods and plate

electrodes. Comply with manufacturer's written recommendations. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

- C. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure type grounding lugs. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to the housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to the ground bus in the housing. Bond electrically noncontinuous conduits at both entrances and exits with grounding bushings and bare grounding conductors.
- D. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486.
- E. Connections at Test Wells: Use compression type connectors on conductors and make bolted and clamped type connections between conductors and ground rods.
- F. Compression Type Connections: Use hydraulic compression tools to provide the correct circumferential pressure for compression connectors. Use tools and dies recommended by the manufacturer of the connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the ground conductor.
- G. Moisture Protection: Where insulated ground conductors are connected to ground rods or ground buses, insulate the entire area of the connection and seal against moisture penetration of the insulation and cable.

3.4 FIELD QUALITY CONTROL

- A. Independent Testing Organization: Arrange and pay for the services of a qualified independent electrical testing organization to perform tests described below.
- B. Tests: Subject the completed grounding system to a megger test at service disconnect enclosure ground terminal, and at ground test wells. Measure ground resistance without the soil being moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the 2 point method in accordance with Section 9.03 of IEEE 81, "Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System."
- C. Deficiencies: Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values. Coordinate with the Owner's Representative.
- D. Report: Prepare test reports, certified by the testing organization, of the ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

3.5 CLEANING AND ADJUSTING

- A. Restore surface features at areas disturbed by excavation and reestablish original grades except as otherwise indicated. Where sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other Work to their original condition. Include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, or mulching. Perform such Work in accordance with Division 2.

END OF SECTION

SECTION 26 05 33
RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements specified in other Division 26 Sections apply to this section.

1.2 SUMMARY

- A. This Section includes raceways for electrical wiring. Types of raceways in this section include the following:
 - 1. Rigid metal conduit.
 - 2. Intermediate metal conduit.
 - 3. Liquidtight flexible conduit.
 - 4. Flexible metal conduit.
 - 5. Electrical Metallic Tubing (EMT).
 - 6. Rigid nonmetallic conduit.
 - 7. Wireways.
- B. This section includes cabinets, boxes, and fittings for electrical installations and certain types of electrical fittings not covered in other sections. Types of products specified in this Section include:
 - 1. Outlet and device boxes.
 - 2. Pull and junction boxes.
 - 3. Cabinets.
 - 4. Hinged door enclosures.
- C. Related Sections: The following Division 26 Sections contain requirements that relate to this Section:
 - 1. "Low voltage electrical power conductors and cables" for other wiring methods.
 - 2. "Supporting Devices" for raceway supports.

1.3 DEFINITIONS

- A. Cabinets: An enclosure designed either for surface or for flush mounting and having a frame, or trim in which a door or doors may be mounted.
- B. Device Box: An outlet box designed to house a receptacle device or a wiring box designed to house a switch.
- C. Enclosure: A box, case, cabinet, or housing for electrical wiring or components.

- D. Outlet Box: A wiring enclosure where current is taken from a wiring system to supply utilization equipment.
- E. Wiring Box: An enclosure designed to provide access to wiring systems or for the mounting of indicating devices or of switches for controlling electrical circuits.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections:
 - 1. Product data for Raceway systems.
 - 2. Product data for cabinets and enclosures with classification higher than NEMA 1.
 - 3. Shop drawings for boxes, enclosures and cabinets that are to be shop fabricated, (nonstock items). For shop fabricated junction and pull boxes, show accurately scaled views and spatial relationships to adjacent equipment. Show box types, dimensions, and finishes.

1.5 QUALITY ASSURANCE

- A. UL Listing and Labeling: Items provided under this section shall be listed and labeled by UL.
- B. Nationally Recognized Testing Laboratory Listing and Labeling (NRTL): Items provided under this section shall be listed and labeled by a NRTL. The term "NRTL" shall be as defined in OSHA Regulation 1910.7.
- C. National Electrical Code Compliance: Components and installation shall comply with NFPA 70 "National Electrical Code."
- D. NEMA Compliance: Comply with NEMA Standard 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)."
- E. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.
- F. Provide raceway products and components listed and labeled by UL, ETL, or CSA.

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate with other Work, including metal and concrete deck installation, as necessary to interface installation of electrical raceways and components with other Work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

- B. Conduit Bodies:
 - 1. Appleton Electric Co.
 - 2. Carlon
 - 3. Killark Electric Mfg. Co.
 - 4. O Z/Gedney
 - 5. Spring City Electrical Mfg. Co.

- C. Wireways:
 - 1. Erickson Electric Equipment Co.
 - 2. GS Metals Corp.
 - 3. Hoffman Engineering Co.

- D. Cabinets:
 - 1. Erickson Electrical Equipment Co.
 - 2. Hoffman Engineering Co.
 - 3. Spring City Electrical Mfg. Co.
 - 4. Square D Co.

2.2 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Intermediate Steel Conduit: UL 1242.
- C. Electrical Metallic Tubing and Fittings: ANSI C80.3
- D. Flexible Metal Conduit: UL 1, zinc coated steel.
- E. Liquid-tight Flexible Metal Conduit and Fittings: UL 360. Fittings shall be specifically approved for use with this raceway.

2.3 NONMETALLIC CONDUIT AND DUCTS

- A. Rigid Nonmetallic Conduit: NEMA TC 2 and UL 651, Schedule 40 or 80 PVC.
- B. PVC Conduit and Tube Fittings: TC 3; match to conduit or conduit/tube type and material.
- C. Conduit, Tubing and Duct Accessories: Types, sizes and materials complying with manufacturer's published product information. Mate and ,attach to raceway.

2.4 CONDUIT BODIES

- A. General: Types, shapes, and sizes as required to suit individual applications and NEC requirements. Provide matching gasketed covers secured with corrosion resistant screws.
- B. Metallic Conduit and Tubing: Use metallic conduit bodies. Use bodies with threaded hubs for threaded raceways.
- C. Conduit Bodies 1 Inch and Smaller: Use bodies with compression type threaded connectors.

- D. Nonmetallic Conduit and Tubing: Use nonmetallic conduit bodies conforming to UL 514B

2.5 WIREWAYS

- A. General: Electrical wireways shall be of types, sizes, and number of channels indicated. Fittings and accessories including but not limited to couplings, offsets, elbows, expansion joints, adapters, hold-down straps, and end caps shall match and mate with wireway as required for completed system. Where features are not indicated, select to fulfill wiring requirements and comply with applicable provisions of NEC.
- B. Wireway covers to be hinged type.

2.6 CABINETS, BOXES, AND FITTINGS, GENERAL

- A. Electrical Cabinets, Boxes, and Fittings: Of indicated types, sizes, and NEMA enclosure classes. Where not indicated, provide units of types, sizes, and classes appropriate for the use and location. Provide all items complete with covers and accessories required for the intended use. Provide gaskets for units in damp or wet locations. This applies to kitchen areas.
- B. Materials and finish
1. Sheet Steel: Flat-rolled, code-gage, galvanized steel.
 2. Fasteners for General Use: Corrosion resistant screws and hardware including cadmium and zinc plated items.
 3. Fasteners for Damp or Wet Locations: Stainless steel screws and hardware.
 4. Cast Metal for Boxes, Enclosures, and Covers; Copper-free aluminum except as otherwise specified.
 5. Exterior Finish: Gray baked enamel for items exposed in finished locations except as otherwise indicated.
 6. Painted Interior Finish: Where indicated, white baked enamel.
 7. Fittings for Boxes, Cabinets, and Enclosures: Conform to UL 514B. Malleable iron or zinc plated steel for conduit hubs, bushings and box connectors.

2.7 METAL OUTLET, DEVICE, AND SMALL WIRING BOXES

- A. General: Conform to UL 514A, "Metallic Outlet Boxes, Electrical," and UL 514B, "Fittings for Conduit and Outlet Boxes." Boxes shall be of type, shape, size, and depth to suit each location and application.
- B. Steel Boxes: Conform to NEMA OS 1, "Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports." Boxes shall be sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs.
- C. Cast-Iron Boxes: Iron alloy, waterproof, with threaded raceway entries and features and accessories suitable for each location, including mounting ears, threaded screw holes for devices and closure plugs.

2.8 PULL OR JUNCTION BOXES

- A. General: Comply with UL 50, "Electrical Cabinets and Boxes", for boxes over 100 cubic inches volume. Boxes shall have screwed or bolted on covers of material same as box and shall be of size and shape to suit application.
- B. Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing.
- C. Hot-Dipped Galvanized Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing. Hot-dip galvanized after fabrication. Cover shall be gasketed.
- D. Stainless-Steel Boxes: Fabricate of stainless steel conforming to Type 302 of ASTM A 167, "Specification for Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip." Where necessary to provide a rigid assembly, construct with internal structural stainless steel bracing. Cover shall be gasketed.
- E. Cast-Iron Boxes: Molded of cast iron alloy with gasketed cover and integral threaded conduit entrances.

2.9 CABINETS

- A. Comply with UL 50, "Electrical Cabinets and Boxes."
- B. Construction: Sheet steel, NEMA 4 class except as otherwise indicated. Cabinet shall consist of a box and a front consisting of a one piece frame and a hinged door. Arrange door to close against a rabbet placed all around the inside edge of the frame, with a uniformly close fit between door and frame. Provide concealed fasteners, not over 24-inches apart, to hold fronts to cabinet boxes and provide for adjustment. Provide flush or concealed door hinges not over 24-inches apart and not over 6-inches from top and bottom of door. For flush cabinets, make the front approximately 3/4 inch larger than the box all around. For surface mounted cabinets make front same height and width as box.
- C. Doors: Double doors for cabinets wider than 24-inches.
- D. Locks: Combination spring catch and key lock, with all locks for cabinets of the same system keyed alike. Locks may be omitted on signal, power, and lighting cabinets located within wire closets and mechanical-electrical rooms. Locks shall be of a type to permit doors to latch closed without locking.

2.10 STEEL ENCLOSURES WITH HINGED DOORS

- A. Comply with UL 50, "Cabinets and Enclosures" and NEMA ICS 6,
- B. "Enclosures for Industrial Controls and Systems."
- C. Construction: Sheet steel, 16 gage, minimum, with continuous welded seams. NEMA class as indicated; arranged for surface mounting.

- D. Doors: Hinged directly to cabinet and removable, with approximately 3/4-inch flange around all edges, shaped to cover edge of box. Provide handle operated, key locking latch. Individual door width shall be no greater than 24-inches. Provide multiple doors where required.
- E. Mounting Panel: Provide painted removable internal mounting panel for component installation.
- F. Enclosure: NEMA 4 except as indicated. Where door gasketing is required, provide neoprene gasket attached with oil-resistant adhesive, and held in place with steel retaining strips. For all enclosures of class higher than NEMA 1, use hubbed raceway entrances.

PART 3 EXECUTION

3.1 RACEWAY WIRING METHOD

- A. Outdoors: Use the following wiring methods:
 - 1. Exposed / Concealed: Rigid metal conduit, Intermediate metal conduit.
 - 2. Underground: Rigid metal conduit, Rigid nonmetallic conduit.
 - 3. Connection to Vibrating Equipment: Including transformers and hydraulic, pneumatic, or electric solenoid or motor driven equipment: liquidtight flexible metal conduit. Maximum length six (6) feet.
- B. Indoors: Use the following wiring methods:
 - 1. Connection to Vibrating Equipment: Including transformers and hydraulic, pneumatic or electric solenoid or motor operated equipment: Flexible metal conduit. Maximum length six (6) feet.
 - 2. Exposed/Concealed: branch circuits: EMT.
 - 3. Exposed/Concealed Panelboards feeders: Intermediate metal conduit, Rigid metal conduit.
 - 4. Connection to vibrating equipment and hydraulic, pneumatic, or electric solenoid or motor driven equipment in moist or humid location or corrosive atmosphere, or where subject to water spray or dripping oil, grease, or water: Liquidtight flexible metal conduit. Maximum length six (6) feet.

3.2 RACEWAY INSTALLATION

- A. General: Install electrical raceways in accordance with manufacturer's written installation instructions, applicable requirements of NEC, and as follows:
- B. Conceal Conduit, unless indicated otherwise, within finished walls, ceilings, and floors. Keep raceways at least 6 inches away from parallel runs of flues and hot water pipes. Install raceways level and square and at proper elevations.
- C. Elevation of Raceway: Where possible, install horizontal raceway runs above water and sanitary piping.

- D. Complete installation of electrical raceways before starting installation of conductors within raceways.
- E. Provide supports for raceways as specified elsewhere in Division 26.
- F. Prevent foreign matter from entering raceways by using temporary closure protection.
- G. Protect stub ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab.
- H. Make bends and offsets so the inside diameter is not effectively reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel.
- I. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings except as otherwise indicated.
- J. Run concealed raceways with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions except as otherwise indicated.
- K. Install exposed raceways parallel and perpendicular to nearby surfaces or structural members and follow the surface contours as much as practical.
- L. Run exposed, parallel, or banked raceways together. Make bends in parallel or banked runs from the same center line so that the bends are parallel. Factory elbows may be used in banked runs only where they can be installed parallel. This requires that there be a change in the plane of the run such as from wall to ceiling and that the raceways be of the same size. In other cases provide field bends for parallel raceways.
- M. Join raceways with fittings designed and approved for the purpose and make joints tight. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Make raceway terminations tight. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors.
- N. Tighten set screws of threadless fittings with suitable tool.
- O. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.
- P. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.
- Q. Install pull wires in empty raceways. Use no. 14 AWG zinc coated steel or monofilament plastic line having not less than 200 lb tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

- R. Install raceway sealing fittings in accordance with the manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with UL listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points and elsewhere as indicated:
 - 1. Where conduits pass from warm locations to cold locations, such as the boundaries of conditioned spaces and mechanical spaces.
 - 2. Where required by the NEC.
- S. Stub up Connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; flexible metal conduit may be used 6 inches above the floor.
- T. Flexible Connections: Use short length (maximum of 6 ft.) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet locations. Install separate ground conductor across flexible connections.

3.3 CABINETS AND BOXES INSTALLATION, GENERAL

- A. Locations: Install items where indicated and where required to suit code requirements and installation conditions.
- B. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.
- C. Support and fasten items securely in accordance with Division 16 Section "Supporting Devices."
- D. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than sizes indicated.
- E. Remove sharp edges where they may come in contact with wiring or personnel.

3.4 APPLICATIONS

- A. Cabinets: Flush mounted, NEMA enclosure Type 1 except as otherwise indicated.
- B. Hinged Door Enclosures: NEMA Type 1 enclosure except as indicated.
- C. Hinged Door Enclosures Outdoors: Install drip hood, factory tailored to individual units.
- D. Outlet Boxes and Fittings: Install outlet and device boxes and associated covers and fittings of materials and NEMA types suitable for each location and in conformance with the following requirements:
 - 1. Interior Dry Locations: NEMA Type 1, sheet steel or as permitted by local code.
 - 2. Locations Exposed to Weather, Dampness, or Wet Locations: NEMA Type 3R enclosures.

- E. Pull and Junction Boxes: Install pull and junction boxes of materials and NEMA types suitable for each location except as otherwise indicated.

3.5 INSTALLATION OF OUTLET BOXES

- A. Outlets at Windows and Doors: Locate close to window trim.
- B. Column and Pilaster Locations: Locate outlet boxes for switches and receptacles on columns or pilasters so the centers of the columns are clear for future installation of partitions.
- C. Locations in Special Finish Materials: For outlet boxes for receptacles and switches mounted in desks or furniture cabinets or in glazed tile, concrete block, marble, brick, stone or wood walls, use rectangular shaped boxes with square corners and straight sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls.
- D. Gasketed Boxes: At the following locations use cast metal, threaded hub type boxes with gasketed weatherproof covers:
 - 1. Exterior locations.
 - 2. Where surface mounted on unfinished walls, columns or pilasters. (Cover gaskets may be omitted in dry locations).
 - 3. Where exposed to moisture laden atmosphere.
 - 4. Where indicated.
- E. Cast-Iron Boxes: Iron alloy, waterproof, with threaded raceway entries and features and accessories suitable for each location, including mounting ears, threaded screw holes for devices and closure plugs.
- F. Mounting: Mount outlet boxes for switches with the long axis vertical or as indicated. Mount boxes for receptacles either vertically or horizontally but consistently either way. Three or more gang boxes shall be mounted with the long axis horizontal. Locate box covers or device plates so they will not span different types of building finishes either vertically or horizontally. Locate boxes for switches near doors on the side opposite the hinges and close to door trim, even though electrical floor plans may show them on hinge side.
- G. Ceiling Outlets: For fixtures, where wiring is concealed, use outlet boxes 4-inches square by 1-1/2-inches deep, minimum.
- H. Cover Plates for Surface Boxes: Use plates sized to box front without overlap.
- I. Protect outlet boxes to prevent entrance of plaster, and debris. Thoroughly clean foreign material from boxes before conductors are installed.

3.6 INSTALLATION OF PULL OR JUNCTION BOXES

- A. Box Selection: For boxes in main feeder conduit runs, use sizes not smaller than 8-inches square by 4-inches deep. Do not exceed 6 entering and 6 leaving raceways in a single box. Quantities of conductors (including equipment grounding conductors) in pull or junction box shall not exceed the following:

Size of Largest Conductors in Box	Maximum no. of Conductors in Box
No. 4/0 AWG	30
250 MCM	20
500 MCM	15
Over 500 MCM	10

1. Cable Supports: Install clamps, grids, or devices to which cables may be secured. Arrange cables so they may be readily identified. Support cable at least every 30-inches inside boxes.
2. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling.
3. Size: Provide pull and junction boxes for telephone, signal, and other systems at least 50 percent larger than would be required by or as indicated. Locate boxes strategically and provide shapes to permit easy pulling of future wires or cables of types normal for such systems.

3.7 INSTALLATION OF CABINETS AND HINGED DOOR ENCLOSURES

- A. Mount with fronts straight and plumb.
- B. Install with tops 78-inches above floor.
- C. Set cabinets in finished spaces flush with walls.

3.8 GROUNDING

- A. Electrically ground metallic cabinets, boxes, and enclosures. Where wiring to item includes a grounding conductor, provide a grounding terminal in the interior of the cabinet, box or enclosure.

3.9 RACEWAY ADJUSTING AND CLEANING

- A. Upon completion of installation of raceways, inspect interiors of raceways; clear all blockages and remove burrs, dirt, and construction debris.

3.10 CLEANING AND FINISH REPAIR

- A. Upon completion of installation, inspect components. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, abrasions and weld marks.
- B. Galvanized Finish: Repair damage using a zinc-rich paint recommended by the tray manufacturer.
- C. Painted Finish: Repair damage using matching corrosion inhibiting touch-up coating.

END OF SECTION

SECTION 26 24 01
SERVICE EQUIPMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

1.2 SUMMARY

- A. Types of service-entrance equipment in this section include the following:
 - 1. Circuit Breakers.
 - 2. Meter sockets.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's data on service-entrance equipment and accessories.
- B. Shop Drawings: Submit dimensioned layouts of service-entrance equipment, including spatial relationships to proximate electrical equipment.
- C. Wiring Diagrams: Submit power, signal and control wiring diagrams for service-entrance work. Differentiate between portions of wiring/cabling that are manufacturer-installed and portions that are field-installed.

1.4 QUALITY CONTROL

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of service-entrance equipment, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- D. Installer's Qualifications: Firm with at least 5 years of successful installation experience with projects utilizing service-entrance work similar to that required for this project.
- E. Codes and Standards:
 - 1. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and NEC, including Articles 230, 250, and 338, as applicable to installation, and construction of service-entrances.
 - 2. NEMA Compliance: Comply with applicable construction and installation requirements of the following NEMA standards for service-entrance equipment and accessories:
 - a. Stds Pub/No. KS 1: Enclosed Switches.
 - b. Stds Pub/No. PB 2: Deadfront Distribution Switchboards.
 - c. Stds Pub/No. PB 2.2: Application Guide for Ground-fault Protective Devices for Equipment.

3. UL Compliance: Comply with construction and installation requirements of the following UL standards for service-entrance equipment and accessories:
 - a. UL 50: Electrical Cabinets and Boxes.
 - b. UL 489: Molded-Case Circuit Breakers and Circuit-Breaker Enclosures.
 - c. UL 854: Service-Entrance Cables.
 - d. UL 869: Electrical Service Equipment.
4. Provide service-entrance equipment and accessories which are UL-listed and labeled, and marked, "SUITABLE FOR USE AS SERVICE EQUIPMENT."
5. IEEE Compliance: Comply with applicable requirements of IEEE Std 241 pertaining to service entrances.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver service-entrance equipment components properly packaged and mounted on pallets, or skids to facilitate handling of heavy items. Utilize factory-fabricated type containers or wrappings for service-entrance equipment and components which protect equipment from damage. Install gravity measuring meters in containers which indicate whether container has been bumped or dropped. Return G-meters to manufacturer for reuse upon delivery of switchgear. Inspect equipment to ensure that no damage has occurred during shipment.
- B. Store service-entrance equipment in original packaging and protect from weather and construction traffic. Wherever possible, store indoors; where necessary to store outdoors, store above grade and enclose with watertight wrapping.
- C. Handle service-entrance equipment carefully to prevent physical damage to equipment and components. Remove packaging, including the opening of crates and containers, avoiding the use of excessive hammering and jarring which would damage the electrical equipment contained therein. Do not install damaged equipment; remove from site and replace damaged equipment with new.

1.6 SEQUENCING AND SCHEDULING

- A. Schedule delivery of service-entrance equipment which permits ready building ingress for large equipment components to their designated installation spaces. Coordinate delivery of equipment with the installation of other building components.
- B. Coordinate the size and location of concrete equipment pads. Cast anchor bolt inserts into pad. Concrete, reinforcement, and formwork requirements as per code.
- C. Coordinate with other electrical work including raceways, electrical boxes and fittings, and cabling/wiring work, as necessary to interface installation of service-entrance work with other work.

PART 2 PRODUCTS

2.1 SERVICE-ENTRANCE EQUIPMENT

- A. General: Provide service-entrance equipment and accessories; of types, sizes, ratings and electrical characteristics required for electrical load in accordance with NEC, which comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installation; and as herein specified.
- B. Circuit Breaker Units: Provide UL listed service entrance rated circuit breaker enclosure with circuit breaker with ratings as stated on drawings. Enclosure shall be accessible, totally enclosed with gray baked enamel finish. Coordinate sequencing requirements with local utility company.
- C. CT Cabinet:
 - 1. General: Provide CT Cabinet which comply with requirements of local utility company supplying electrical power to service entrance equipment of building project. Refer to drawings for ratings required.
- D. Meter Sockets:
 - 1. General: Provide meter sockets which comply with requirements of local utility company supplying electrical power to service- entrance equipment of building project.

PART 3 EXECUTION

3.1 EXAMINATION:

- A. Examine areas and conditions under which service-entrance equipment and components are to be installed, and notify Design Builder in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until satisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF SERVICE-ENTRANCE EQUIPMENT:

- A. Install service-entrance equipment as indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that service-entrance equipment fulfills requirements. Comply with applicable installation requirements of NEC and NEMA standards.
- B. Install units on vibration isolators in accordance with Division-15 section; and comply with manufacturer's indicated method of installation.
- C. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A and B, and the National Electrical Code.

3.3 FIELD QUALITY CONTROL:

- A. Prior to energization of service-entrance equipment, check accessible connections for

compliance to manufacturer's torque tightening specifications.

- B. Prior to energization of service-entrance equipment, check with ground resistance tester, phase-to-phase and phase-to-ground insulation resistance levels to ensure requirements are fulfilled.
- C. Prior to energization, check circuitry for electrical continuity, and for short-circuits.

3.4 GROUNDING:

- A. Provide equipment grounding connections for service-entrance equipment as indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounding.

3.5 ADJUSTING AND CLEANING:

- A. Adjust operating mechanisms for free mechanical movement.
- B. Touch-up scratched or marred enclosure surfaces to match original finishes.

3.6 DEMONSTRATION:

- A. Upon completion of installation of service-entrance equipment and electrical circuitry, energized circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and retest to demonstrate compliance.

END OF SECTION

SECTION 26 24 16
PANELBOARDS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

1.2 SUMMARY

- A. This Section includes lighting and power panelboards and associated auxiliary equipment rated 600 V or less.
- B. Related Sections: The following Division 26 Sections contain requirements that relate to this Section:
 - 1. "Overcurrent Protective Devices" for circuit breakers, fusible switches, fuses, and other devices used in panelboards

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type panelboard, accessory item, and component specified.
- C. Shop drawings from manufacturers of panelboards including dimensioned plans, sections, and elevations. Show tabulations of installed devices, major features, and voltage rating. Include the following:
 - 1. Enclosure type with details for types other than NEMA Type 1.
 - 2. Bus configuration and current ratings.
 - 3. Short circuit current rating of panelboard.
 - 4. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components.
- D. Wiring diagrams detailing schematic diagram including control wiring, and differentiating between manufacturer installed and field installed wiring.
- E. Qualification data for field testing organization certificates, signed by the Contractor, certifying that the organization complies with the requirements specified in Quality Assurance below. Include list of completed projects with project names, addresses, and names of Architect and Owner plus basic organization qualifications data.
- F. Report of field tests and observations certified by the testing organization.
- G. Panel schedules for installation in panelboards. Submit final versions after load balancing.

- H. Maintenance data for panelboard components, for inclusion in Operating and Maintenance Manual specified in Division 1 and in Division 16 Section "Basic Electrical Requirements." Include instructions for testing circuit breakers.

1.4 QUALITY ASSURANCE

- A. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
 - 1. The terms "listed" and "labeled" shall be defined as they are in the National Electrical Code, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- B. Field Testing Organization Qualifications: To qualify for acceptance, the independent testing organization must demonstrate, based on evaluation of organization submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct satisfactorily the testing indicated.
- C. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code."
- D. NEMA Standard: Comply with NEMA PB1, "Panelboards."
- E. UL Standards: Comply with UL 61, "Panelboards," and UL 50, "Cabinets and Boxes."

1.5 DEFINITIONS AND ABBREVIATIONS

- A. Overcurrent Protective Device (OCPD): A device operative on excessive current that causes and maintains the interruption of power in the circuit it protects.

1.6 EXTRA MATERIALS

- A. Keys: Furnish six spares of each type for panelboard cabinet locks.
- B. Touch up Paint for surface mounted panelboards: One half pint container.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
 - 1. Eaton Corp - Cutler Hammer
 - 2. General Electric Company.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Schneider Electric - Square D

2.2 PANELBOARDS, GENERAL REQUIREMENTS

- A. Overcurrent Protective Devices (OCPDs): Provide type, rating, and features as indicated. Comply with Division 16 Section "Overcurrent Protective Devices," with OCPDs adapted to panelboard installation. Tandem circuit breakers shall not be used. Multipole breakers shall have common trip.
- B. Enclosures: Cabinets, flush or surface mounted as indicated. NEMA Type 1 enclosure, except where the following enclosure requirements are indicated.
 - 1. NEMA 3R: Raintight.
- C. Front: Hinged front covers.
- D. Directory Frame: Metal, mounted inside each panel door.
- E. Bus: Hard drawn copper of 98 percent conductivity.
- F. Main and Neutral Lugs: Compression type.
- G. Equipment Ground Bus: Adequate for feeder and branch circuit equipment ground conductors. Bonded to box.
- H. Service Equipment Approval: Listed for use as service equipment for panelboards having main service disconnect.
- I. Provision for Future Devices: Equip with mounting brackets, bus connections, and necessary appurtenances, for the OCPD ampere ratings indicated for future installation of devices.
- J. Special Features: Provide the following features for panelboards as indicated.
 - 1. Isolated Equipment Ground Bus: Adequate for branch circuit equipment ground conductors; insulated from box.
 - 2. Hinged Front Cover: Entire front trim hinged to box with standard door within hinged trim cover.
 - 3. Split Bus: Vertical bus of indicated panels divided into two vertical sections with connections as indicated.
 - 4. Skirt For Surface Mounted Panels: Same gage and finish as panel front with flanges for attachment to panel, wall, and floor.
 - 5. Extra Gutter Space: Dimensions and arrangement as indicated.
 - 6. Gutter Barrier: Arranged to isolate section of gutter as indicated.
 - 7. Column Type Panelboard Configuration: Narrow cabinet extended as wireway to overhead junction box equipped with ground and neutral terminal buses.
 - 8. Subfeed: OCPD or lug provision as indicated.

2.3 LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS

- A. Branch OCPDs: Bolt on circuit breakers, replaceable without disturbing adjacent units.
- B. Double Width Panels: Where more than 42 poles are indicated or where otherwise indicated, provide two panelboards under single front.

- C. Doors: In panel front, with concealed hinges. Secure with flush catch and tumbler lock, all keyed alike.

2.4 ACCESSORY COMPONENTS AND FEATURES

- A. Accessory Set: Include tools and miscellaneous items as required for overcurrent protective device test, inspection, maintenance, and operation.
- B. Portable Test Set: Arranged to permit testing of functions of solid state trip devices without removal from panelboard.

2.5 IDENTIFICATION

- A. Panelboard Nameplates: Engraved laminated plastic or metal nameplate for each panelboard mounted with epoxy or industrial cement or industrial adhesive.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General: Install panelboards and accessory items in accordance with NEMA PB 1.1, "General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less" and manufacturers' written installation instructions.
- B. Mounting Heights: Top of trim 6' 2" above finished floor, except as indicated, or required to fit existing wall cavity.
- C. Mounting: Plumb and rigid without distortion of box. Mount flush panels uniformly flush with wall finish.
- D. Circuit Directory: Typed and reflective of final circuit changes required to balance panel loads. Obtain approval before installing.
- E. Install filler plates in unused spaces.
- F. Wiring in Panel Gutters: Train conductors neatly in groups, bundle, and wrap with wire ties after completion of load balancing.

3.2 IDENTIFICATION

- A. Identify field installed wiring and components and provide warning signs in accordance with Division 16 Section "Electrical Identification."

3.3 GROUNDING

- A. Connections: Make equipment grounding connections for panelboards as indicated.
- B. Provide ground continuity to main electrical ground bus indicated.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals, including grounding connections, in accordance with manufacturer's published torque tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

- A. Independent Testing Organization: Arrange and pay for the services of an independent electrical testing organization (with minimum 5 years experience) to perform tests on low voltage power panelboards and accessories.
- B. Pretesting: Upon completing installation of the system, perform the following preparations for independent tests:
 - 1. Make insulation resistance tests of panelboard buses, components, and connecting supply, feeder, and control circuits.
 - 2. Make continuity tests of circuits.
 - 3. Provide set of Contract Documents to test organization. Include full updating on final system configuration and parameters where they supplement or differ from those indicated in original Contract Documents.
- C. Quality Control Program: Conform to the following:
 - 1. Procedures: Make field tests and inspections and prepare panelboard for satisfactory operation in accordance with manufacturer's recommendations and these specifications.
 - 2. Schedule tests with at least one week in advance notification.
 - 3. Reports by Testing Organization: Report written reports of tests and observations. Report defective materials and workmanship and unsatisfactory test results. Include records of repairs and adjustments made.
 - 4. Labeling: Upon satisfactory completion of tests and related effort, apply a label to tested components indicating results of tests and inspections, responsible organization and person, and date.
 - 5. Protective Device Ratings and Settings: Verify indicated ratings and settings to be appropriate for final system configuration and parameters. Where discrepancies are found, recommend final protective device ratings and settings. Use accepted ratings or settings to make the final system adjustments.
- D. Visual and Mechanical Inspection: Include the following inspections and related work:
 - 1. Inspect for defects and physical damage, labeling, and nameplate compliance with requirements of up to date drawings and panelboard schedules.
 - 2. Exercise and perform of operational tests of all mechanical components and other operable devices in accordance with manufacturer's instruction manual.
 - 3. Check panelboard mounting, area clearances, and alignment and fit of components.
 - 4. Check tightness of bolted electrical connections with calibrated torque wrench. Refer to manufacturer's instructions for proper torque values.
 - 5. Perform visual and mechanical inspection and related work for overcurrent protective devices as specified in Division 16 Section "Overcurrent Protective Devices."

- E. Electrical tests: Include the following items performed in accordance with manufacturer's instruction:
 - 1. Insulation resistance test of buses and portions of control wiring that disconnected from solid state devices. Insulation resistance less than 100 megohms is not acceptable.
 - 2. Ground resistance test on system and equipment ground connections.
 - 3. Test main and subfeed overcurrent protective devices in accordance with Section "Overcurrent Protective Devices."
- F. Retest: Correct deficiencies identified by tests and observations and provide retesting of panelboards by testing organization. Verify by the system tests that the total assembly meets specified requirements.

3.6 CLEANING

- A. Upon completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

3.7 COMMISSIONING

- A. Balancing Loads: After Substantial Completion, but not more than two months after Final Acceptance, conduct load balancing measurements and circuit changes as follows:
 - 1. Perform measurements during period of normal working load as advised by the Owner.
 - 2. Perform load balancing circuit changes outside the normal occupancy/working schedule of the facility. Make special arrangements with Owner to avoid disrupting critical 24 hour services such as FAX machines and on line data processing, computing, transmitting, and receiving equipment.
 - 3. Recheck loads after circuit changes during normal load period. Record all load readings before and after changes and submit test records.
 - 4. Tolerance: Difference between phase loads exceeding 20 percent at any one panelboard is not acceptable. Rebalance and recheck as required to meet this minimum requirement.
- B. Infrared Scanning: After Substantial Completion, but not more than two months after Final Acceptance, perform an infrared scan of each panelboard. Remove fronts to make joints and connections accessible to a portable scanner.
- C. Follow up Infrared Scanning: Perform one additional follow up infrared scan of each panelboard 11 months after the date of Substantial Completion.
- D. Instrument: Use an approved infrared scanning device designed to measure temperature or detect significant deviations from normal values. Provide calibration record for device used.
- E. Record of Infrared Scanning: Prepare a certified report identifying panelboards checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION

SECTION 26 28 00
OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes overcurrent protective devices (OCPDs) rated 600 V and below and switching devices commonly used with them.
- B. Panelboards: Application, installation, and other related requirements for overcurrent protective device installations in distribution equipment are specified in other Division 16 sections.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Cartridge Fuses:
 - a. Bussmann
 - b. Ferraz Shawmut
 - c. Littelfuse Inc.
 - 2. Fusible Switches:
 - a. Allen-Bradley Co.
 - b. Crouse-Hinds Distribution Equipment.
 - c. Eaton Corp.
 - d. General Electric Co.
 - e. Siemens Energy & Automation, Inc.
 - f. Square D Co.
 - 3. Molded-Case Circuit Breakers:
 - a. Eaton Corp. General Electric Co.
 - b. General Electric Co.
 - c. Siemens Energy & Automation, Inc.
 - d. Square D Co.

2.2 OVERCURRENT PROTECTIVE DEVICES (OCPDs), GENERAL

- A. General: Provide OCPDs in indicated types, as integral components of panelboards and also as individually enclosed and mounted single units.
- B. General: Provide OCPDs in indicated types, as integral components of panelboards, switchboards, and motor control centers; and also as individually enclosed and mounted single units.

- C. Enclosures: NEMA 250 "Enclosures for Electrical Equipment (1,000 Volts Maximum)."

2.3 CARTRIDGE FUSES

- A. General: NEMA Standard FU1, "Low-Voltage Cartridge Fuses." Unless indicated otherwise, provide nonrenewable cartridge fuses of indicated types, classes, and current ratings that have voltage ratings consistent with the circuits on which used.
- B. Class J Fuses: UL 198C, "High-Interrupting Capacity Fuses, Current-Limiting Type."
- C. Class L Fuses: UL 198C, "High-Interrupting Capacity Fuses, Current-Limiting Type."
- D. Class RK1 and RK5 Dual Element Time-Delay Fuses: UL 198E, "Class R Fuses."
- E. Class RK1 Fast-Acting Fuses: UL 198E, "Class R Fuses."

2.4 FUSIBLE SWITCHES

- A. General: UL 98 "Enclosed and Dead Front Switches" and NEMA KS 1 "Enclosed Switches," quick-make, quick-break heavy-duty units.
- B. Rating: Load-breaking capacity in excess of the normal horsepower rating for the switch.
- C. Withstand Capability: In excess of the let-through current permitted by its fuse when subject to faults up to 100,000 RMS symmetrical amperes.
- D. Operation: By means of external handle.
- E. Interlock: Prevents access to switch interior except when in "off" position.
- F. Fuse Clips: Rejection type.
- G. Padlocking Provisions: For 2 padlocks, whether open or closed.
- H. Enclosure for Independent Mounting: NEMA Type 1 enclosure except as otherwise indicated or required to suit environment where located.

2.5 MOLDED-CASE CIRCUIT BREAKERS (15A TO 350A RATING ONLY)

- A. General: UL 489, "Molded Case Circuit Breakers and Circuit Breaker Enclosures," and NEMA AB 1, "Molded Case Circuit Breakers."
- B. Construction: Bolt-in type, except breakers 225-ampere frame size and larger may be plug-in type if held in place by positive locking device requiring mechanical release for removal.
- C. Construction: Bolt-in type, except breakers in load-center-type panelboards and breakers 225-ampere frame size and larger may be plug-in type if held in place by positive locking device requiring mechanical release for removal.

- D. Characteristics: Indicated frame size, trip rating, number of poles, and a short-circuit interrupting capacity rating of 10,000 amperes symmetrical, unless a greater rating is indicated.
- E. Tripping Device: Quick-make, quick-break toggle mechanism with inverse-time delay and instantaneous overcurrent trip protection for each pole.
- F. Enclosure for Panelboard Mounting: Suitable for panel mounting in switchboard or panelboards where indicated.
- G. Enclosure for Independent Mounting: NEMA Type 1 enclosure, except as otherwise indicated or required to suit environment where located.

2.6 ELECTROINC TRIP INSULATED CASE CIRCUIT BREAKERS (400A AND LARGER RATING)

- A. General: UL 489, "Molded Case Circuit Breakers and Circuit Breaker Enclosures," and NEMA AB 1, "Molded Case Circuit Breakers."
- B. Construction: Bolt in type. May be plug in type if held in place by positive locking device requiring mechanical release for removal.
- C. Characteristics: Indicated frame size, trip rating, number of poles, and a short circuit interrupting capacity rating of 10,000 amperes symmetrical, unless a greater rating is indicated.
- D. Tripping Device: Electronic with adjustable instantaneous trip settings. Long-time and short-time pickup, long-time and short-time delay adjustments, ground fault pickup and delay adjustments.
- E. Enclosure for Panelboard Mounting: Suitable for panel mounting in switchboard or panelboards where indicated.
- F. Enclosure for Independent Mounting: NEMA Type 1 enclosure, except as otherwise indicated or required to suit environment where located.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Independently Mounted OCPDs: Locate as indicated and install in accordance with manufacturer's written installation instructions.
- B. OCPDs in distribution equipment shall be factory installed.

3.2 IDENTIFICATION

- A. Identify components in accordance with Division 16 Section "Electrical Identification."

3.3 CONTROL WIRING INSTALLATION

- A. Install wiring between OCPDs and control/indication devices as specified in Division 16 Section "Wires and Cables" for hard wired connections.

3.4 CONNECTIONS

- A. Check connectors, terminals, bus joints, and mountings for tightness. Tighten field-connected connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.

3.5 GROUNDING

- A. Provide equipment grounding connections for individually mounted OCPD units as indicated and as required by NEC. Tighten connectors to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounding.

3.6 FIELD QUALITY CONTROL

- A. Independent Testing Organization: Arrange and pay for the services of an independent electrical testing organization with a minimum of five (5) years experience to perform tests and observations on OCPDs.
- B. Reports: Prepare written reports certified by testing organization on tests and observations. Report defective materials and workmanship and unsatisfactory test results. Include complete records of repairs and adjustments made.
- C. Labeling: Upon satisfactory completion of tests and related effort, apply a label to tested components indicating test results, date, and responsible organization and person.
- D. Schedule visual and mechanical inspections and electrical tests with at least one week's advance notification.
- E. Pretesting: Upon completing installation of the system, perform the following preparations for independent tests:
 1. Make insulation resistance tests of OCPD buses, components, and connecting supply, feeder, and control circuits.
 2. Make continuity tests of circuits.
 3. Provide set of Contract Documents to test personnel. Include full updating on final system configuration and parameters where they supplement or differ from those indicated in original Contract Documents.
 4. Provide manufacturer's instructions for installation and testing of OCPDs to test personnel.

- F. Visual and mechanical inspection: Include the following inspections and related work.
1. Overcurrent-Protective-Device Ratings and Settings: Verify indicated ratings and settings to be appropriate for final system arrangement and parameters. Where discrepancies are found, test organization shall recommend final protective device ratings and settings. Use accepted revised ratings or settings to make the final system adjustments.
 2. Inspect for defects and physical damage, NRTL labeling, and nameplate compliance with current single line diagram.
 3. Exercise and perform operational tests of all mechanical components and other operable devices in accordance with manufacturer's instruction manual.
 4. Check tightness of electrical connections of OCPDs with calibrated torque wrench. Refer to manufacturer's instructions for proper torque values.
 5. Clean OCPDs using manufacturer's approved methods and materials.
 6. Verify installation of proper fuse types and ratings in fusible OCPDs.
- G. Electrical Tests: Include the following items performed in accordance with manufacturer's instructions:
1. Insulation resistance test of OCPD conducting parts. Insulation resistance less than 100 megohms is not acceptable.
 2. Contact resistance test or measurement of millivolt drop across contacts of drawout circuit breakers and fused power circuit devices at rated current. Compare contact resistance or millivolt drop values of adjacent poles and of similar breakers. Deviations of more than 50 percent are not acceptable.
 3. Insulation resistance test of fused power circuit devices and insulated-case and molded-case circuit breakers over 600-ampere frame size at 1000 V d.c. for one minute from pole to pole and from each pole to ground with breaker closed and across open contacts of each phase. Insulation resistance less than 100 megohms is not acceptable.
 4. Use primary current injection to check performance characteristics of trip units of molded-case breakers over 600-ampere frame size. Trip characteristics not falling within manufacturer's published time-current characteristic tolerance bands when adjusted to approved parameters are not acceptable. Perform the following tests:
 - a. Determine minimum pickup current acceptable per manufacturer's instructions.
 - b. Determine long-time delay at 300 percent pickup current.
 - c. Determine short-time-pickup current and corresponding delay time.
 - d. Determine ground-fault current pickup and corresponding delay time.
 - e. Determine instantaneous pickup current value.
 5. Make adjustments for final settings of adjustable-trip devices.
 6. Activate auxiliary protective devices such as ground fault or undervoltage relays, to verify operation of shunt-trip devices.
 7. Check operation of electrically operated OCPDs in accordance with manufacturer's instructions.
- H. Retest: Correct deficiencies identified by tests and observations and provide retesting of OCPDs by testing organization. Verify by the system tests that specified requirements are met.

3.7 CLEANING

- A. Upon completion of installation, inspect OCPDs. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

3.8 DEMONSTRATION

- A. Training: Arrange and pay for the services of factory-authorized service representatives to demonstrate OCPDs and train Owner's maintenance personnel.
- B. Conduct a minimum of one half day of training in operation and maintenance as specified under "Instructions to Owner Employees" in the "Project Closeout" Section of these specifications. Include both classroom training and hands-on equipment operation and maintenance procedures.
- C. Schedule training with at least seven days' advance notification.

3.9 COMMISSIONING

- A. Infrared Scanning: After Substantial Completion, but not more than 2 months after Final Acceptance, perform an infrared scan of OCPDs including their line and load connections, fuses, and fuse clips. Also scan OCPD contact structures where accessible to a portable scanner. Include individual OCPDs and those installed in switchboards, panelboards, and motor control centers.
- B. Follow-up Infrared Scanning: Perform two additional follow-up infrared scans of the same devices: one four months after Substantial Completion, and one 11 months after Substantial Completion.
- C. Instrument: Use an infrared scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.
- D. Record of Infrared Scanning: Prepare a certified report identifying all OCPDs checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and rescanning observations after remedial action.

END OF SECTION

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

1.2 SUMMARY

- A. This section specifies the furnishing, installation, and connection of exterior fixtures, poles, and supports. The terms “lighting fixtures”, “fixture” and “luminaire” are used interchangeably.
- B. Luminaires shall comply with Illumination Engineering Society of North America (IESNA) requirements as well as International Dark-Sky Association requirements.

1.3 DEFINITIONS

- A. Fixture: A complete lighting unit. Fixtures include lamping and parts required to distribute the light, position and protect lamping, and connect lamping to the power supply.
- B. Luminaire: Fixture.
- C. Average Life: The time after which 50 percent will have failed and 50 percent will have survived under normal conditions.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data describing fixtures, lamping, drivers and ballasts. Arrange product data for fixtures in order of fixture designation. Include data on features and accessories and the following information:
 - 1. Outline drawings of fixtures indicating dimensions and principal features.
 - 2. Electrical ratings and photometric data with specified lamping and certified results of independent laboratory tests.
 - 3. Data on batteries and chargers for exterior fixtures with emergency drivers.
- C. Maintenance data for products for inclusion in Operating and Maintenance Manual specified in Division 1.
- D. Product certifications signed by manufacturers of lighting fixtures certifying that their fixtures comply with specified requirements.

- E. Shop drawings from manufactures detailing nonstandard fixtures and indicating dimensions, weights, methods of field assembly, components, features, and accessories.

1.5 QUALITY ASSURANCE

- A. Comply with NFPA 70 "National Electrical Code" for components and installation.
- B. Listing and Labeling: Provide fixtures and exit sign units that are listed and labeled for their indicated use on the Project.
 - 1. The terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
 - 2. Listing and Labeling Agency Qualification: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- C. Manufacturers Qualifications: Firms experienced in manufacturing fixtures that are similar to those indicated for this Project and that have a record of successful in service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Provide manufacturer's standard provisions for protecting fixtures during transportation, storage, and installation. Do not store outside. Store indoors in an area that is within manufacturers storage temperature range. Do not remove factory-applied wrappings until just before installation.

PART 2 PRODUCTS

2.1 FIXTURES, GENERAL

- A. Comply with the requirements specified in the Articles below and luminaire schedule.

2.2 LUMINAIRES

- A. Luminaires shall be UL Listed for outdoor wet locations and shall utilize energy efficient LED light sources.
- B. Vandalism: Fixtures shall be vandal resistant and shall utilize a high impact acrylic or UV stabilized polycarbonate lens. Fixture hardware shall be tamper resistant.
- C. Dark Sky Friendly: Fixtures shall be full cutoff with total uplighting levels not exceeding amount allowed to be compliant with dark sky rating.

2.3 LAMPS

- A. Fixtures shall utilize LED lamp module arrays.
- B. Color temperature shall be as indicated on the luminaire schedule.

2.4 BALLASTS AND DRIVERS

- A. LED drivers shall be cold weather, field replaceable and integrated with fixture housing.

- B. Ballasts and drivers shall include a five (5) year manufacturer's warranty.

2.5 CENTRAL EMERGENCY LIGHTING SYSTEM

- A. Provide a 120V, 375W central emergency power system lighting inverter to supply emergency power to the pedestrian site pole lighting circuit. Upon loss of normal supply voltage, system shall automatically disconnect from normal power and shall transfer to inverter battery(s). The emergency system shall automatically switch back to normal power once restored.
Design Base – LVS model 'CEPS-375-SDT'
- B. System shall be capable of operating LED loads.
- C. Provide system with automatic battery charger that maintains the batteries in a fully charged condition and recharges the batteries to full capacity within 24 hours after full discharge in accordance with UL 924.
- D. Batteries shall be maintenance free, sealed lead-calcium batteries with capacity to supply rated load for 90 minutes. Batteries shall have a 3 year full warranty plus a 7 year pro-rata coverage.
- E. System shall have self-resetting overload protect and fused output, automatic low voltage battery disconnect, deep discharge protection, over- temperature shutdown and reverse polarity protection. Provide with test switch and visual system status indicators.
- F. The system shall have self –testing and self-diagnostics.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install lighting in accordance with the NEC, as shown on the drawings, and in accordance with manufacturer's recommendations.
- B. Setting and Securing: Set units plumb, square, and level and secure according to manufacturer's printed instructions and approved shop drawings.

3.2 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Give advance notice of dates and times for field tests.
- C. Provide instruments to make and record test results.
- D. Tests: Verify normal operation of each fixture after fixtures have been installed and circuits have been energized with normal power source. Interrupt electrical energy to demonstrate

proper operation of fixtures with emergency drivers. Include the following in tests of fixtures with emergency drivers or circuits powered by central battery system.

1. Duration of supply with central battery system.
 2. Normal transfer to battery source and retransfer to normal.
- E. Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.

3.3 ADJUSTING AND CLEANING

- A. Clean fixtures upon completion of installation. Use methods and materials recommended by manufacturer.
- B. Adjust aimable fixtures to provide required light intensities.

END OF SECTION

SECTION 26 56 68
EXTERIOR ATHLETIC FIELD LIGHTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

1.2 SUMMARY

- A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.
- B. The purpose of these specifications is to define the lighting system performance and design standards for Avon High School's football lighting project using an LED Lighting source. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.
- C. The sports lighting will be for the following venues:
 - 1. Football/Soccer
- D. The primary goals of this sports lighting project are:
 - 1. Guaranteed Light Levels: Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore light levels are guaranteed to not drop below specified target values for a period of 25 years.
 - 2. Environmental Light Control: It is the primary goal of this project to minimize spill light to adjoining properties and glare to the players, spectators and neighbors. The LED design should provide better control than a good HID design.
 - 3. Life-cycle Cost: In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated for the duration of the warranty.
 - 4. Control and Monitoring: To allow for optimized use of labor resources and avoid unneeded operation of the facility, customer requires a remote on/off control system for the lighting system. Fields should be proactively monitored to detect luminaire outages over a 25-year life cycle. All communication and monitoring costs for 25-year period shall be included in the Bid.

1.3 LIGHTING PERFORMANCE

- A. Illumination Levels and Design Factors: Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Appropriate light loss factors shall be applied and submitted for the basis of design. Average illumination level shall be measured in accordance with the IESNA LM-5-04 (IESNA Guide for Photometric Measurements of Area and Sports Lighting Installations). Illumination levels shall not to drop below desired target values in accordance

to IES RP-6-15, Page 2, Maintained Average Illuminance and shall be guaranteed for the full warranty period.

Area of Lighting	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Football/Soccer	50FC	2:1	72/84	30' x 30'

- B. Color: The lighting system shall have a minimum color temperature of 5700K and a CRI of 75.
- C. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as described below. Higher mounting heights may be required based on photometric report and ability to ensure the top of the field angle is a minimum of 10 degrees below horizontal.

# of Poles	Pole Designation	Pole Height
4	F1-F4	80'

1.4 ENVIRONMENTAL LIGHT CONTROLS

- A. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers and external shields. No symmetrical beam patterns are accepted.
- B. Spill Light and Glare Control: To minimize impact on adjacent properties, spill light and candela values must not exceed the following.

	Average	Maximum
Property Line Horizontal Footcandles	<0.25 fc	<2 fc

NOTE: Measurements for horizontal spill at property line should be measured 3 feet above grade, spaced every 30 feet, totaling 60 grid points.

- C. Spill Scans: Spill scans must be submitted indicating the amount of horizontal and vertical footcandles along the specified lines. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights. Illumination level shall be measured in accordance with the IESNA LM-5-04 after 1 hour warm up.
- D. The first page of a photometric report for all luminaire types proposed showing horizontal and vertical axial candle power shall be provided to demonstrate the capability of achieving the specified performance. Reports shall be certified by a qualified independent testing laboratory with a minimum of five years experience or by a manufacturer’s laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products. A summary of the horizontal and vertical aiming angles for each luminaire shall be included with the photometric report.

1.5 LIFE CYCLE COSTS

- A. Preventative and Spot Maintenance: Manufacturer shall provide all preventative and spot maintenance, including parts and labor for 25 years from the date of equipment shipment. Individual outages shall be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

1.6 SUBMITTALS

- A. General: Follow the procedures specified in Division 1.
- B. Additional copies may be required by individual sections of these Specifications.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

PART 2 PRODUCTS

2.1 SPORTS LIGHTING SYSTEM CONSTRUCTION

- A. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, drivers and other enclosures shall be factory assembled, aimed, wired and tested.
- B. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel of 18-8 grade or better, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.
- C. System Description: Lighting system shall consist of the following:
 - 1. Galvanized steel poles and cross-arm assembly.
 - 2. Non-approved pole technology:
 - a. Square static cast concrete poles will not be accepted.
 - b. Direct bury steel poles which utilize the extended portion of the steel shaft for their foundation will not be accepted due to potential for internal and external corrosive reaction to the soils and long term performance concerns.

3. Lighting systems shall use concrete foundations. See Section 2.3 for details.
 - a. For a foundation using a pre-stressed concrete base embedded in concrete backfill the concrete shall be air-entrained and have a minimum compressive design strength at 28 days of 3,000 PSI. 3,000 PSI concrete specified for early pole erection, actual required minimum allowable concrete strength is 1,000 PSI. All piers and concrete backfill must bear on and against firm undisturbed soil.
 - b. For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or re-inforced pier design pole erection may occur after 7 days. Or after a concrete sample from the same batch achieves a certain strength.
4. Manufacturer will supply all drivers and supporting electrical equipment
 - a. Remote drivers and supporting electrical equipment shall be mounted approximately 10 feet above grade in aluminum enclosures. The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure.
 - b. If drivers are located atop the poles, climbing steps, safety cables and a service platform must be provided.
5. Manufacturer shall provide surge protection at the pole equal to or greater than 40 kA for each line to ground (Common Mode) as recommended by IEEE C62.41.2_2002.
6. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
7. All luminaires, visors, and cross-arm assemblies shall withstand 150 mph winds and maintain luminaire aiming alignment.
8. Control cabinet to provide remote on-off control and monitoring of the lighting system. See Section 2.4 for further details.
9. Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.
 - a. Integrated grounding via concrete encased electrode grounding system.
 - b. If grounding is not integrated into the structure, the manufacturer shall supply grounding electrodes, copper down conductors, and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be minimum size of 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.

- D. Safety: All system components shall be UL listed for the appropriate application.

2.2 ELECTRICAL

- A. Electric Power Requirements for the Sports Lighting Equipment:
 - 1. Electric power: 208 Volt, 3 Phase
 - 2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.
- B. Energy Consumption: The kW consumption for the field lighting system shall be 60 kW, or less.

2.3 STRUCTURAL PARAMETERS

- A. Wind Loads: Wind loads shall be based on the 2015 International Building Code. Wind loads to be calculated using ASCE 7-10, an ultimate design wind speed of 120 mph and exposure category C.
- B. Pole Structural Design: The stress analysis and safety factor of the poles shall conform to 2013 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-6).
- C. Foundation Design: The foundation design shall be based on soil parameters as outlined in the geotechnical report. If no geotechnical report is available, the foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2009 IBC Table 1806.2.
- D. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state where the project is located are required. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole. These drawings must be submitted at time of bid to allow for accurate pricing.

2.4 CONTROL

- A. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires.
- B. Lighting contactor cabinet(s) constructed of NEMA Type 4 aluminum, designed for easy installation with contactors, labeled to match field diagrams and electrical design. Manual off-on-auto selector switches shall be provided.
- C. Dimming: System shall provide for "High, Medium, Low", or "High/Low" dimming. System shall include key-activated switches to allow for automated dimming control or manual override.

A push-button control unit shall be provided to allow players/pedestrians to turn the lighting system on or off during times allowed by the owner. Once a player/pedestrian pushes the "on" button, the lights will come on for a preset time of 1 minute to 160 minutes. At the end of the specified period, a strobe will start flashing for approximately 3 minutes. During this time,

players/pedestrians will be able to push the “on” button again to continue play, or the lights will go off.

- D. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields to only having permission to execute “early off” commands by phone. Scheduling tool shall be capable of setting curfew limits.

Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

- E. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The controller shall determine switch position (manual or auto) and contactor status (open or closed).
- F. Management Tools: Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group. Dashboard shall also show current status of luminaire outages, control operation and service. Mobile application will be provided suitable for IOS, Android and Blackberry devices.

Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the owner.

1. Cumulative hours: shall be tracked to show the total hours used by the facility
2. Report hours saved by using early off and push buttons by users.

- G. Communication Costs: Manufacturer shall include communication costs for operating the controls and monitoring system for a period of 25 years.

PART 3 EXECUTION

3.1 SOIL QUALITY CONTROL

- A. It shall be the Contractor’s responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner’s approval / payment for additional costs associated with:
1. Providing engineered foundation embedment design by a registered engineer in the State of Connecticut for soils other than specified soil conditions;
 2. Additional materials required to achieve alternate foundation;

3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

3.2 DELIVERY TIMING

- A. Delivery Timing Equipment On-Site: The equipment must be on-site 6-8 weeks from receipt of approved submittals and receipt of complete order information.

3.3 FIELD QUALITY CONTROL

- A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04.

- B. Field Light Level Accountability

1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warranty period of 25 Years.
2. The contractor/manufacturer shall be responsible for an additional inspection one year from the date of commissioning of the lighting system and will utilize the owner's light meter in the presence of the owner.
3. The contractor/manufacturer will be held responsible for any and all changes needed to bring these fields back to compliance for light levels and uniformities. Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.

- C. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles and uniformity ratios are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

3.4 WARRANTY AND GUARANTEE

- A. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years from the date of shipment. Warranty shall guarantee specified light levels. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers.

- B. Maintenance: Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for 25 years from the date of equipment shipment. Parts and labor shall be covered such that individual luminaire outages will be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

PART 4 DESIGN APPROVAL

4.1 PRE-BID SUBMITTAL REQUIREMENTS

- A. Design Approval: The owner / engineer will review pre-bid submittals per section 4.1.B from all the manufacturers to ensure compliance to the specification 10 days prior to bid. If the design meets the design requirements of the specifications, a letter and/or addendum will be issued to the manufacturer indicating approval for the specific design submitted.
- B. Approved Product: Musco's Light-Structure System™ with TLC for LED™ is the approved product. All substitutions must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 10 days prior to bid. Special manufacturing to meet the standards of this specification may be required. An addendum will be issued prior to bid listing any other approved lighting manufacturers and designs.
- C. All listed manufacturers not pre-approved shall submit the information at the end of this section at least 10 days prior to bid. An addendum will be issued prior to bid; listing approved lighting manufacturers and the design method to be used.
- D. Bidders are required to bid only products that have been approved by this specification or addendum by the owner or owner's representative. Bids received that do not utilize an approved system/design, will be rejected.

REQUIRED SUBMITTAL INFORMATION FOR ALL MANUFACTURERS (NOT PRE-APPROVED) 10 DAYS PRIOR TO BID

*All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements. Complete the Yes/No column to indicate compliance (Y) or noncompliance (N) for each item. **Submit checklist below with submittal.***

Yes / No	Tab	Item	Description
	A	Letter/ Checklist	Listing of all information being submitted must be included on the table of contents. List the name of the manufacturer's local representative and his/her phone number. Signed submittal checklist to be included.
	B	Equipment Layout	Drawing(s) showing field layouts with pole locations
	C	On Field Lighting Design	Lighting design drawing(s) showing: <ol style="list-style-type: none"> a. Field Name, date, file number, prepared by b. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x & y), Illuminance levels at grid spacing specified c. Pole height, number of fixtures per pole, horizontal and vertical aiming angles, as well as luminaire information including wattage, lumens and optics d. Height of light test meter above field surface. e. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance (CV), coefficient of utilization (CU) uniformity gradient; number of luminaires, total kilowatts, average tilt factor; light loss factor.
	D	Off Field Lighting Design	Lighting design drawing showing initial spill light levels along the boundary line (defined on bid drawings) in footcandles. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights.
	F	Photometric Report	Provide first page of photometric report for all luminaire types being proposed showing candela tabulations as defined by IESNA Publication LM-35-02. Photometric data shall be certified by laboratory with current National Voluntary Laboratory Accreditation Program or an independent testing facility with over 5 years experience.
	G	Performance Guarantee	Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner. Light levels must be guaranteed to not fall below target levels for warranty period.
	H	Structural Calculations	Pole structural calculations and foundation design showing foundation shape, depth backfill requirements, rebar and anchor bolts (if required). Pole base reaction forces shall be shown on the foundation drawing along with soil bearing pressures. Design must be stamped by a structural engineer in the state of Connecticut, if required by owner. (May be

			supplied upon award).
	I	Control & Monitoring System	Manufacturer of the control and monitoring system shall provide written definition and schematics for automated control system to include monitoring. They will also provide ten (10) references of customers currently using proposed system in the state of Connecticut.
	J	Electrical Distribution Plans	Manufacturer bidding an alternate product must include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer in the state of Connecticut.
	K	Warranty	Provide written warranty information including all terms and conditions. Provide ten (10) references of customers currently under specified warranty in the state of Connecticut.
	L	Project References	Manufacturer to provide a list of ten (10) projects where the technology and specific fixture proposed for this project has been installed in the state of Connecticut. Reference list will include project name, project city, installation date, and if requested, contact name and contact phone number.
	M	Product Information	Complete bill of material and current brochures/cut sheets for all product being provided.
	N	Delivery	Manufacturer shall supply an expected delivery timeframe from receipt of approved submittals and complete order information.
	O	Non-Compliance	Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted.
	P	Life-cycle Cost Calculation	Document life-cycle cost calculations as defined in the specification. Identify energy costs for operating the luminaires. Maintenance cost for the system must be included in the warranty. All costs should be based on 25 Years. (complete table below)

The information supplied herein shall be used for the purpose of complying with the specifications for Avon High Schools' football lighting project. By signing below I agree that all requirements of the specifications have been met and that the manufacturer will be responsible for any future costs incurred to bring their equipment into compliance for all items not meeting specifications and not listed in the Non-Compliance section.

Manufacturer: _____

Signature: _____

Contact Name: _____

Date: ____/____/____

Contractor: _____

Signature: _____

END OF SECTION

SIGN-IN SHEET

**Avon High School Synthetic Turf Field and Track Improvements
Mandatory Pre-Bid Meeting – February 20, 2019 at 10:00 AM**

Name	Company	Phone No.	E-Mail Address
Coleman Patterson Margaret Chavez	HELLAS CONSTRUCTION	512-516-1517 ^(a) 512-250-2910 ^(a)	mchavez@hellasconstruction.com cpatterson@hellasconstruction.com
SEAN CORRIGAN	MOUNTAIN VIEW	413-836-7885 413 265-1607	SEAN@MOUNTAINVIEWINC.COM ANANDAS@MOUNTAINVIEWINC.COM
KEVIN FOLEY	LIBERTY LANDSCAPES	(860) 289-8073 (860) 883-5337	katherine@liberty498.com gps@liberty498.com
Spark Carpenter	Martin Laviero Cont.	860-599-7579	Spark@martinlaviero.com
Andrew Dyjak	Field Turf	(860) 333-7839	andrew.dyjak@fieldturf.com
JOHN GOLAS	LTC CONST. CO. INC	(860) 223-2009	JOHN@LTCCONSTRUCTION.COM
Vincent Genovesi	Genovesi Construction Vincent@Genovesiconstructionllc.com	(860) 8106107	
Bob Lord	Astroturf - Track	774-513-0020	blord@astroturf.com
SAN NEAGLE	LAWRENCE BRUNOLI, INC.	860-676-9900	bids@lbrunoli.com
ROGER WARD	MATHUR CORP	860 242 0743	ROGERWARD@MATHURCORP.COM
RYAN CONROY	CLASSIC TURF COMPANY	800-246-7951	RYAN@classicturf.org
MONTE RUSSO	A&J CONSTRUCTION	203-775-1385	MONTE@AJPAVING.COM
Wesley Cook	Sprinturf	717 917 1790	wcook@sprinturf.com

