

# WOODMEN HILLS METROPOLITAN DISTRICT REGIONAL WATER RECLAMATION FACILITY – GRADING & EROSION CONTROL PLAN

## SHEET INDEX

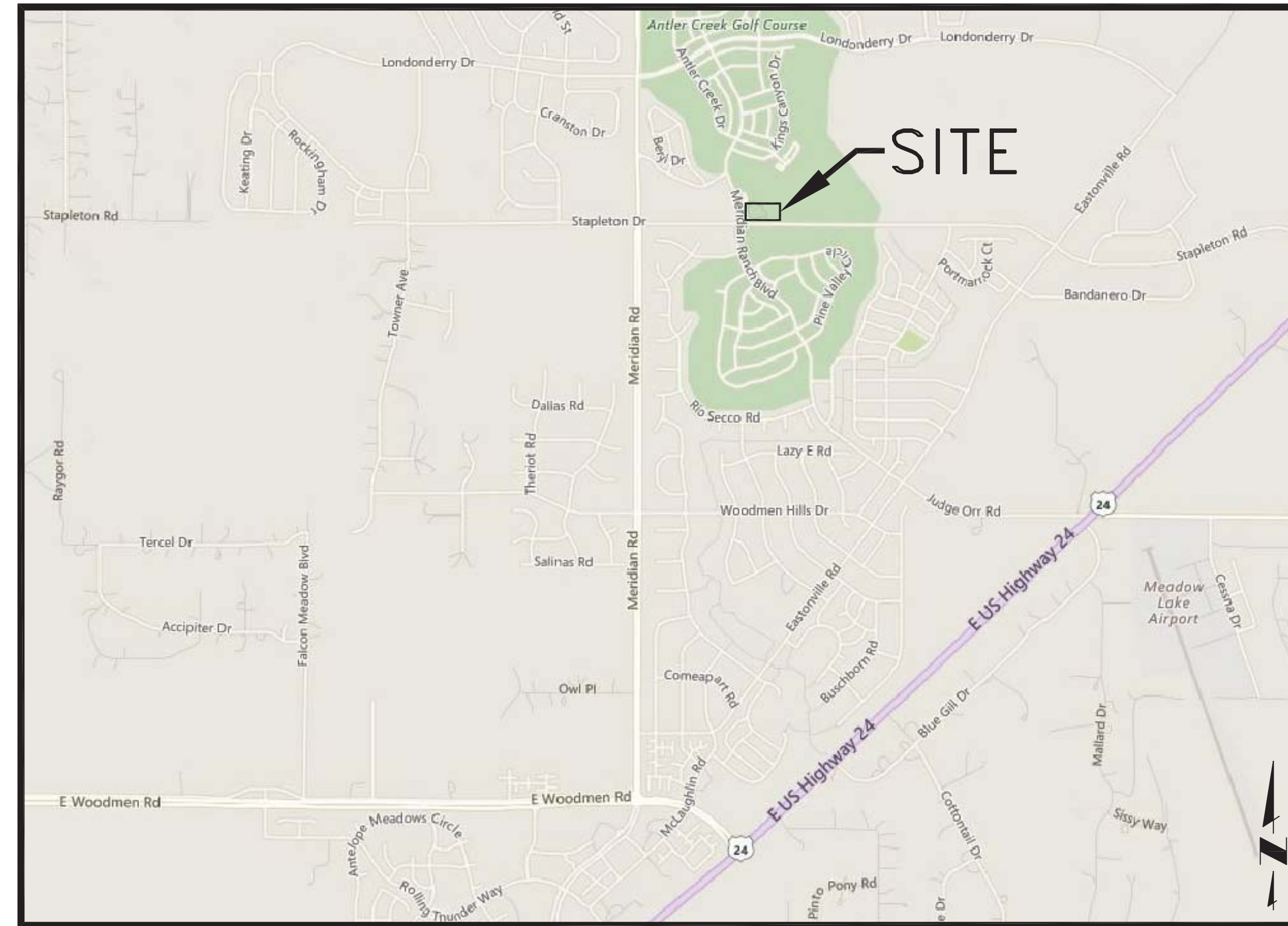
COVER SHEET/VICINITY MAP

<p>CIVIL EC1 EC2 EC3 EC4 EC5 EC6 EC7 EC8 EC9 EC10 EC11</p>	<p>EXISTING SITE PLAN GRADING &amp; EROSION CONTROL PLAN EROSION CONTROL NOTES EROSION CONTROL DETAILS 1 EROSION CONTROL DETAILS 2 EROSION CONTROL DETAILS 3 RETAINING WALL ELEVATIONS RETAINING WALL NOTES RETAINING WALL DETAILS RIGHT-OUT DETAILS MISC. DETAILS</p>
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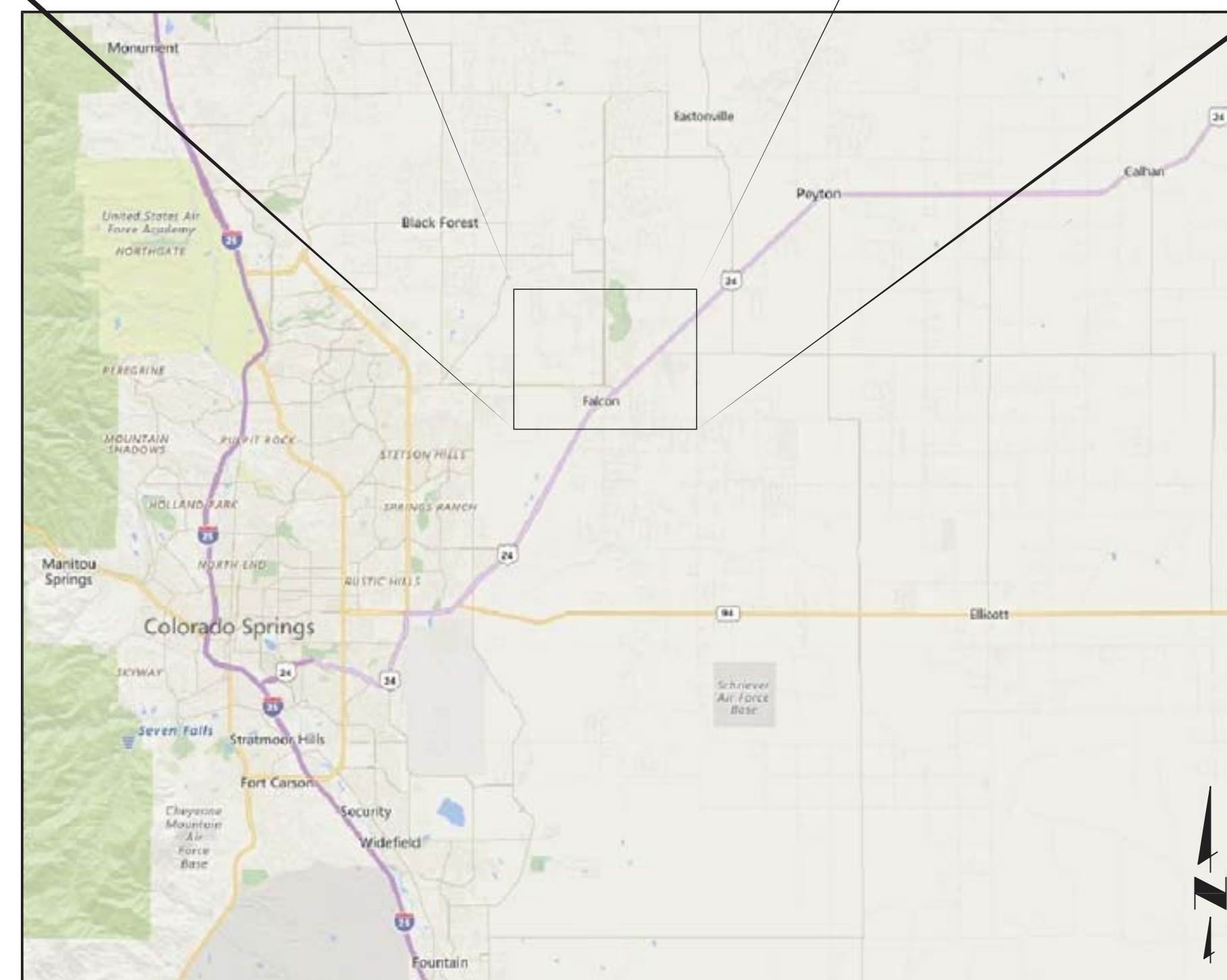
## LEGEND

---	BOUNDARY / RIGHT-OF-WAY
---	EXISTING FENCE
---	PROPOSED FENCE
—W—W—	EXISTING WATER LINE (W)
—RAW—RAW—RAW—	EXISTING RAW WATER LINE
—SS—SS—SS—	EXISTING SANITARY SEWER LINE
→→→→→	EXISTING ON-SITE SEWER LINE
	EXISTING STORM SEWER
—UGE—UGE—UGE—	EXISTING UNDERGROUND ELECTRIC
—OHE—OHE—OHE—	EXISTING OVERHEAD ELECTRIC
—GAS—GAS—GAS—	EXISTING GAS LINE
—FOP—FOP—FOP—	EXISTING FIBER OPTIC LINE
⊗	EXISTING VALVE
---7270---	EXISTING CONTOURS
==7270==	PROPOSED CONTOURS
====	PROPOSED SEWER LINE
—W—W—	PROPOSED WATERLINE

## LOCATION & VICINITY MAPS



**VICINITY MAP**  
N.T.S.



**LOCATION MAP**  
N.T.S.

## SIGNATURES

**ENGINEER'S STATEMENT:**

THIS GRADING AND EROSION CONTROL PLAN WAS PREPARED UNDER MY DIRECTION AND SUPERVISION AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. SAID PLAN HAS BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR GRADING AND EROSION CONTROL PLANS. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARING THIS PLAN.

\_\_\_\_\_  
RYAN M. MANGINO, PE #43304

\_\_\_\_\_  
DATE

**OWNER'S STATEMENT:**

THE OWNER WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN.

\_\_\_\_\_  
Type Owner Name, Title,  
Address.

\_\_\_\_\_  
DATE

**EL PASO COUNTY:**

COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA, AND ENGINEERING CRITERIA MANUAL AS AMENDED.

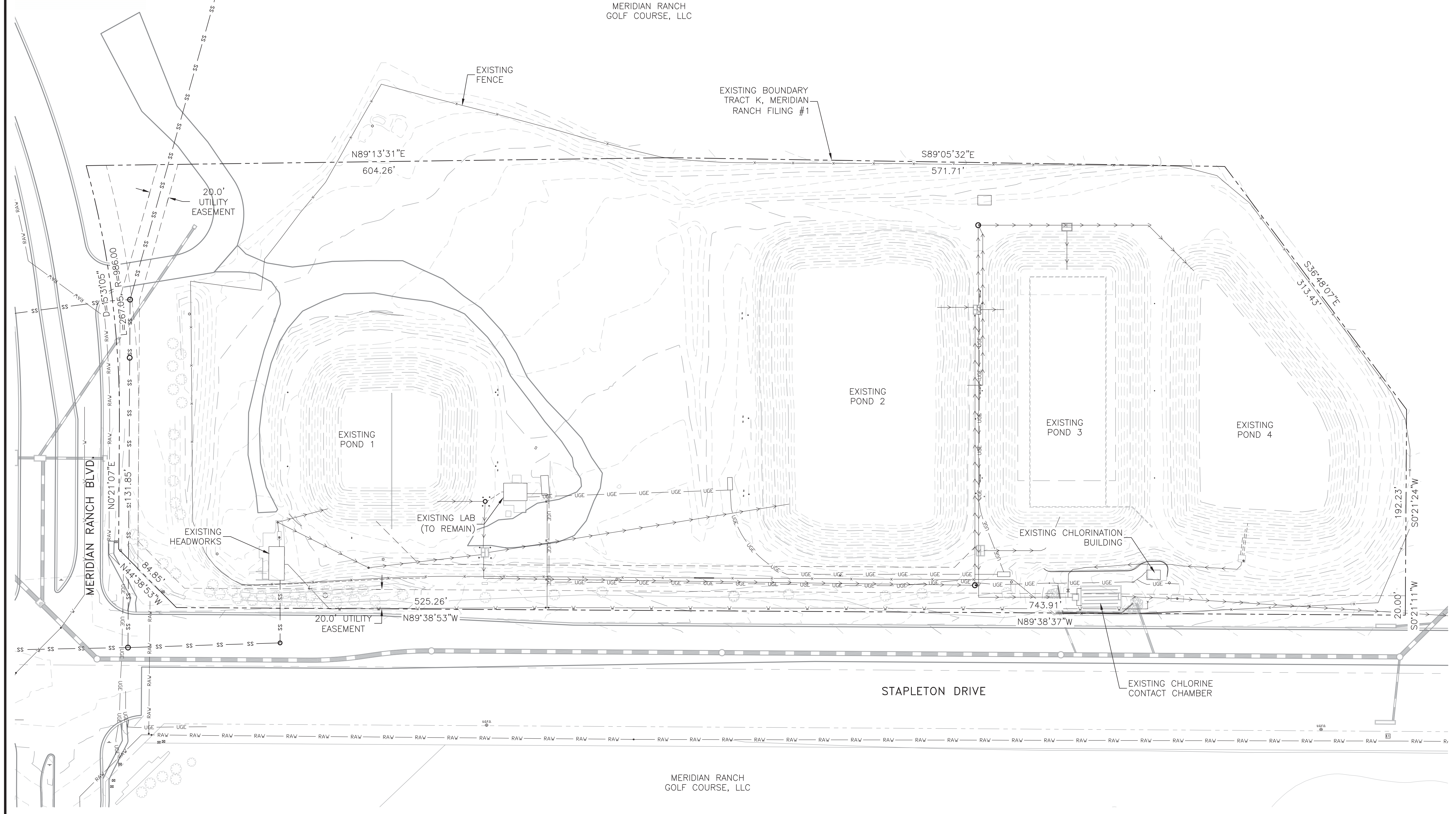
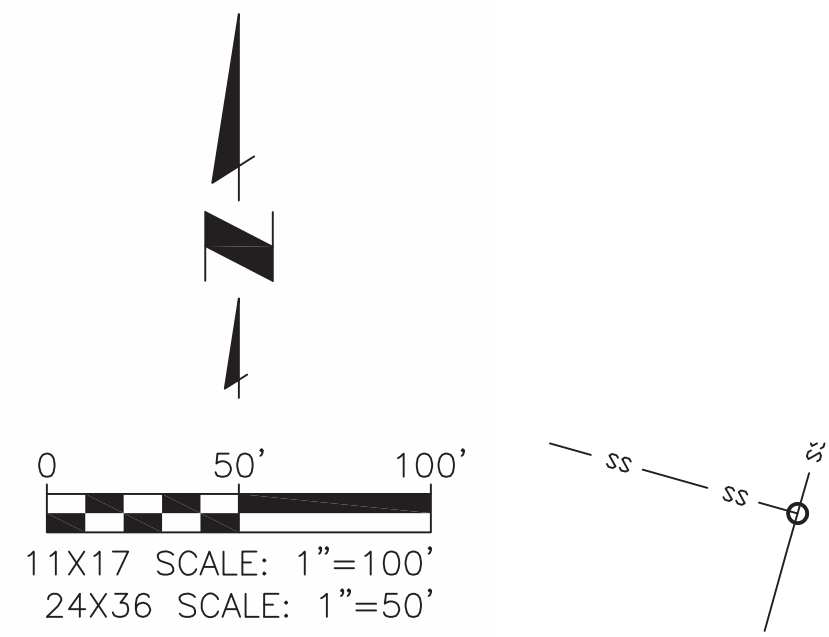
IN ACCORDANCE WITH ECM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTOR'S DISCRETION.

\_\_\_\_\_  
JENNIFER IRVINE, P.E.  
COUNTY ENGINEER

\_\_\_\_\_  
DATE

**LEGAL DESCRIPTION:**

TRACT K, MERIDIAN RANCH FILING NO. 1.



**WOODMEN HILLS METROPOLITAN DISTRICT  
 REGIONAL WATER RECLAMATION FACILITY  
 EXISTING SITE PLAN**  
 PCD FILE NO: PPR-17-027

Project No.:	112.88
Scale:	AS NOTED
Date:	07/07/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	



**EROSION CONTROL NOTES:**

1. CONSTRUCTION MAY NOT COMMENCE UNTIL A CONSTRUCTION PERMIT IS OBTAINED FROM THE PLANNING & COMMUNITY DEVELOPMENT DEPARTMENT.
2. STORMWATER DISCHARGES FROM CONSTRUCTION SITES SHALL NOT CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR DEGRADATION OF STATE WATERS. ALL WORK AND EARTH DISTURBANCE SHALL BE DONE IN A MANNER THAT MINIMIZES POLLUTION OF ANY ON-SITE OR OFF SITE WATERS, INCLUDING WETLANDS.
3. NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OR GRAPHIC REPRESENTATION, ALL DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO THE STANDARDS AND REQUIREMENTS OF THE MOST RECENT VERSION OF THE RELEVANT ADOPTED EL PASO COUNTY STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE, THE ENGINEERING CRITERIA MANUAL, THE DRAINAGE CRITERIA MANUAL, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS TO REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.
4. A SEPARATE STORMWATER MANAGEMENT PLAN (SWMP) FOR THIS PROJECT SHALL BE COMPLETED AND AN EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP) ISSUED PRIOR TO COMMENCING CONSTRUCTION. DURING CONSTRUCTION THE SWMP IS THE RESPONSIBILITY OF THE DESIGNATED STORMWATER MANAGER, SHALL BE LOCATED ON SITE AT ALL TIMES AND SHALL BE KEPT UP TO DATE WITH WORK PROGRESS AND CHANGES IN THE FIELD.
5. ONCE THE ESQCP HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL BMPS AS INDICATED ON THE GEC. A PRECONSTRUCTION MEETING BETWEEN THE CONTRACTOR, ENGINEER, AND EL PASO COUNTY WILL BE HELD PRIOR TO ANY CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COORDINATE THE MEETING TIME AND PLACE WITH COUNTY DSD INSPECTIONS STAFF.
6. SOIL EROSION CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN 21 CALENDAR DAYS AFTER FINAL GRADING, OR FINAL EARTH DISTURBANCE, HAS BEEN COMPLETED. DISTURBED AREAS AND STOCKPILES WHICH ARE NOT AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 30 DAYS SHALL ALSO BE MULCHED WITHIN 21 DAYS AFTER INTERIM GRADING. AN AREA THAT IS GOING TO REMAIN IN AN INTERIM STATE FOR MORE THAN 60 DAYS SHALL ALSO BE SEEDED. ALL TEMPORARY SOIL EROSION CONTROL MEASURES AND BMPS SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED AND ESTABLISHED.
7. TEMPORARY SOIL EROSION CONTROL FACILITIES SHALL BE REMOVED AND EARTH DISTURBANCE AREAS GRADED AND STABILIZED WITH PERMANENT SOIL EROSION CONTROL MEASURES PURSUANT TO STANDARDS AND SPECIFICATION PRESCRIBED IN THE DCM VOLUME II AND THE ENGINEERING CRITERIA MANUAL (ECM) APPENDIX I.
8. ALL PERSONS ENGAGED IN EARTH DISTURBANCE SHALL IMPLEMENT AND MAINTAIN ACCEPTABLE SOIL EROSION AND SEDIMENT CONTROL MEASURES INCLUDING BMPS IN CONFORMANCE WITH THE EROSION CONTROL TECHNICAL STANDARDS OF THE DRAINAGE CRITERIA MANUAL (DCM) VOLUME II AND IN ACCORDANCE WITH THE STORMWATER MANAGEMENT PLAN (SWMP).
9. ALL TEMPORARY EROSION CONTROL FACILITIES INCLUDING BMPS AND ALL PERMANENT FACILITIES INTENDED TO CONTROL EROSION OF ANY EARTH DISTURBANCE OPERATIONS, SHALL BE INSTALLED AS DEFINED IN THE APPROVED PLANS, THE SWMP AND THE DCM VOLUME II AND MAINTAINED THROUGHOUT THE DURATION OF THE EARTH DISTURBANCE OPERATION.
10. ANY EARTH DISTURBANCE SHALL BE CONDUCTED IN SUCH A MANNER SO AS TO EFFECTIVELY REDUCE ACCELERATED SOIL EROSION AND RESULTING SEDIMENTATION. ALL DISTURBANCES SHALL BE DESIGNED, CONSTRUCTED, AND COMPLETED SO THAT THE EXPOSED AREA OF ANY DISTURBED LAND SHALL BE LIMITED TO THE SHORTEST PRACTICAL PERIOD OF TIME.
11. ANY TEMPORARY OR PERMANENT FACILITY DESIGNED AND CONSTRUCTED FOR THE CONVEYANCE OF STORMWATER AROUND, THROUGH, OR FROM THE EARTH DISTURBANCE AREA SHALL BE DESIGNED TO LIMIT THE DISCHARGE TO A NON-EROSIVE VELOCITY.
12. CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO RUNOFF TO STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES.
13. EROSION CONTROL BLANKETING IS TO BE USED ON SLOPES STEEPER THAN 3:1.
14. BUILDING, CONSTRUCTION, EXCAVATION, OR OTHER WASTE MATERIALS SHALL NOT BE TEMPORARILY PLACED OR STORED IN THE STREET, ALLEY, OR OTHER PUBLIC WAY, UNLESS IN ACCORDANCE WITH AN APPROVED TRAFFIC CONTROL PLAN. BMP'S MAY BE REQUIRED BY EL PASO COUNTY ENGINEERING IF DEEMED NECESSARY, BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.
15. VEHICLE TRACKING OF SOILS AND CONSTRUCTION DEBRIS OFF-SITE SHALL BE MINIMIZED. MATERIALS TRACKED OFFSITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL WASTES FROM THE CONSTRUCTION SITE FOR DISPOSAL IN ACCORDANCE WITH LOCAL AND STATE REGULATORY REQUIREMENTS. NO CONSTRUCTION DEBRIS, TREE SLASH, BUILDING MATERIAL WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURIED, DUMPED, OR DISCHARGED AT THE SITE.
17. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, AND SAND THAT MAY ACCUMULATE IN THE STORM SEWER OR OTHER DRAINAGE CONVEYANCE SYSTEM AND STORMWATER APPURTENANCES AS A RESULT OF SITE DEVELOPMENT.
18. THE QUANTITY OF MATERIALS STORED ON THE PROJECT SITE SHALL BE LIMITED, AS MUCH AS PRACTICAL, TO THAT QUANTITY REQUIRED TO PERFORM THE WORK IN AN ORDERLY SEQUENCE. ALL MATERIALS STORED ON-SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER, IN THEIR ORIGINAL CONTAINERS, WITH ORIGINAL MANUFACTURER'S LABELS.
19. NO CHEMICALS ARE TO BE USED BY THE CONTRACTOR, WHICH HAVE THE POTENTIAL TO BE RELEASED IN STORMWATER UNLESS PERMISSION FOR THE USE OF A SPECIFIC CHEMICAL IS GRANTED IN WRITING BY THE ECM ADMINISTRATOR. IN GRANTING THE USE OF SUCH CHEMICALS, SPECIAL CONDITIONS AND MONITORING MAY BE REQUIRED.
20. BULK STORAGE STRUCTURES FOR PETROLEUM PRODUCTS AND OTHER CHEMICALS SHALL HAVE ADEQUATE PROTECTION SO AS TO CONTAIN ALL SPILLS AND PREVENT ANY SPILLED MATERIAL FROM ENTERING STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES.
21. NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE FLOW LINE OF THE CURB AND GUTTER OR IN THE DITCHLINE.
22. INDIVIDUALS SHALL COMPLY WITH THE "COLORADO WATER QUALITY CONTROL ACT" (TITLE 25, ARTICLE 8, CRS), AND THE "CLEAN WATER ACT" (33 USC 1344), IN ADDITION TO THE REQUIREMENTS INCLUDED IN THE DCM VOLUME II AND THE ECM APPENDIX I. ALL APPROPRIATE PERMITS MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION (NPDES, FLOODPLAIN, 404, FUGITIVE DUST, ETC.). IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND LAWS, RULES, OR REGULATIONS OF OTHER FEDERAL, STATE, OR COUNTY AGENCIES, THE MORE RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.
23. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE AT APPROVED CONSTRUCTION ACCESS POINTS.
24. PRIOR TO ACTUAL CONSTRUCTION THE PERMITEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.
25. A WATER SOURCE SHALL BE AVAILABLE ON SITE DURING EARTHWORK OPERATIONS AND UTILIZED AS REQUIRED TO MINIMIZE DUST FROM EARTHWORK EQUIPMENT AND WIND.
26. THE SOILS REPORT FOR THIS SITE HAS BEEN PREPARED BY CTL-THOMPSON, INC. DATED SEPTEMBER 24, 2015, AND SHALL BE CONSIDERED A PART OF THESE PLANS.
27. AT LEAST TEN DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB 1 ACRE OR MORE, THE OWNER OR OPERATOR OF CONSTRUCTION ACTIVITY SHALL SUBMIT A PERMIT APPLICATION FOR STORMWATER DISCHARGE TO THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, WATER QUALITY DIVISION. THE APPLICATION CONTAINS CERTIFICATION OF COMPLETION OF A STORMWATER MANAGEMENT PLAN (SWMP), OF WHICH THIS GRADING AND EROSION CONTROL PLAN MAY BE A PART. FOR INFORMATION OR APPLICATION MATERIALS CONTACT:  
  
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT  
WATER QUALITY CONTROL DIVISION  
WQCD - PERMITS  
4300 CHERRY CREEK DRIVE SOUTH  
DENVER, CO 80246-1530  
ATTN: PERMITS UNIT
28. ALL AREAS NOTED TO BE RESEEDED SHALL BE SEEDED WITH A NATIVE AND INTRODUCED GRASS MIXTURE. THE SEED WILL BE APPLIED USING MECHANICAL TYPE DRILLS AT 0.25"-0.5" INTO TOPSOIL. AREA NOT ACCESSIBLE TO A DRILL SEEDER AND SLOPES STEEPER THAN 2:1 SHALL BE HAND BROADCAST AT DOUBLE THE ABOVE SEED RATE AND RAKED AT 1/4 TO 1/2 INTO THE TOPSOIL. ALL SEEDED AREAS WILL BE MULCHED: 1-1/2 TONS CERTIFIED WEED FREE NATIVE HAY PER ACRE MECHANICALLY CRIMPED IN TOPSOIL IN COMBINATION WITH AN ORGANIC MULCH TACKIFIER. MAINTENANCE OF ANY SWALES WILL INCLUDE EROSION CONTROL AND PREVENTION, DEBRIS REMOVAL AND OCCASIONAL MOWING. CARE SHALL BE USED DURING THE REMOVAL OF SEDIMENT FROM ANY DRAINAGE WAYS. ANY SEEDING OR EROSION CONTROL MEASURE THAT IS DISTURBED DURING MAINTENANCE SHALL BE IMMEDIATELY REPAIRED. THE SEED MIX SHALL BE MADE UP OF THE FOLLOWING AS PER THE EL PASO COUNTY CONSERVATION DISTRICT (RECOMMENDATION OBTAINED APRIL 2015):

COMMON NAME (N=NATIVE, I=INTRODUCED)	SCIENTIFIC NAME	LBS. PLS./ACRE
WHEATGRASS, SIBERIAN	I AGROPYRON FRAGILE	2.04
WHEATGRASS, SLENDER	N ELYMUS TRACHYCAULUS	10.90
WHEATGRASS, INTERMEDIATE	I THINOPYRUM INTERMEDIUM	3.00
WILD RYE, RUSSIAN	I PSATHYRSTACHYS JUNCEA	2.04
WHEATGRASS, WESTERN	N PASCOPYRUM SMITHII	3.20
CLOVER, RED	I TRIFOLIUM PRATENSE	0.40
FLAX, BLUE-APPAR	I LINUM PERENNE	0.41
SULPHUR-FLOWER BUCKWHEAT	N ERIOGONUM UMBELLATUM	0.55
TOTAL/POUNDS/ACRE		22.54

**TIMING, CONSTRUCTION STAGING AND SEQUENCING:**

EXPECTED START DATE: JUNE 2017  
 INSTALL TEMPORARY EROSION CONTROL - 2 DAYS  
 - PERIMETER SILT FENCING  
 - VEHICLE TRACKING CONTROL PAD  
 - STRAW BALE BARRIERS

ROUGH GRADING - 2 DAYS  
 INSTALL FINAL SITE IMPROVEMENTS - 14 MONTHS  
 REMOVE TEMPORARY EROSION CONTROL - 5 DAYS

**MINIMUM BEST MANAGEMENT PRACTICES ELEMENTS:**

- STEP 1- EROSION AND SEDIMENT CONTROL  
 INSTALL SEDIMENT TRAPPING DEVICES (PERIMETER CONTROLS) PRIOR TO THE START OF CONSTRUCTION.
- STEP 2- SPILL PREVENTION AND RESPONSE
- STEP 3- MATERIAL MANAGEMENT  
 MATERIAL AND EQUIPMENT STORAGE AREAS SHALL BE SECURE AND CONTAINED TO PREVENT DISCHARGE OF ANY MATERIAL IN RUNOFF. WASTE SHALL BE CONTAINED AND DISPOSED OF PROPERLY. MAINTAIN BMP'S DURING BUILDING AND UTILITY CONSTRUCTION.
- STEP 4- INSPECTION AND MAINTENANCE  
 (SEE EROSION CONTROL NOTES)
- STEP 5- INSTALL FINAL STABILIZATION - BASE COURSE, LANDSCAPING, EROSION CONTROL BLANKETS, AND SEEDING.
- STEP 6- REMOVE TEMPORARY CONTROLS - SILT FENCING AFTER PERMANENT FEATURES ARE INSTALLED.

**FINAL STABILIZATION AND LONG-TERM STORMWATER MANAGEMENT:**

FINAL STABILIZATION MEASURES INCLUDE BASE COURSE, PARTIAL LANDSCAPE, AND REVEGETATION

**EARTHWORK SUMMARY:**

PROPOSED WASTEWATER TREATMENT SITE:  
 CUT - 40,000 CY  
 FILL - 10,000 (\*1.15) = 11,500 CY  
 NET - 28,500 CY CUT

DISTURBED AREA - 5.70 AC

**EROSION CONTROL FACILITIES:**

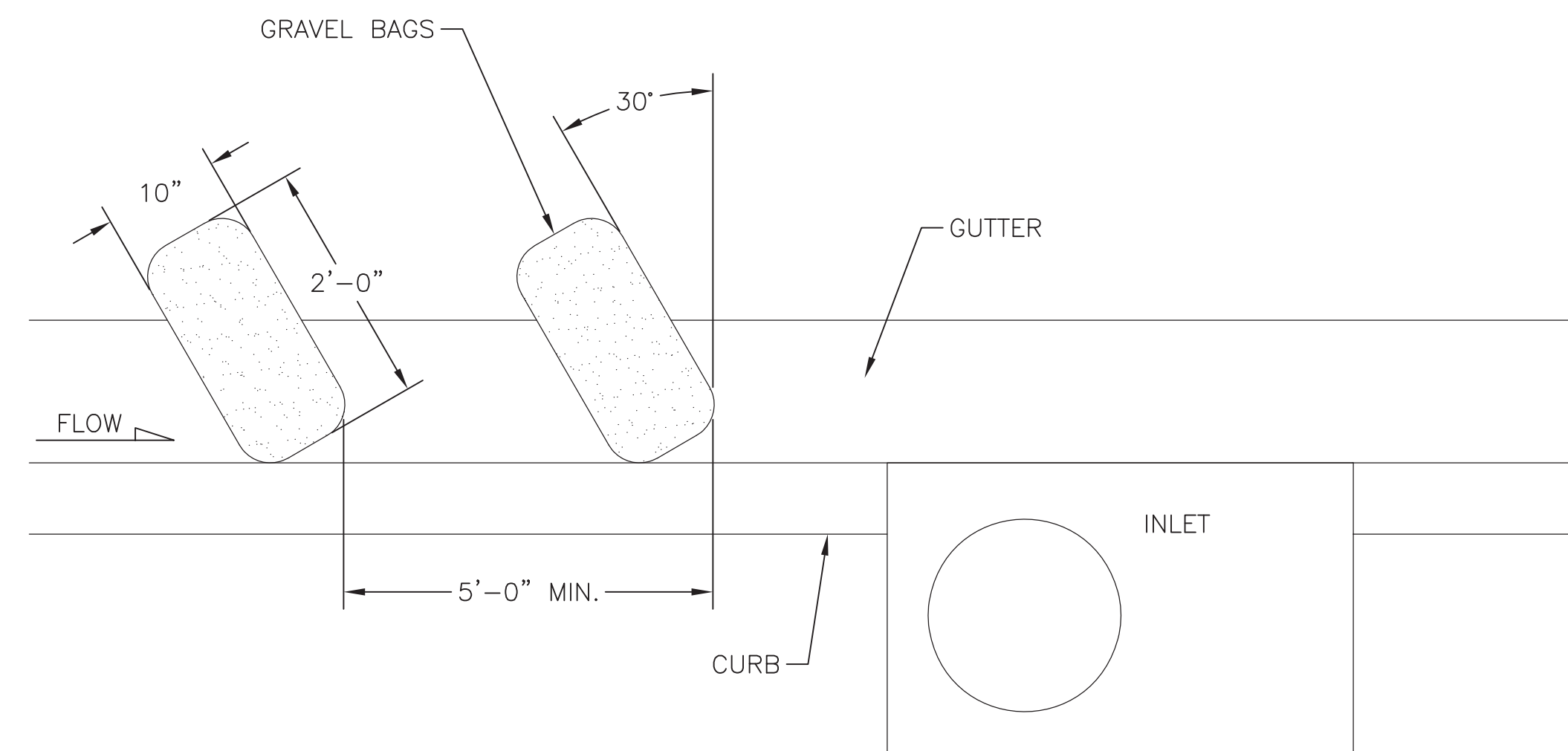
SILT FENCE (SF) - 2,000 LF  
 VEHICLE TRACKING PAD (VT) - 1  
 STRAW BALE CHECK DAMS - 3



**WOODMEN HILLS METROPOLITAN DISTRICT  
 REGIONAL WATER RECLAMATION FACILITY  
 EROSION CONTROL NOTES**

PCD FILE NO: PPR-17-027

Project No.: 112.88
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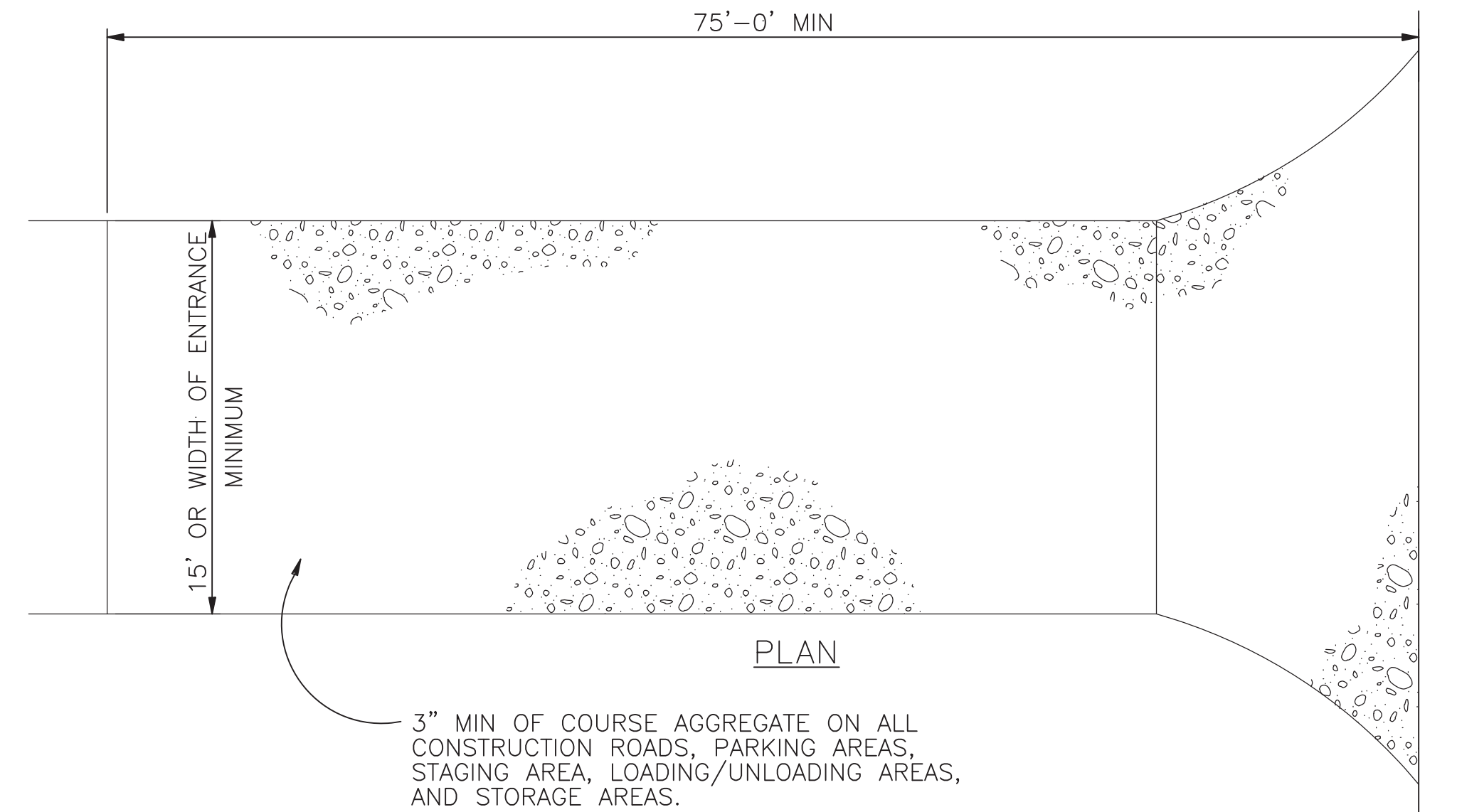
CURB SOCK DETAIL  
N.T.S.

INSTALLATION REQUIREMENTS:

1. CURB SOCKS SHALL BE INSTALLED PRIOR TO CONSTRUCTION AT EXISTING CURB AND GUTTER LOCATIONS UPSTREAM OF EXISTING INLETS.
2. SOCK IS TO BE MADE OF 1/4-INCH WIRE MESH (USED WITH GRAVEL ONLY) OR GEOTEXTILE.
3. WASHED SAND OR GRAVEL 3/4-INCH TO 4 INCHES IN DIAMETER IS PLACED INSIDE THE SOCK.
4. PLACEMENT OF THE SOCK IS TO BE 30-DEGREES FROM PERPENDICULAR IN THE OPPOSITE DIRECTION OF FLOW.
5. SOCKS ARE TO BE FLUSH WITH THE CURB AND SPACED AT A MINIMUM 5 FEET APART.
6. AT LEAST 2 CURB SOCKS IN SERIES ARE REQUIRED.

MAINTENANCE REQUIREMENTS:

1. CONTRACTOR SHALL INSPECT INLET PROTECTION IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL AND WEEKLY DURING PERIODS OF NO RAINFALL.
2. DAMAGED OR INEFFECTIVE INLET PROTECTION SHALL PROMPTLY BE REPAIRED OR REPLACED.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND THE SOCK WHEN GUTTER WIDTH IS FILLED.
4. INLET PROTECTION SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED WITHIN THE UPSTREAM DRAINAGE AREA.



VEHICLE TRACKING PAD DETAIL  
N.T.S.

INSTALLATION REQUIREMENTS:

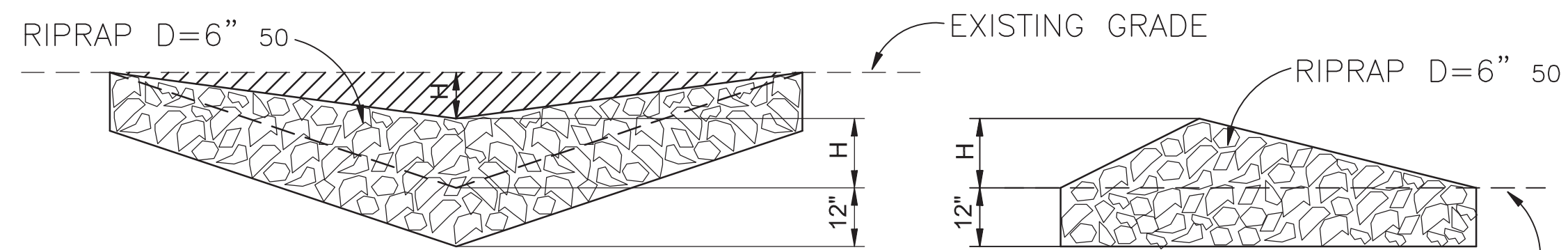
1. ALL ENTRANCES TO THE CONSTRUCTION SITE ARE TO BE STABILIZED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. CONSTRUCTION ENTRANCES ARE TO BE BUILT WITH AN APRON TO ALLOW FOR TURNING TRAFFIC, BUT SHOULD NOT BE BUILT OVER EXISTING PAVEMENT EXCEPT FOR A SLIGHT OVERLAP.
3. AREAS TO BE STABILIZED ARE TO BE PROPERLY GRADED AND COMPACTED.
4. CONSTRUCTION ROADS, PARKING AREAS, LOADING/UNLOADING ZONES, STORAGE AREAS, AND STAGING AREAS ARE TO BE STABILIZED.
5. CONSTRUCTION ROADS ARE TO BE BUILT TO CONFORM TO SITE GRADES, BUT SHOULD NOT HAVE SIDE SLOPES OR ROAD GRADES THAT ARE EXCESSIVELY STEEP.

MAINTENANCE REQUIREMENTS

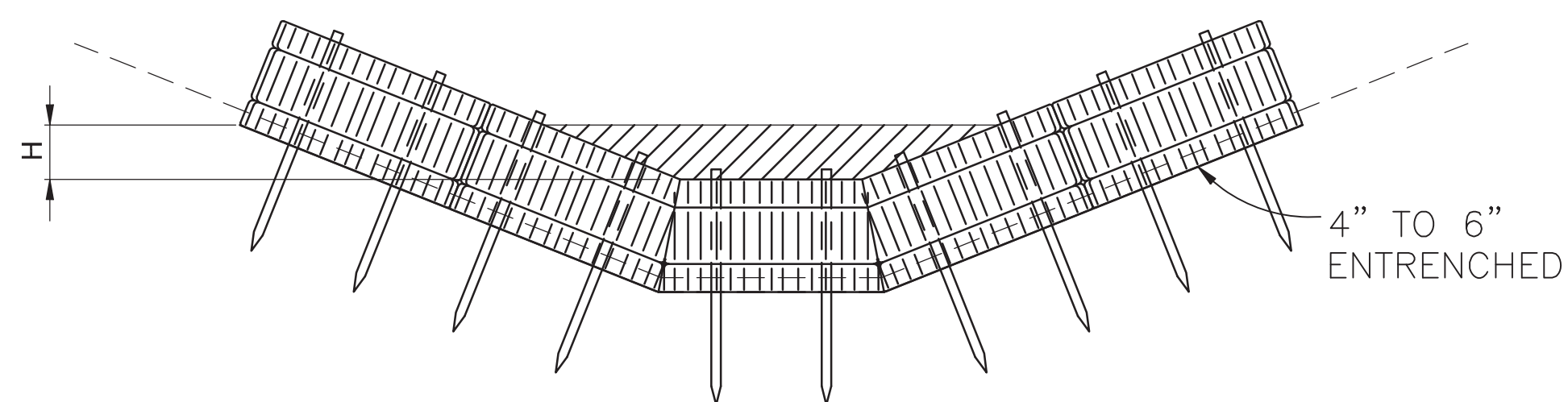
1. REGULAR INSPECTIONS ARE TO BE MADE OF ALL STABILIZED AREAS, ESPECIALLY AFTER STORM EVENTS.
2. STONES ARE TO BE REAPPLIED PERIODICALLY AND WHEN REPAIR IS NECESSARY.
3. SEDIMENT TRACKED ONTO PAVED ROADS IS TO BE REMOVED DAILY BY SHOVELING OR SWEEPING. SEDIMENT IS NOT TO BE WASHED DOWN STORM SEWER DRAINS.
4. OTHER ASSOCIATED SEDIMENT CONTROL MEASURES ARE TO BE INSPECTED TO ENSURE GOOD WORKING CONDITION.
5. TO BE REMOVED JUST PRIOR TO FINAL SURFACING AND STABILIZATION.

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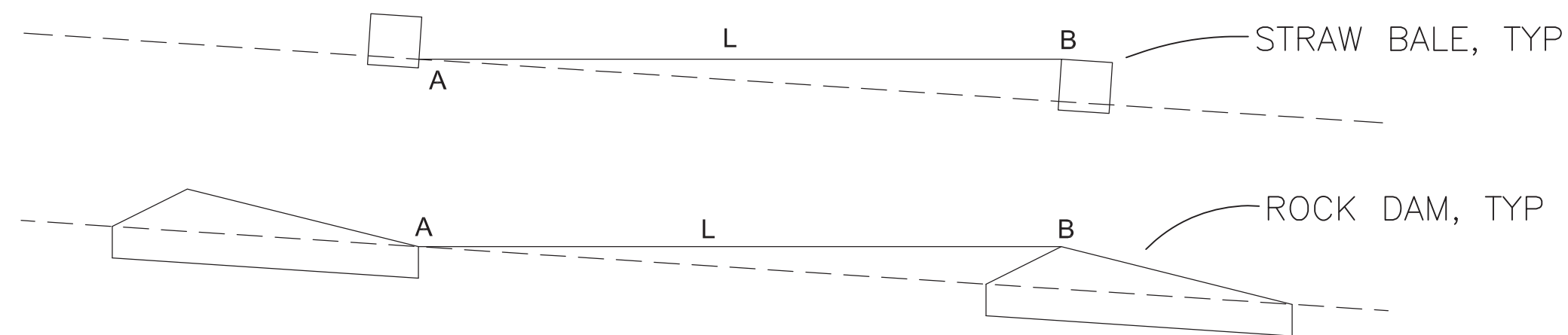
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Revised:



**A. ROCK DAM**



**B. STRAW BALE CHECK DAM (SEE STRAW BALE BARRIER INSTALLATION)**



L = THE DISTANCE SUCH THAT POINTS A AND B ARE AT THE SAME ELEVATION.

**C. SPACING CHECK DAMS**

CHECK DAM  
N.T.S.



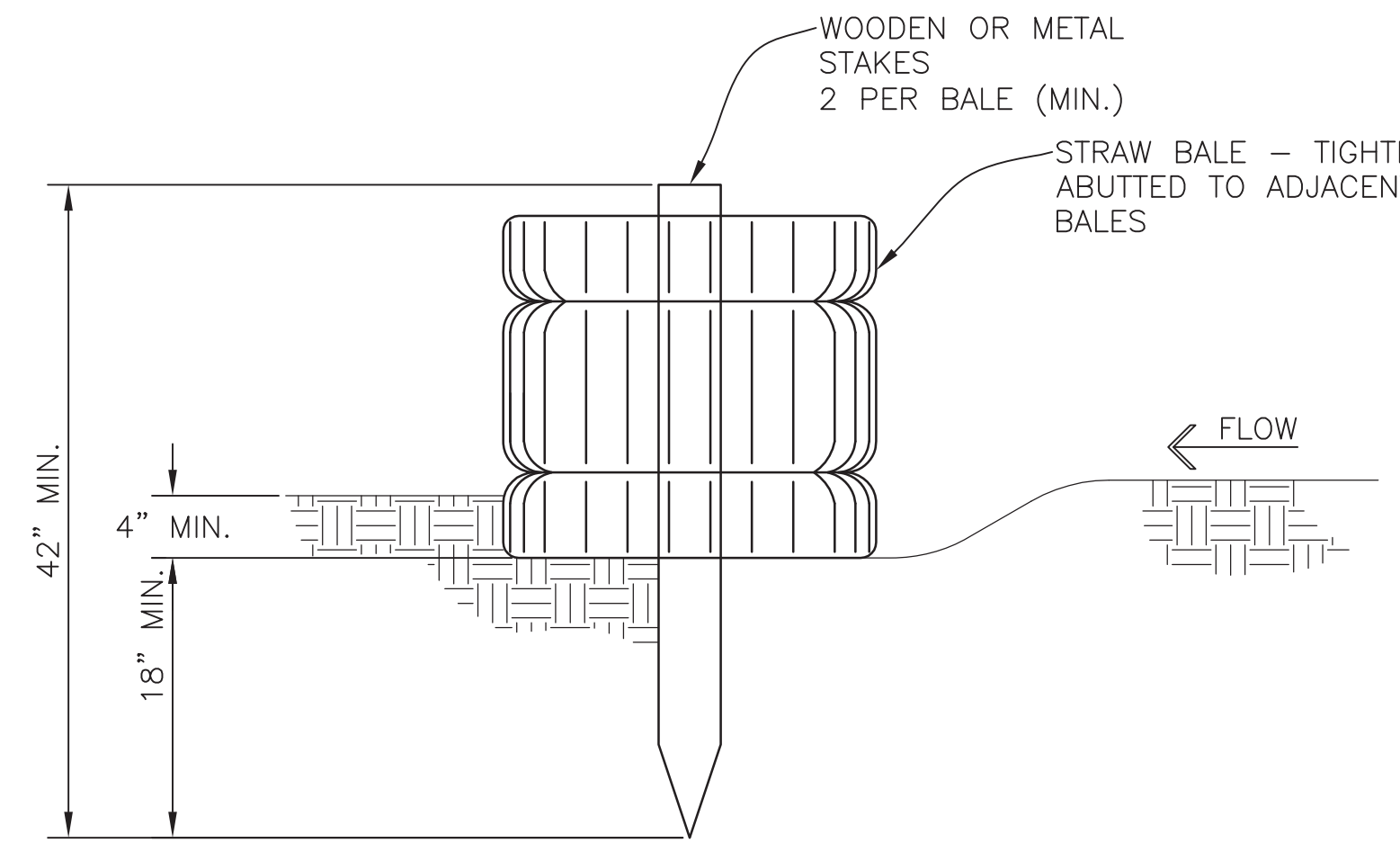
**CHECK DAM NOTES**

**INSTALLATION REQUIREMENTS**

1. STRAW BALES USED AS CHECK DAMS ARE TO MEET THE REQUIREMENTS STATED IN FIGURE STRAW BALE BARRIER DETAIL.
2. THE "H" DIMENSION SHALL BE SELECTED TO PROVIDE WEIR FLOW CONVEYANCE FOR 2-YEAR FLOW OR GREATER.

**MAINTENANCE REQUIREMENTS**

1. REGULAR INSPECTIONS ARE TO BE MADE OF ALL CHECK DAMS, ESPECIALLY AFTER STORM EVENTS.
2. REPLACE STONE AS NECESSARY TO MAINTAIN THE CORRECT HEIGHT OF THE DAM.
3. ACCUMULATED SEDIMENT AND DEBRIS IS TO BE REMOVED FROM BEHIND THE DAMS AFTER EACH STORM OR WHEN 1/2 OF THE ORIGINAL HEIGHT OF THE DAM IS REACHED.
4. CHECK DAMS ARE TO REMAIN IN PLACE AND OPERATIONAL UNTIL THE DRAINAGE AREA AND CHANNEL ARE PERMANENTLY STABILIZED.
5. WHEN CHECK DAMS ARE REMOVED THE CHANNEL LINING OR VEGETATION IS TO BE RESTORED.



**STRAW BALE BARRIER**  
N.T.S.



**STRAW BALE BARRIER NOTES**

**INSTALLATION REQUIREMENTS**

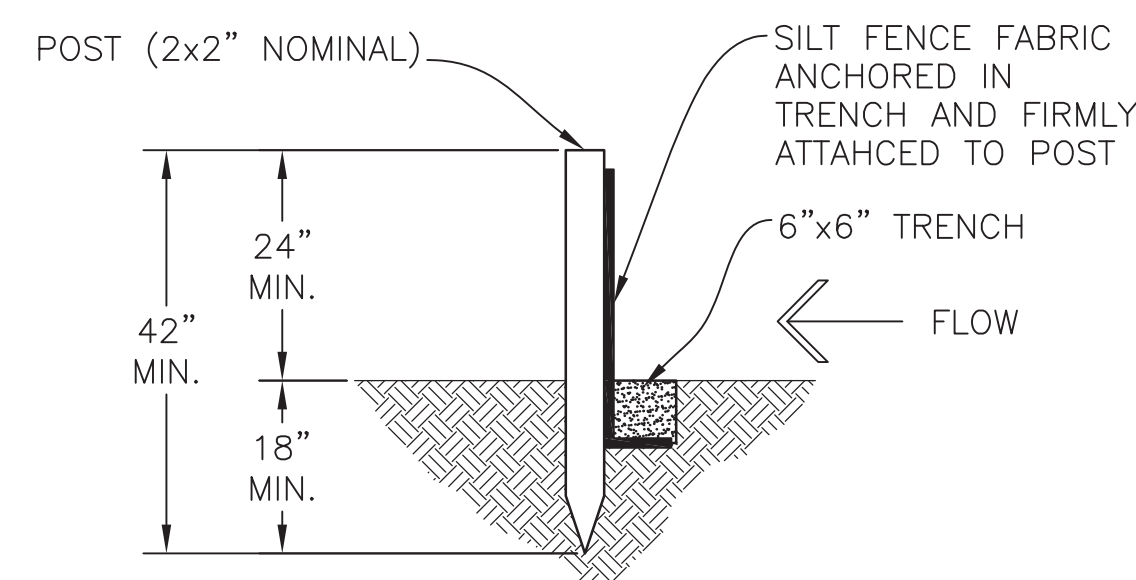
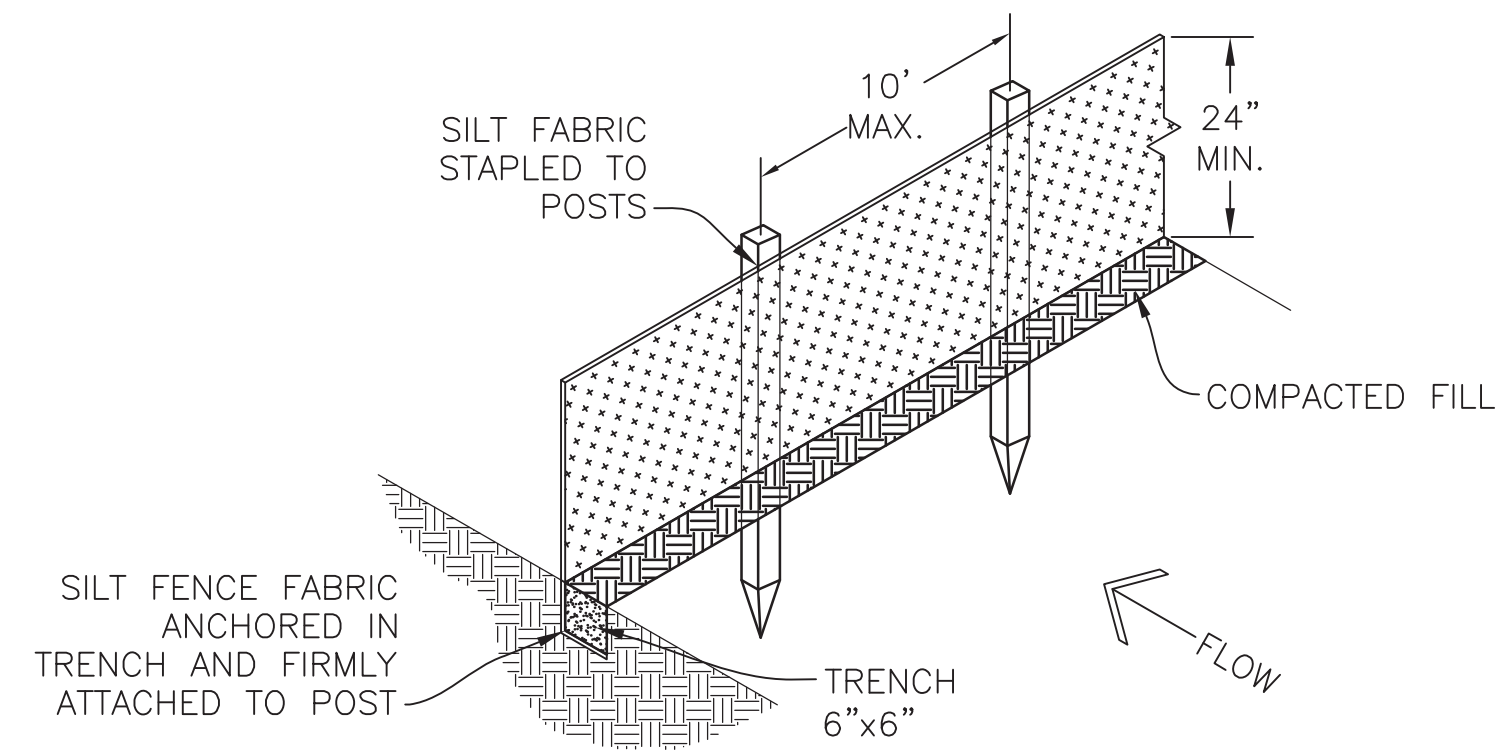
1. STRAW BALE BARRIERS SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
2. BALES SHALL CONSIST OF APPROXIMATELY 5 CUBIC FEET OF CERTIFIED WEED FREE HAY OR STRAW AND WEIGH NOT LESS THAN 35 POUNDS.
3. BALES ARE TO BE PLACED IN A SINGLE ROW WITH THE END OF THE BALES TIGHTLY ABUTTING ONE ANOTHER.
4. EACH BALE IS TO BE SECURELY ANCHORED WITH AT LEAST TWO STAKES AND THE FIRST STAKE IS TO BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER.
5. STAKES ARE TO BE A MINIMUM OF 42 INCHES LONG. METAL STAKES SHALL BE STANDARD "T" OR "U" TYPE WITH MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT. WOOD STAKES SHALL HAVE A MINIMUM DIAMETER OR CROSS SECTION DIMENSION OF 2 INCHES.
6. BALES ARE TO BE BOUND WITH EITHER WIRE OR STRING AND ORIENTED SUCH THAT THE BINDINGS ARE AROUND THE SIDES AND NOT ALONG THE TOPS AND BOTTOMS OF THE BALE.
7. GAPS BETWEEN BALES ARE TO BE CHINKED ( FILLED BY WEDGING) WITH STRAW OR THE SAME MATERIAL OF THE BALE.
8. END BALES ARE TO EXTEND UPSLOPE SO THE TRAPPED RUNOFF CANNOT FLOW AROUND THE ENDS OF THE BARRIER.

**MAINTENANCE REQUIREMENTS**

1. CONTRACTOR SHALL INSPECT STRAW BALE BARRIERS IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS NO RAINFALL.
2. DAMAGED OR INEFFECTIVE BARRIERS SHALL PROMPTLY BE REPAIRED, REPLACING BALES IF NECESSARY, AND UNENTRENCHED BALES NEED TO BE REPAIRED WITH COMPACTED BACKFILL MATERIAL.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND STRAW BALE BARRIERS WHEN IT ACCUMULATES TO APPROXIMATELY 1/2 THE HEIGHT OF THE BARRIER.
4. STRAW BALE BARRIERS SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED

**HAY BALE SPACING REQUIREMENTS**

SLOPE	SPACING
0.5%	300'
1.0%	150'
2.0%	75'
3.0%	50'



SILT FENCE DETAIL  
N.T.S.

**INSTALLATION REQUIREMENTS:**

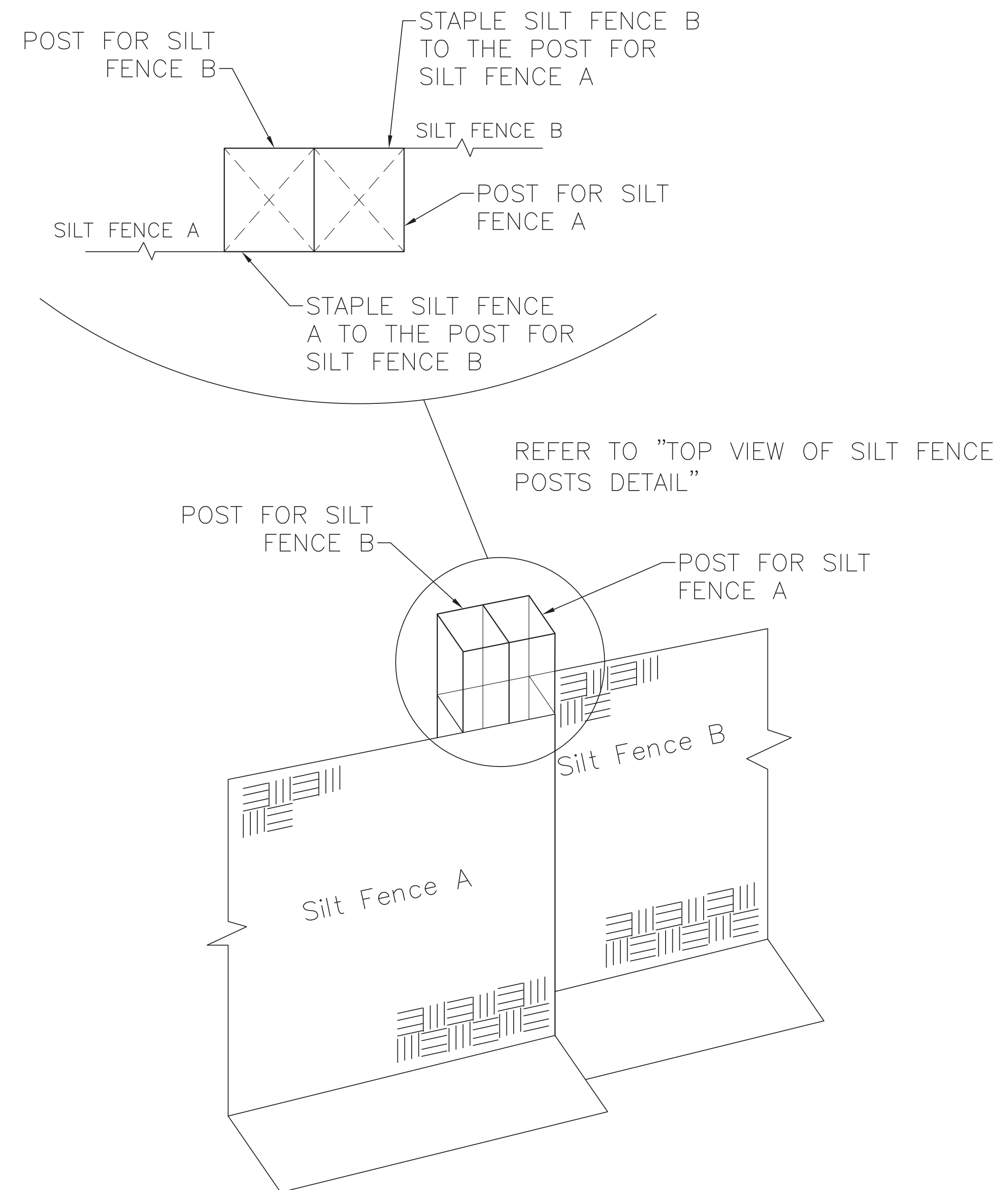
- SILT FENCES SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
- WHEN JOINTS ARE NECESSARY, SILT FENCE GEOTEXTILE SHALL BE SPLICED TOGETHER ONLY AT SUPPORT POST AND SECURELY SEALED.
- METAL POSTS SHALL BE "STUDDED TEE" OR "U" TYPE WITH MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT. WOOD POSTS SHALL HAVE A MINIMUM DIAMETER OR CROSS SECTION DIMENSION OF 2 INCHES.
- THE FILTER MATERIAL SHALL BE FASTENED SECURELY TO METAL POSTS USING WIRE TIES, OR TO WOOD POSTS WITH 3/4" LONG #9 HEAVY-DUTY WIRE STAPLES AT LEAST 3/4" LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 6 INCHES AND SHALL NOT EXTEND MORE THAN 3 FEET ABOVE THE ORIGINAL GROUND SURFACE.

- ALONG THE TOE OF FILLS, INSTALL THE SILT FENCE ALONG A LEVEL CONTOUR AND PROVIDE AN AREA BEHIND THE FENCE FOR RUNOFF TO POND AND SEDIMENT TO SETTLE. A MINIMUM DISTANCE OF 5 FEET FROM THE TOE OF THE FILL IS RECOMMENDED.
- THE HEIGHT OF THE SILT FENCE FROM THE GROUND SURFACE SHALL BE MINIMUM OF 24 INCHES AND SHALL NOT EXCEED 36 INCHES. HIGHER FENCES MAY IMPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE.

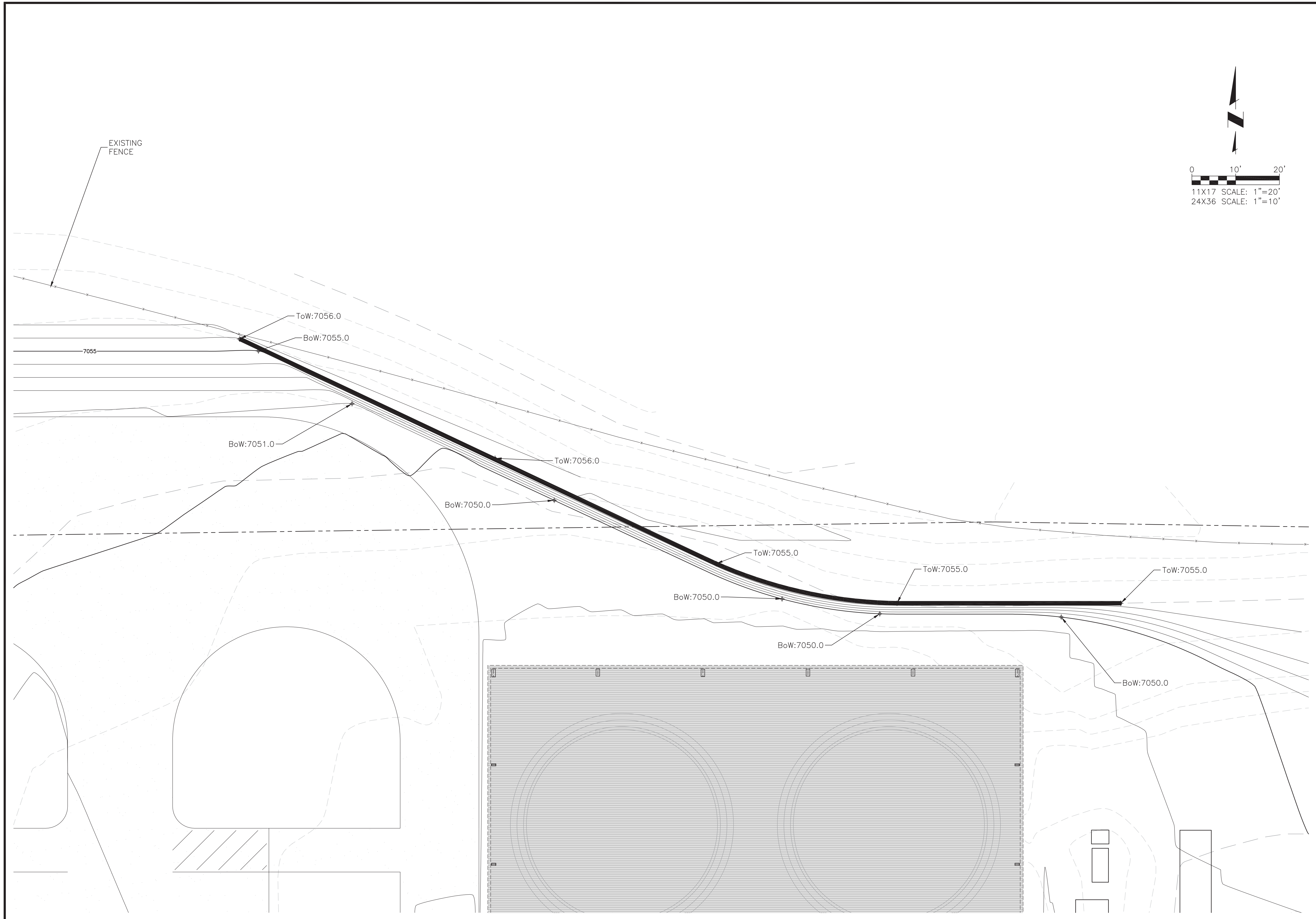
**MAINTENANCE REQUIREMENTS:**

- CONTRACTOR SHALL INSPECT SILT FENCES IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL. DAMAGED, COLLAPSED, UNENTRENCHED OR INEFFECTIVE SILT FENCES SHALL BE PROMPTLY REPAIRED OR REPLACED.
- SEDIMENT SHALL BE REMOVED FROM BEHIND SILT FENCE WHEN IT ACCUMULATES TO HALF THE EXPOSED GEOTEXTILE HEIGHT.
- SILT FENCES SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED.

TOP VIEW OF SILT FENCE POSTS DETAIL



Project No.:	112.88
Scale:	AS NOTED
Date:	07/07/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	



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**WOODMEN HILLS METROPOLITAN DISTRICT  
 REGIONAL WATER RECLAMATION FACILITY  
 RETAINING WALL ELEVATIONS**  
 PCD FILE NO: PPR-17-027

Project No.:	112.88
Scale:	AS NOTED
Date:	07/07/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	



## 1.0 RETAINING WALL BLOCK:

### 1.1 MODULAR WALL UNITS

- WALL UNITS SHALL BE ALLAN BLOCK RETAINING WALL UNITS AS PRODUCED BY A LICENSED MANUFACTURER.
- WALL UNITS SHALL HAVE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI (20.7 MPA) IN ACCORDANCE WITH ASTM C1372. THE CONCRETE UNITS SHALL HAVE ADEQUATE FREEZE-THAW PROTECTION WITH AN AVERAGE ABSORPTION RATE IN ACCORDANCE WITH ASTM C1372 OR AN AVERAGE ABSORPTION RATE OF 7.5 LB/FT<sup>3</sup> (120 KG/M<sup>3</sup>) FOR NORTHERN CLIMATES AND 10 LB/FT<sup>3</sup> (160 KG/M<sup>3</sup>) FOR SOUTHERN CLIMATES.
- EXTERIOR DIMENSIONS SHALL BE UNIFORM AND CONSISTENT. MAXIMUM DIMENSIONAL DEVIATIONS ON THE HEIGHT OF ANY TWO UNITS SHALL BE 0.125 IN.
- WALL UNITS SHALL PROVIDE A MINIMUM OF 110 LBS TOTAL WEIGHT PER SQUARE FOOT OF WALL FACE AREA (555 KG/M<sup>2</sup>). FILL CONTAINED WITHIN THE UNITS MAY BE CONSIDERED 80% EFFECTIVE WEIGHT.
- EXTERIOR FACE SHALL BE TEXTURED. COLOR AS SPECIFIED BY OWNER.

### 1.2 WALL ROCK

- MATERIAL MUST BE WELL-GRADED COMPACTABLE AGGREGATE, 0.25 IN. TO 1.5 IN., WITH NO MORE THAN 10% PASSING THE #200 SIEVE.(ASTM D422)
- MATERIAL BEHIND AND WITHIN THE BLOCKS MAY BE THE SAME MATERIAL.

### 1.3 INFILL SOIL

- INFILL MATERIAL SHALL BE SITE EXCAVATED SOILS WHEN APPROVED BY THE ON-SITE SOILS ENGINEER UNLESS OTHERWISE SPECIFIED IN THE DRAWINGS. UNSUITABLE SOILS FOR BACKFILL (HEAVY CLAYS OR ORGANIC SOILS) SHALL NOT BE USED IN THE REINFORCED SOIL MASS. FINE GRAINED COHESIVE SOILS (F<31) MAYBE USED IN WALL CONSTRUCTION, BUT ADDITIONAL BACKFILLING, COMPACTION AND WATER MANAGEMENT EFFORTS ARE REQUIRED. POORLY GRADED SANDS, EXPANSIVE CLAYS AND/OR SOILS WITH A PLASTICITY INDEX (PI) >20 OR A LIQUID LIMIT (LL) >40 SHOULD NOT BE USED IN WALL CONSTRUCTION.
- THE INFILL SOIL USED MUST MEET OR EXCEED THE DESIGNED FRICTION ANGLE AND DESCRIPTION NOTED ON THE DESIGN CROSS SECTIONS, AND MUST BE FREE OF DEBRIS AND CONSIST OF ONE OF THE FOLLOWING INORGANIC USCS SOIL TYPES: GP, GW, SW, SP MEETING THE FOLLOWING GRADATION AS DETERMINED IN ACCORDANCE WITH ASTM D422.

SIEVE SIZE	PERCENT PASSING
4 INCH (100 MM)	100 - 75
#4 (4.75 MM)	100 - 20
#40 (0.425 MM)	0 - 60
#200 (0.075 MM)	0 - 35
- WHERE ADDITIONAL FILL IS REQUIRED, CONTRACTOR SHALL SUBMIT SAMPLE AND SPECIFICATIONS TO THE WALL DESIGN ENGINEER OR THE ONSITE SOILS ENGINEER FOR APPROVAL AND THE APPROVING ENGINEER MUST CERTIFY THAT THE SOILS PROPOSED FOR USE HAS PROPERTIES MEETING OR EXCEEDING ORIGINAL DESIGN STANDARDS.

## 2.0 WALL CONSTRUCTION:

### 2.1 EXCAVATION

- CONTRACTOR SHALL EXCAVATE TO THE LINES AND GRADES SHOWN ON THE CONSTRUCTION DRAWINGS. CONTRACTOR SHALL USE CAUTION NOT TO OVER-EXCAVATE BEYOND THE LINES SHOWN, OR TO DISTURB THE BASE ELEVATIONS BEYOND THOSE SHOWN.
- CONTRACTOR SHALL VERIFY LOCATIONS OF EXISTING STRUCTURES AND UTILITIES PRIOR TO EXCAVATION. CONTRACTOR SHALL ENSURE ALL SURROUNDING STRUCTURES ARE PROTECTED FROM THE EFFECTS OF WALL EXCAVATION.

### 2.2 FOUNDATION SOIL PREPARATION

- FOUNDATION SOIL SHALL BE DEFINED AS ANY SOILS LOCATED BENEATH A WALL.
- FOUNDATION SOIL SHALL BE EXCAVATED AS DIMENSIONED ON THE PLANS AND COMPACTED TO A MINIMUM OF 95% OF STANDARD PROCTOR (ASTM D698) PRIOR TO PLACEMENT OF THE BASE MATERIAL.
- FOUNDATION SOIL SHALL BE EXAMINED BY THE ON-SITE SOILS ENGINEER TO ENSURE THAT THE ACTUAL FOUNDATION SOIL STRENGTH MEETS OR EXCEEDS ASSUMED DESIGN STRENGTH. SOIL NOT MEETING THE REQUIRED STRENGTH SHALL BE REMOVED AND REPLACED WITH ACCEPTABLE MATERIAL.

### 2.3 BASE

- THE BASE MATERIAL SHALL BE THE SAME AS THE WALL ROCK MATERIAL (SECTION 1.2) OR A LOW PERMEABLE GRANULAR MATERIAL.
- BASE MATERIAL SHALL BE PLACED AS SHOWN ON THE CONSTRUCTION DRAWING. TOP OF BASE SHALL BE LOCATED TO ALLOW BOTTOM WALL UNITS TO BE BURIED TO PROPER DEPTHS AS PER WALL HEIGHTS AND SPECIFICATIONS.
- BASE MATERIAL SHALL BE INSTALLED ON UNDISTURBED NATIVE SOILS OR SUITABLE REPLACEMENT FILLS COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR (ASTM D698).
- BASE SHALL BE COMPACTED AT 95% STANDARD PROCTOR (ASTM D698) TO PROVIDE A LEVEL HARD SURFACE ON WHICH TO PLACE THE FIRST COURSE OF BLOCKS. THE BASE SHALL BE CONSTRUCTED TO ENSURE PROPER WALL EMBEDMENT AND THE FINAL ELEVATION SHOWN ON THE PLANS. WELL-GRADED SAND CAN BE USED TO SMOOTH THE TOP 1/2 IN. ON THE BASE MATERIAL.
- BASE MATERIAL SHALL BE A 4 IN. MINIMUM DEPTH FOR WALLS UNDER 4 FT AND A 6 IN. MINIMUM DEPTH FOR WALLS OVER 4FT.

### 2.4 UNIT INSTALLATION

- THE FIRST COURSE OF WALL UNITS SHALL BE PLACED ON THE PREPARED BASE WITH THE RAISED LIP FACING UP AND OUT AND THE FRONT EDGES TIGHT TOGETHER. THE UNITS SHALL BE CHECKED FOR LEVEL AND ALIGNMENT AS THEY ARE PLACED.
- ENSURE THAT UNITS ARE IN FULL CONTACT WITH BASE. PROPER CARE SHALL BE TAKEN TO DEVELOP STRAIGHT LINES AND SMOOTH CURVES ON BASE COURSE AS PER WALL LAYOUT.
- FILL ALL CORES AND CAVITIES A MINIMUM OF 12 IN. BEHIND THE BASE COURSE WITH WALL ROCK. USE INFILL SOILS BEHIND THE WALL ROCK AND APPROVED SOILS IN FRONT OF THE BASE COURSE TO FIRMLY LOCK IN PLACE. CHECK AGAIN FOR LEVEL AND ALIGNMENT. USE A PLATE COMPACTOR TO CONSOLIDATE THE AREA BEHIND THE BASE COURSE. ALL EXCESS MATERIAL SHALL BE SWEEP FROM TOP OF UNITS.
- INSTALL NEXT COURSE OF WALL UNITS ON TOP OF BASE COURSE. POSITION BLOCKS TO BE OFFSET FROM SEAMS OF BLOCKS BELOW. PERFECT RUNNING BOND IS NOT ESSENTIAL, BUT A 3 IN. MINIMUM OFFSET IS RECOMMENDED. CHECK EACH BLOCK FOR PROPER ALIGNMENT AND LEVEL. FILL ALL CAVITIES IN AND AROUND WALL UNITS TO A MINIMUM OF 12 IN. DEPTH BEHIND BLOCK WITH WALL ROCK. FOR TALLER WALL APPLICATION THE DEPTH OF WALL ROCK BEHIND THE BLOCK SHOULD BE INCREASED; WALLS FROM 15 FT TO 25 FT SHOULD HAVE A MINIMUM OF 2 FT AND WALLS ABOVE 25FT THE CONSOLIDATION ZONE SHALL BE DEFINED AS 3 FT BEHIND THE WALL. COMPACTION WITHIN THE CONSOLIDATION ZONE SHALL BE ACCOMPLISHED BY USING A HAND OPERATED PLATE COMPACTOR AND SHALL BEGIN BY RUNNING THE PLATE COMPACTOR DIRECTLY ON THE BLOCK AND THEN COMPACTION IN PARALLEL PATHS FROM THE WALL FACE UNTIL THE ENTIRE CONSOLIDATION ZONE HAS BEEN COMPACTED. A MINIMUM OF TWO PASSES OF THE PLATE

COMPACTOR ARE REQUIRED WITH MAXIMUM LIFTS OF 8 IN. EXPANSIVE OR FINE-GRAINED SOILS MAY REQUIRE ADDITIONAL COMPACTION PASSES AND/OR SPECIFIC COMPACTION EQUIPMENT SUCH AS A SHEEPS FOOT ROLLER. MAXIMUM LIFTS OF 4 INCHES MAY BE REQUIRED TO ACHIEVE ADEQUATE COMPACTION WITHIN THE CONSOLIDATION ZONE. EMPLOY METHODS USING LIGHTWEIGHT COMPACTION EQUIPMENT THAT WILL NOT DISRUPT THE STABILITY OR BATTER OF THE WALL. FINAL COMPACTION REQUIREMENTS IN THE CONSOLIDATION ZONE SHALL BE ESTABLISHED BY THE ENGINEER OF RECORD.

- AS WITH ANY CONSTRUCTION WORK, SOME DEVIATION FROM CONSTRUCTION DRAWING ALIGNMENTS WILL OCCUR. VARIABILITY IN CONSTRUCTION OF SRWS IS APPROXIMATELY EQUAL TO THAT OF CAST-IN-PLACE CONCRETE RETAINING WALLS. AS OPPOSED TO CAST-IN-PLACE CONCRETE WALLS, ALIGNMENT OF SRWS CAN BE SIMPLY CORRECTED OR MODIFIED DURING CONSTRUCTION. BASED UPON EXAMINATION OF NUMEROUS COMPLETED SRWS, THE FOLLOWING RECOMMENDED MINIMUM TOLERANCES CAN BE ACHIEVED WITH GOOD CONSTRUCTION TECHNIQUES:
  - VERTICAL CONTROL: +/-1.25 IN. MAX. OVER 10 FT DISTANCE
  - HORIZONTAL LOCATION CONTROL: +/-1.25 IN. OVER A 10 FT DISTANCE
  - ROTATION: FROM ESTABLISHED PLAN WALL BATTER: 2.0 DEG.
  - BULGING: 1.0 IN. OVER A 10 FT DISTANCE

## 3.0 GEOGRID REINFORCEMENT SYSTEM:

### 3.1 DEFINITIONS

- GEOGRID PRODUCTS SHALL BE OF HIGH DENSITY POLYETHYLENE OR POLYESTER YARNS ENCAPSULATED IN A PROTECTIVE COATING SPECIFICALLY FABRICATED FOR USE AS A SOIL REINFORCEMENT MATERIAL.
- CONCRETE RETAINING WALL UNITS ARE AS DETAILED ON THE DRAWINGS AND SHALL BE ALLAN BLOCK RETAINING WALL UNITS.
- DRAINAGE MATERIAL IS FREE DRAINING GRANULAR MATERIAL AS DEFINED IN SECTION 1.2 WALL ROCK.
- INFILL SOIL IS THE SOIL USED AS FILL FOR THE REINFORCED SOIL MASS.
- FOUNDATION SOIL IS THE IN-SITU SOIL.

### 3.2 PRODUCTS

- GEOGRID SHALL BE THE TYPE AS SHOWN ON THE DRAWINGS HAVING THE PROPERTY REQUIREMENTS AS DESCRIBED WITHIN THE MANUFACTURER'S SPECIFICATIONS.

### 3.3 ACCEPTABLE MANUFACTURERS

- A MANUFACTURER'S PRODUCT SHALL BE APPROVED BY THE WALL DESIGN ENGINEER.

## 4.0 WALL CONSTRUCTION

### 4.1 FOUNDATION SOIL PREPARATION

- FOUNDATION SOIL SHALL BE EXCAVATED TO THE LINES AND GRADES AS SHOWN ON THE CONSTRUCTION DRAWINGS, OR AS DIRECTED BY THE ON-SITE SOILS ENGINEER.
  - FOUNDATION SOIL SHALL BE EXAMINED BY THE ON-SITE SOILS ENGINEER TO ASSURE THAT THE ACTUAL FOUNDATION SOIL STRENGTH MEETS OR EXCEEDS ASSUMED DESIGN STRENGTH.
  - OVER-EXCAVATED AREAS SHALL BE FILLED WITH COMPACTED BACKFILL MATERIAL APPROVED BY ON-SITE SOILS ENGINEER.
  - CONTRACTOR SHALL VERIFY LOCATIONS OF EXISTING STRUCTURES AND UTILITIES PRIOR TO EXCAVATION. CONTRACTOR SHALL ENSURE ALL SURROUNDING STRUCTURES ARE PROTECTED FROM THE EFFECTS OF WALL EXCAVATION.
- ### 4.2 GEOGRID INSTALLATION
- INSTALL ALLAN BLOCK WALL TO DESIGNATED HEIGHT OF FIRST GEOGRID LAYER. BACKFILL AND COMPACT THE WALL ROCK AND INFILL SOIL IN LAYERS NOT TO EXCEED 8IN. LIFTS BEHIND WALL TO DEPTH EQUAL TO DESIGNED GRID LENGTH BEFORE GRID IS INSTALLED.
  - CUT GEOGRID TO DESIGNED EMBEDMENT LENGTH AND PLACE ON TOP OF ALLAN BLOCK TO BACK EDGE OF LIP. EXTEND AWAY FROM WALL APPROXIMATELY 3% ABOVE HORIZONTAL ON COMPACTED INFILL SOILS.
  - LAY GEOGRID AT THE PROPER ELEVATION AND ORIENTATIONS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS DIRECTED BY THE WALL DESIGN ENGINEER. CORRECT ORIENTATION OF THE GEOGRID SHALL BE VERIFIED BY THE CONTRACTOR AND ON-SITE SOILS ENGINEER. STRENGTH DIRECTION IS TYPICALLY PERPENDICULAR TO WALL FACE.
  - FOLLOW MANUFACTURER'S GUIDELINES FOR OVERLAP REQUIREMENTS.
  - PLACE NEXT COURSE OF ALLAN BLOCK ON TOP OF GRID AND FILL BLOCK CORES WITH WALL ROCK TO LOCK IN PLACE. REMOVE SLACK AND FOLDS IN GRID AND STAKE TO HOLD IN PLACE.
  - ADJACENT SHEETS OF GEOGRID SHALL BE BUTTED AGAINST EACH OTHER AT THE WALL FACE TO ACHIEVE 100 PERCENT COVERAGE.
  - GEOGRID LENGTHS SHALL BE CONTINUOUS. SPlicing PARALLEL TO THE WALL FACE IS NOT ALLOWED.

### 4.3 FILL PLACEMENT

- INFILL SOIL SHALL BE PLACED IN LIFTS AND COMPACTED.
- INFILL SOIL SHALL BE PLACED, SPREAD AND COMPACTED IN SUCH A MANNER THAT MINIMIZES THE DEVELOPMENT OF SLACK OR MOVEMENT OF THE GEOGRID.
- ONLY HAND-OPERATED COMPACTION EQUIPMENT SHALL BE ALLOWED WITHIN 3 FT BEHIND THE WALL. THIS AREA SHALL BE DEFINED AS THE CONSOLIDATION ZONE. COMPACTION IN THIS ZONE SHALL BEGIN BY RUNNING THE PLATE COMPACTOR DIRECTLY ON THE BLOCK AND THEN COMPACTION IN PARALLEL PATHS TO THE WALL FACE UNTIL THE ENTIRE CONSOLIDATION ZONE HAS BEEN COMPACTED. A MINIMUM OF TWO PASSES OF THE PLATE COMPACTOR ARE REQUIRED WITH MAXIMUM LIFTS OF 8 IN.
- WHEN FILL IS PLACED AND COMPACTION CANNOT BE DEFINED IN TERMS OF STANDARD PROCTOR DENSITY, THEN COMPACTION SHALL BE PERFORMED USING ORDINARY COMPACTION PROCESS AND COMPACTED SO THAT NO DEFORMATION IS OBSERVED FROM THE COMPACTION EQUIPMENT OR TO THE SATISFACTION OF THE ENGINEER OF RECORD OR THE SITE SOILS ENGINEER. TRACKED CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY ON THE GEOGRID. A MINIMUM FILL THICKNESS OF 6 IN. IS REQUIRED PRIOR TO OPERATION OF TRACKED VEHICLES OVER THE GEOGRID. TURNING OF TRACKED VEHICLES SHOULD BE KEPT TO A MINIMUM TO PREVENT TRACKS FROM DISPLACING THE FILL AND DAMAGING THE GEOGRID.
- RUBBER-TIRED EQUIPMENT MAY PASS OVER THE GEOGRID REINFORCEMENT AT SLOW SPEEDS, LESS THAN 10 MPH. SUDDEN BRAKING AND SHARP TURNING SHALL BE AVOIDED.
- THE INFILL SOIL SHALL BE COMPACTED TO ACHIEVE 95% STANDARD PROCTOR (ASTM D698). COMPACTION TESTS SHALL BE TAKEN AT 3 FT BEHIND THE BLOCK AND AT THE BACK OF THE REINFORCED ZONE. THE FREQUENCY SHALL BE AS DETERMINED BY THE ON-SITE SOILS ENGINEER OR AS SPECIFIED ON THE PLAN. SOIL TESTS OF THE INFILL SOIL SHALL BE SUBMITTED TO THE ON-SITE SOILS ENGINEER FOR REVIEW AND APPROVAL PRIOR TO THE PLACEMENT OF ANY MATERIAL. THE CONTRACTOR IS RESPONSIBLE FOR ACHIEVING THE SPECIFIED COMPACTION REQUIREMENTS. THE ON-SITE SOILS ENGINEER MAY DIRECT THE CONTRACTOR TO REMOVE, CORRECT OR AMEND ANY SOIL FOUND NOT IN COMPLIANCE WITH THESE WRITTEN SPECIFICATIONS.

### 4.4 SPECIAL CONSIDERATIONS

- GEOGRID CAN BE INTERRUPTED BY PERIODIC PENETRATION OF A COLUMN,

PIER OR FOOTING STRUCTURE.

- ALLAN BLOCK WALLS WILL ACCEPT VERTICAL AND HORIZONTAL REINFORCING WITH REBAR AND GROUT.
- IF SITE CONDITIONS WILL NOT ALLOW GEOGRID EMBEDMENT LENGTH, CONSIDER THE FOLLOWING ALTERNATIVES:
  - MASONRY REINFORCED WALLS
  - SOIL NAILING
  - INCREASED WALL BATTER
  - EARTH ANCHORS
  - DOUBLE ALLAN BLOCK WALL
  - ROCK BOLTS
  - NO-FINES CONCRETE

## 5.0 WALL DRAINAGE

### 5.1 SURFACE DRAINAGE

- RAINFALL OR OTHER WATER SOURCES SUCH AS IRRIGATION ACTIVITIES COLLECTED BY THE GROUND SURFACE ATOP THE RETAINING WALL CAN BE DEFINED AS SURFACE WATER. RETAINING WALL DESIGN SHALL TAKE INTO CONSIDERATION THE MANAGEMENT OF THIS WATER.
- AT THE END OF EACH DAY'S CONSTRUCTION AND AT FINAL COMPLETION, GRADE THE BACKFILL TO AVOID WATER ACCUMULATION BEHIND THE WALL OR IN THE REINFORCED ZONE.
  - SURFACE WATER MUST NOT BE ALLOWED TO POND OR BE TRAPPED IN THE AREA ABOVE THE WALL OR AT THE TOE OF THE WALL.
  - EXISTING SLOPES ADJACENT TO RETAINING WALL OR SLOPES CREATED DURING THE GRADING PROCESS SHALL INCLUDE DRAINAGE DETAILS SO THAT SURFACE WATER WILL NOT BE ALLOWED TO DRAIN OVER THE TOP OF THE SLOPE FACE AND/OR WALL. THIS MAY REQUIRE A COMBINATION OF BERMS AND SURFACE DRAINAGE DITCHES.
  - IRRIGATION ACTIVITIES AT THE SITE SHALL BE DONE IN A CONTROLLED AND REASONABLE MANNER. IF AN IRRIGATION SYSTEM IS EMPLOYED, THE DESIGN ENGINEER OR IRRIGATION MANUFACTURE SHALL PROVIDE DETAILS AND SPECIFICATION FOR REQUIRED EQUIPMENT TO ENSURE AGAINST OVER IRRIGATION WHICH COULD DAMAGE THE STRUCTURAL INTEGRITY OF THE RETAINING WALL SYSTEM.
  - SURFACE WATER THAT CANNOT BE DIVERTED FROM THE WALL MUST BE COLLECTED WITH SURFACE DRAINAGE SWALES AND DRAINED LATERALLY IN ORDER TO DISPERSE THE WATER AROUND THE WALL STRUCTURE.

### 5.2 GRADING

- THE SHAPING AND RECONTOURING OF LAND IN ORDER TO PREPARE IT FOR SITE DEVELOPMENT IS GRADING. SITE GRADING SHALL BE DESIGNED TO ROUTE WATER AROUND THE WALLS.
- ESTABLISH FINAL GRADE WITH A POSITIVE GRADIENT AWAY FROM THE WALL STRUCTURE. CONCENTRATIONS OF SURFACE WATER RUNOFF SHALL BE MANAGED BY PROVIDING NECESSARY STRUCTURES, SUCH AS PAVED DITCHES, DRAINAGE SWALES, CATCH BASINS, ETC.
  - GRADING DESIGNS MUST DIVERT SOURCES OF CONCENTRATED SURFACE FLOW, SUCH AS PARKING LOTS, AWAY FROM THE WALL.

### 5.3 DRAINAGE SYSTEM

- THE INTERNAL DRAINAGE SYSTEMS OF THE RETAINING WALL CAN BE DESCRIBED AS THE MEANS OF ELIMINATING THE BUILDUP OF INCIDENTAL WATER WHICH INFILTRATES THE SOILS BEHIND THE WALL. DRAINAGE SYSTEM DESIGN WILL BE A FUNCTION OF THE WATER CONDITIONS ON THE SITE. POSSIBLE DRAINAGE FACILITIES INCLUDE TOE AND HEEL DRAINAGE COLLECTION PIPES AND BLANKET OR CHIMNEY ROCK DRAINS OR OTHERS. DESIGN ENGINEER SHALL DETERMINE THE REQUIRED DRAINAGE FACILITIES TO COMPLETELY DRAIN THE RETAINING WALL STRUCTURE FOR EACH PARTICULAR SITE CONDITION.
- ALL WALLS WILL BE CONSTRUCTED WITH A MINIMUM OF 12 IN. OF WALL ROCK DIRECTLY BEHIND THE WALL FACING.
  - THE DRAINAGE COLLECTION PIPE (DRAIN PIPE) SHALL BE A 4 IN. PERFORATED OR SLOTTED PVC, OR CORRUGATED HDPE PIPE AS APPROVED BY ENGINEER OF RECORD.
  - ALL WALLS WILL BE CONSTRUCTED WITH A 4 IN. DIAMETER DRAIN PIPE PLACED AT THE LOWEST POSSIBLE ELEVATION WITHIN THE 12 IN. OF WALL ROCK. THIS DRAIN PIPE IS REFERRED TO AS A TOE DRAIN.
  - GEOGRID REINFORCED WALLS SHALL BE CONSTRUCTED WITH AN ADDITIONAL 4 IN. DRAIN PIPE AT THE BACK BOTTOM OF THE REINFORCED SOIL MASS. THIS DRAIN PIPE IS REFERRED TO AS A HEEL DRAIN.

### 5.4 TOE DRAIN

- TOE DRAIN PIPE SHOULD BE LOCATED AT THE BACK OF THE WALL ROCK BEHIND THE WALL AS CLOSE TO THE BOTTOM OF THE WALL AS ALLOWED WHILE STILL MAINTAINING A POSITIVE GRADIENT FOR DRAINAGE TO DAYLIGHT, OR A STORM WATER MANAGEMENT SYSTEM. TOE DRAINS ARE INSTALLED FOR INCIDENTAL WATER MANAGEMENT NOT AS A PRIMARY DRAINAGE SYSTEM.
- FOR SITE CONFIGURATIONS WITH BOTTOMS OF THE BASE ON A LEVEL PLANE IT IS RECOMMENDED THAT A MINIMUM ONE PERCENT GRADIENT BE MAINTAINED ON THE PLACEMENT OF THE PIPE WITH OUTLETS ON 50 FT CENTERS, OR 100 FT CENTERS IF PIPE IS CROWNED BETWEEN THE OUTLETS. THIS WOULD PROVIDE FOR A MAXIMUM HEIGHT ABOVE THE BOTTOM OF THE BASE IN A FLAT CONFIGURATION OF NO MORE THAN 6 IN.
  - FOR RIGID DRAIN PIPES WITH DRAIN HOLES THE PIPES SHOULD BE POSITIONED WITH THE HOLES LOCATED DOWN. ALLAN BLOCK DOES NOT REQUIRE THAT TOE DRAIN PIPES BE WRAPPED WHEN INSTALLED INTO BASE ROCK COMPLYING WITH THE SPECIFIED WALL ROCK MATERIAL.
  - PIPES SHALL BE ROUTED TO STORM DRAINS WHERE APPROPRIATE OR THROUGH OR UNDER THE WALL AT LOW POINTS WHEN THE JOB SITE GRADING AND SITE LAYOUT ALLOWS FOR ROUTING. APPROPRIATE DETAILS SHALL BE INCLUDED TO PREVENT PIPES FROM BEING CRUSHED, PLUGGED, OR INFESTED WITH RODENTS.
  - ON SITES WHERE THE NATURAL DROP IN GRADE EXCEEDS THE ONE PERCENT MINIMUM, DRAIN PIPES OUTLETS SHALL BE ON 100 FOOT CENTERS MAXIMUM. THIS WILL PROVIDE OUTLETS IN THE EVENT THAT EXCESSIVE WATER FLOW EXCEEDS THE CAPACITY OF PIPE OVER LONG STRETCHES.

### 5.5 HEEL DRAIN

- THE PURPOSE OF THE HEEL DRAIN IS TO PICK UP ANY WATER THAT MIGRATES FROM BEHIND THE RETAINING WALL STRUCTURE AT THE CUT AND ROUTE THE WATER AWAY FROM THE REINFORCED MASS DURING THE CONSTRUCTION PROCESS AND FOR INCIDENTAL WATER FOR THE LIFE OF THE STRUCTURE.
- THE PIPING USED AT THE BACK OF THE REINFORCED MASS SHALL HAVE A ONE PERCENT MINIMUM GRADIENT OVER THE LENGTH, BUT IT IS NOT CRITICAL FOR IT TO BE POSITIONED AT THE VERY BOTTOM OF THE CUT. ADDITIONALLY THE ENTIRE LENGTH OF THE PIPE MAY BE VENTED AT ONE POINT AND SHOULD NOT BE TIED INTO THE TOE DRAIN.
  - THE PIPE MAY BE A RIGID PIPE WITH HOLES AT THE BOTTOM WITH AN INTEGRAL SOCK ENCASED THE PIPE OR A CORRUGATED PERFORATED FLEXIBLE PIPE WITH A SOCK TO FILTER OUT FINES WHEN REQUIRED BASED ON SOIL CONDITIONS. FOR INFILL SOILS WITH A HIGH PERCENTAGE OF SAND AND/OR GRAVEL THE HEEL DRAIN PIPE DOES NOT NEED TO BE SURROUNDED BY DRAINAGE ROCK. WHEN WORKING WITH SOILS CONTAINING MORE THAN FIFTY PERCENT CLAY, ONE CUBIC FOOT OF DRAINAGE ROCK IS REQUIRED FOR EACH FOOT OF PIPE.

### 5.6 GROUND WATER

GROUND WATER CAN BE DEFINED AS WATER THAT OCCURS WITHIN THE SOIL. IT MAY BE PRESENT BECAUSE OF SURFACE INFILTRATION OR WATER TABLE FLUCTUATION. GROUND WATER MOVEMENT MUST NOT BE ALLOWED TO COME

IN CONTACT WITH THE RETAINING WALL IF WATER IS ENCOUNTERED IN THE AREA OF THE WALL DURING EXCAVATION OR CONSTRUCTION.

- STANDARD RETAINING WALL DESIGNS DO NOT INCLUDE HYDROSTATIC FORCES ASSOCIATED WITH THE PRESENCE OF GROUND WATER. IF ADEQUATE DRAINAGE IS NOT PROVIDED THE RETAINING WALL DESIGN MUST CONSIDER THE PRESENCE OF THE WATER.
  - WHEN NON-FREE DRAINING SOILS ARE USED IN THE RETAINED ZONE, THE INCORPORATION OF A CHIMNEY AND BLANKET DRAIN SHOULD BE ADDED TO MINIMIZE THE WATER PENETRATION INTO THE REINFORCED MASS.
- ### 5.7 CONCENTRATED WATER SOURCES
- ALL COLLECTION DEVICES SUCH AS ROOF DOWNSPOUTS, STORM SEWERS, AND CURB GUTTERS ARE CONCENTRATED WATER SOURCES. THEY MUST BE DESIGNED TO ACCOMMODATE MAXIMUM FLOW RATES AND TO VENT OUTSIDE OF THE WALL AREA.
- ALL ROOF DOWNSPOUTS OF NEARBY STRUCTURES SHALL BE SIZED WITH ADEQUATE CAPACITY TO CARRY STORM WATER FROM THE ROOF AWAY FROM THE WALL AREA. THEY SHALL BE CONNECTED TO A DRAINAGE SYSTEM IN CLOSED PIPE AND ROUTED AROUND THE RETAINING WALL AREA.
  - SITE LAYOUT MUST TAKE INTO ACCOUNT LOCATIONS OF RETAINING WALL STRUCTURES AND ALL SITE DRAINAGE PATHS. DRAINAGE PATHS SHOULD ALWAYS BE AWAY FROM RETAINING WALL STRUCTURES.
  - STORM SEWERS AND CATCH BASINS SHALL BE LOCATED AWAY FROM RETAINING WALL STRUCTURES AND DESIGNED SO AS NOT TO INTRODUCE ANY INCIDENTAL WATER INTO THE REINFORCED SOIL MASS.
  - A PATH TO ROUTE STORM SEWER OVERFLOW MUST BE INCORPORATED INTO THE SITE LAYOUT TO DIRECT WATER AWAY FROM THE RETAINING WALL STRUCTURE.



CONSULTANTS, INC.

545 EAST PIKES PEAK AVENUE, SUITE 300  
COLORADO SPRINGS, COLORADO 80903  
PH: (719) 227-0072 - FAX: (719) 471-3401

WOODMEN HILLS METROPOLITAN DISTRICT  
REGIONAL WATER RECLAMATION FACILITY  
RETAINING WALL NOTES

PCD FILE NO: PPR-17-027

Project No.: 112.88

Scale: AS NOTED

Date: 07/07/17

Design: RMM

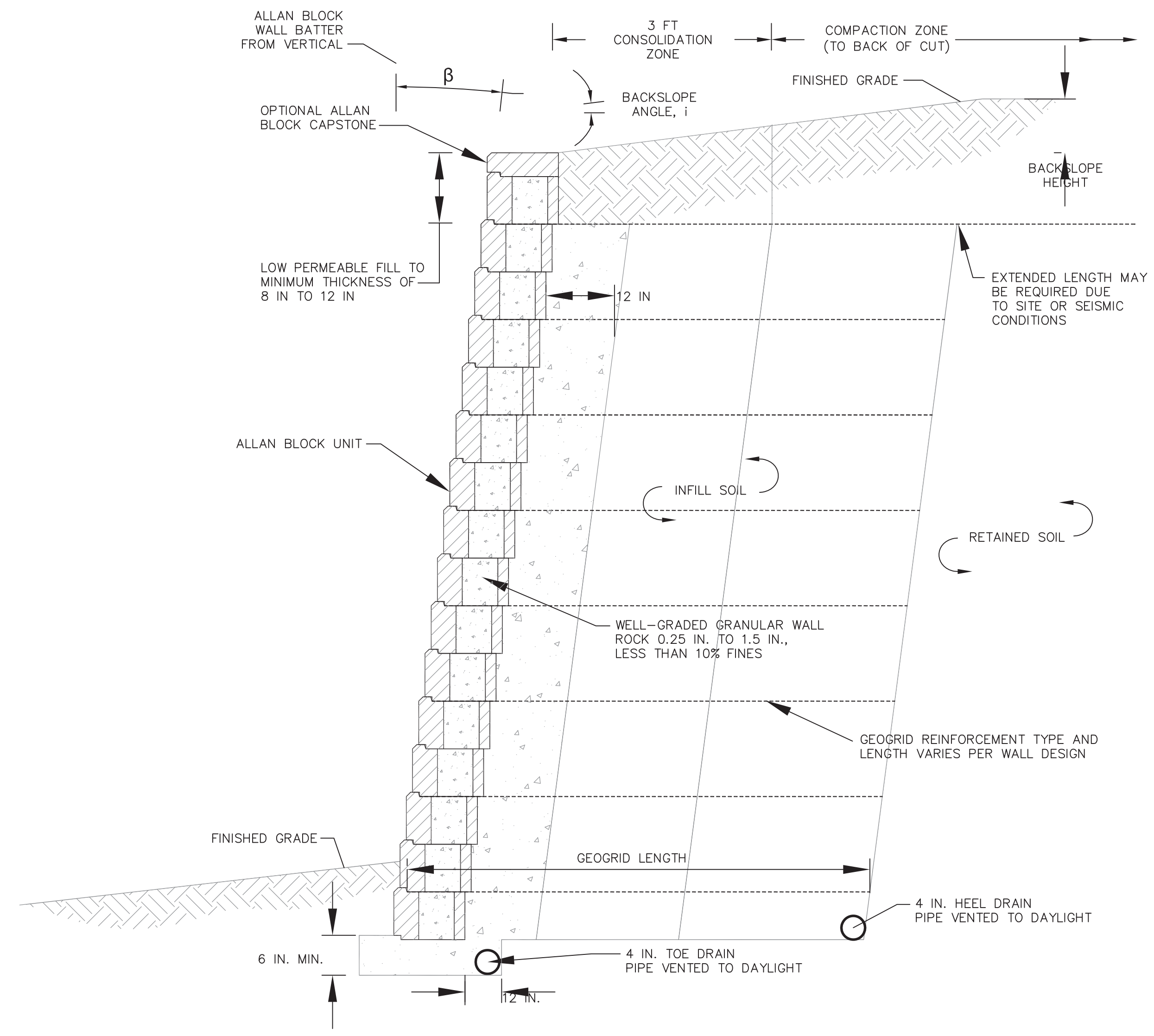
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Check: JPM

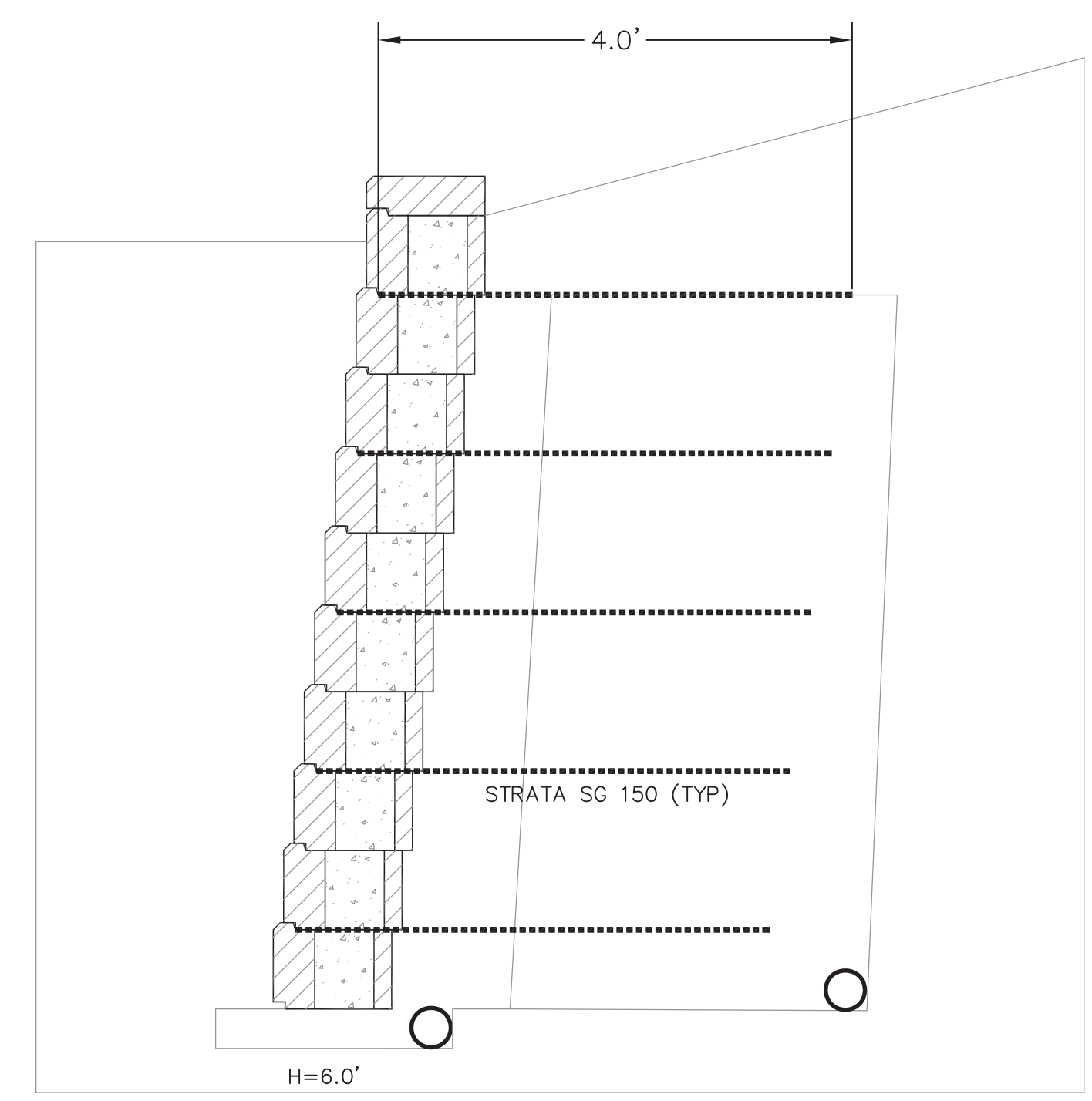
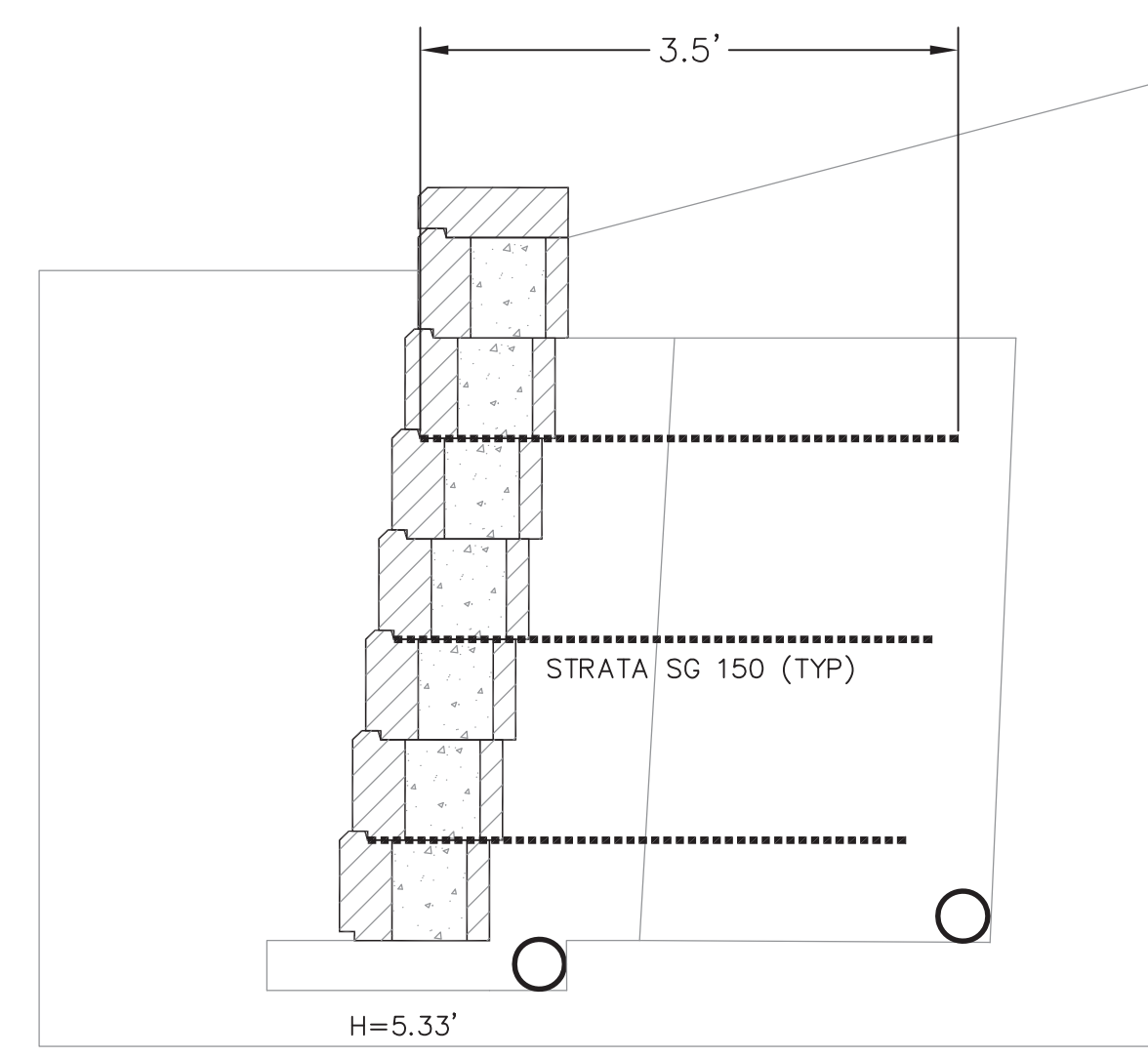
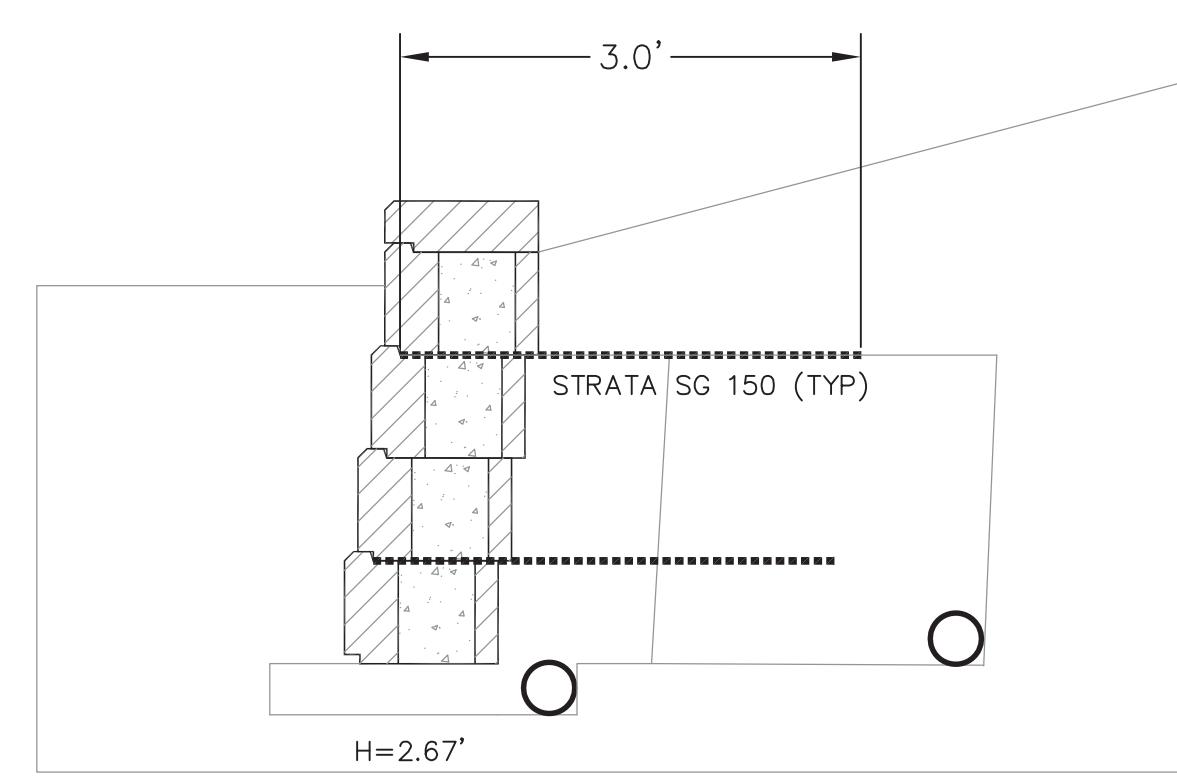
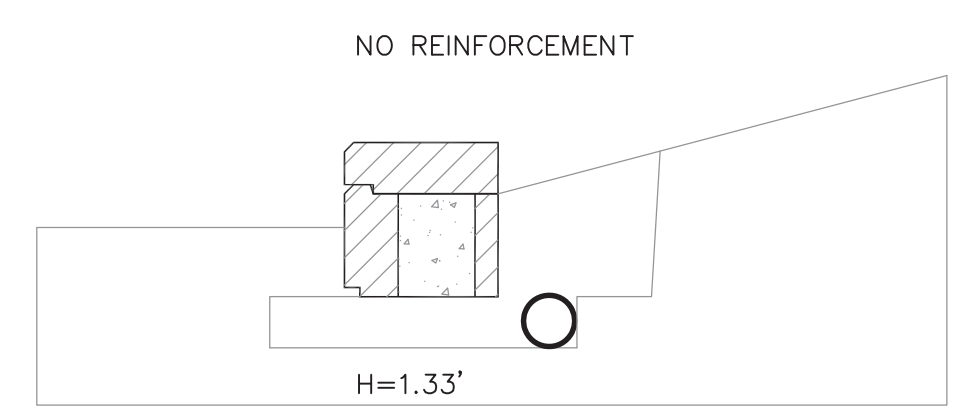
Revised:

EC8

of 11



Since the retaining wall is greater than 4 ft, add a note that a building permit is required.



**WOODMEN HILLS METROPOLITAN DISTRICT  
 REGIONAL WATER RECLAMATION FACILITY  
 RETAINING WALL DETAILS**  
 PCD FILE NO: PPR-17-027

Project No.:	112.88
Scale:	AS NOTED
Date:	07/07/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	



R1-2 YIELD  
36"x36"

1



R3-2  
NO LEFT TURN  
30"x30"

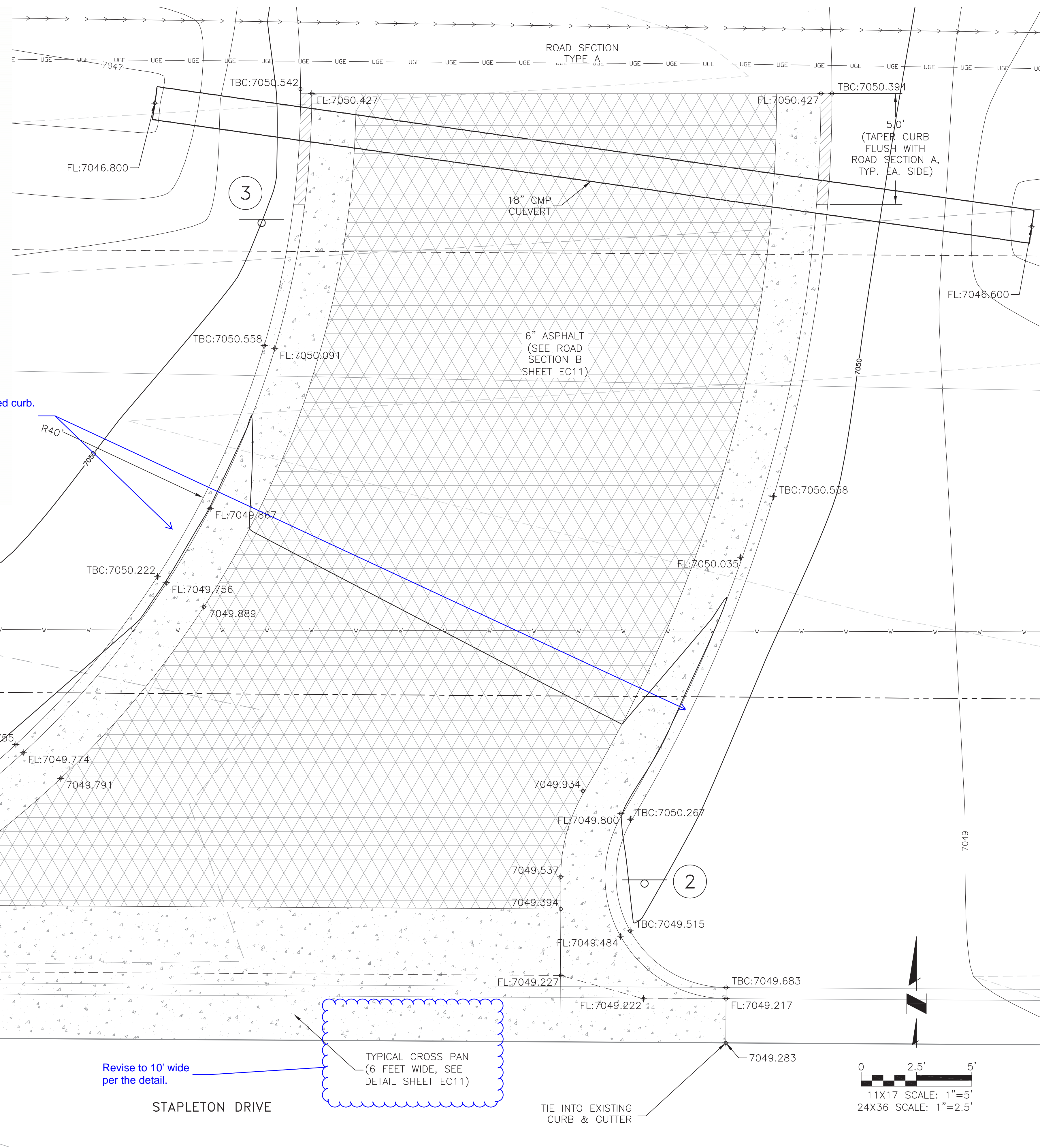
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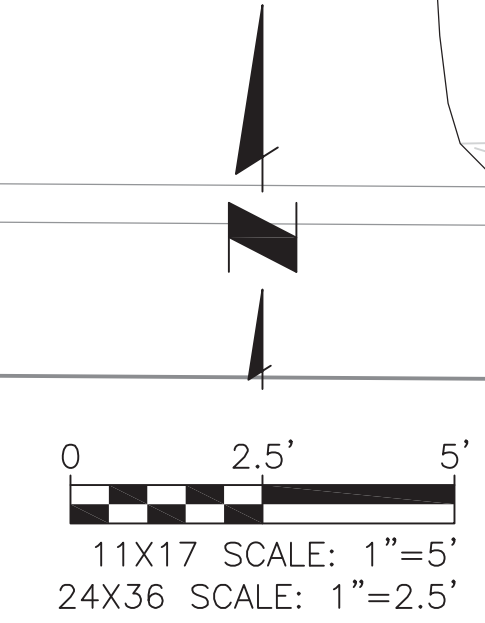
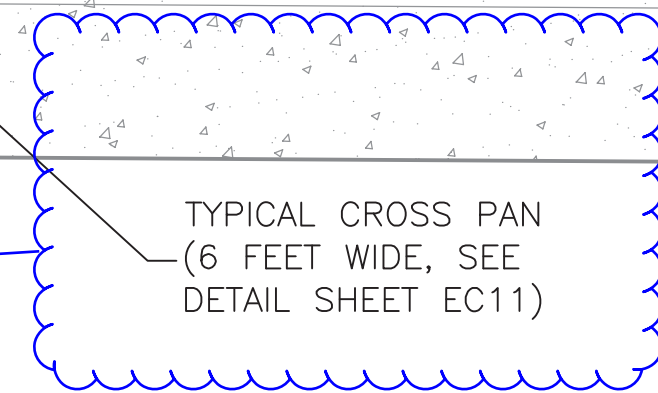
R3-5R  
RIGHT TURN ONLY  
30"x36"

3

Provide Line Curve data for the proposed curb.  
Line: (Bearing/Distance)  
Curve: (Radius, length, delta)



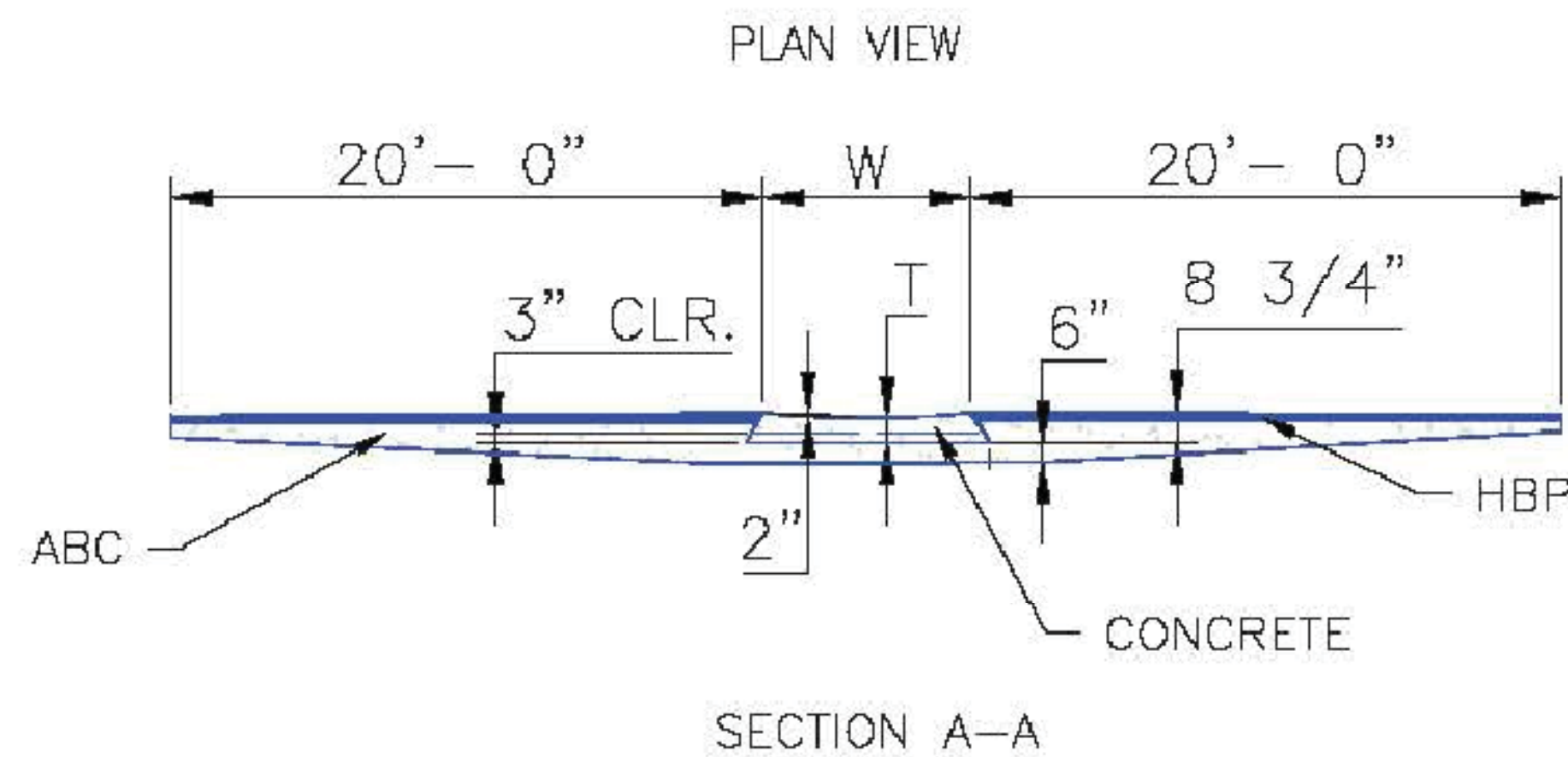
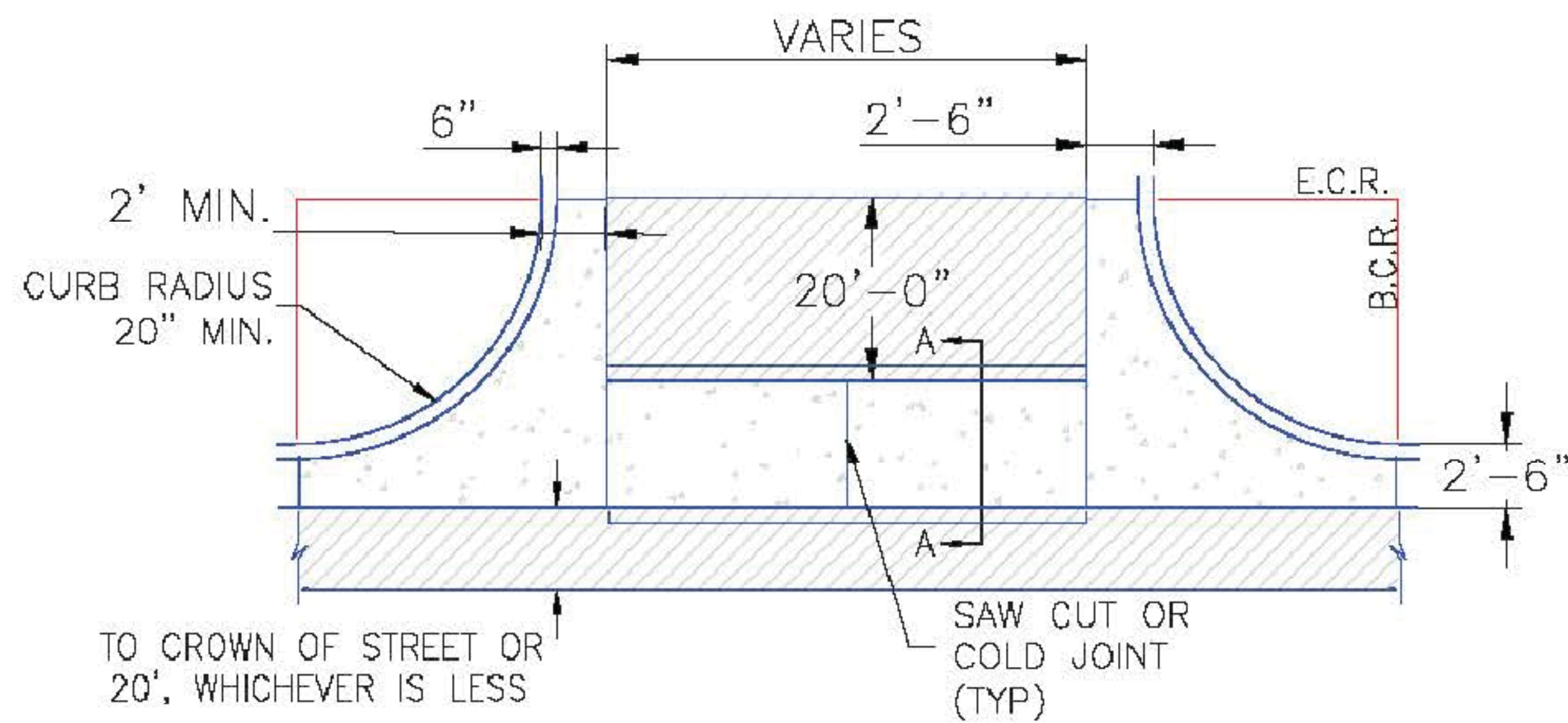
Revise to 10' wide  
per the detail.



**JDS-HYDRO** CONSULTANTS, INC.  
 545 EAST PIKES PEAK AVENUE, SUITE 300  
 COLORADO SPRINGS, COLORADO 80903  
 PH: (719) 227-0072 - FAX: (719) 471-3401

**WOODMEN HILLS METROPOLITAN DISTRICT  
 REGIONAL WATER RECLAMATION FACILITY  
 RIGHT-OUT DETAILS**  
 PCD FILE NO: PPR-17-027

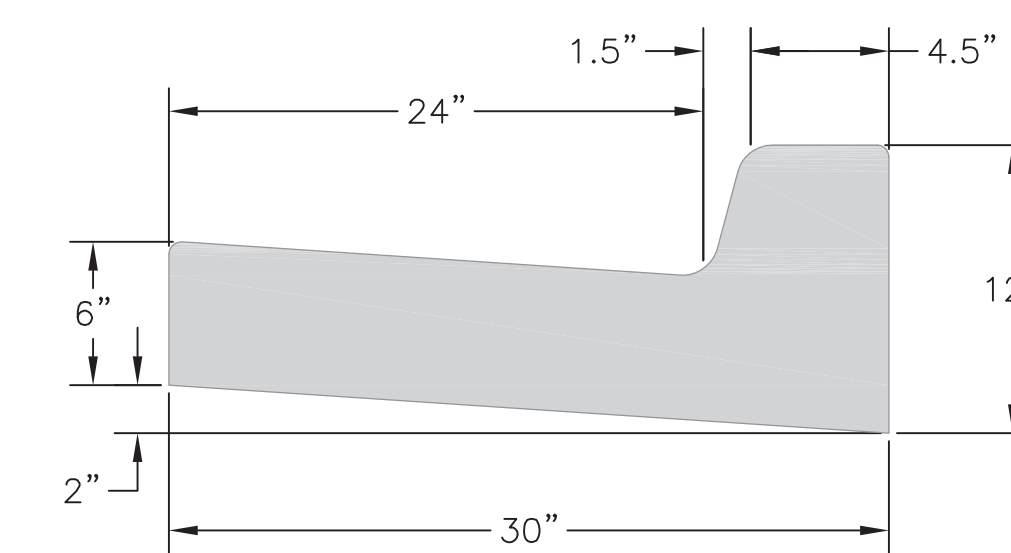
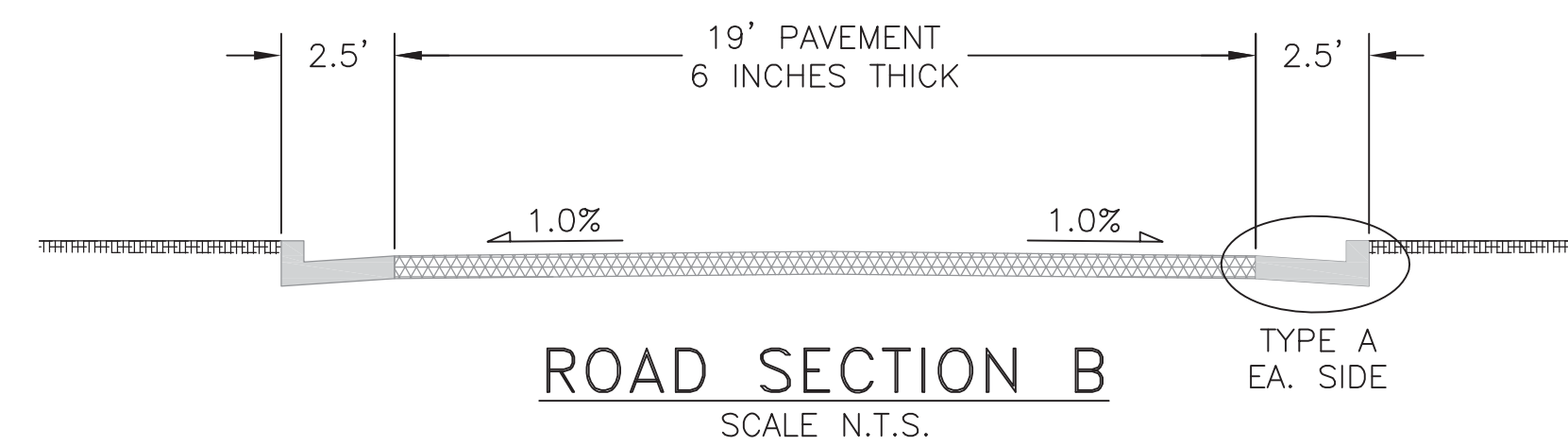
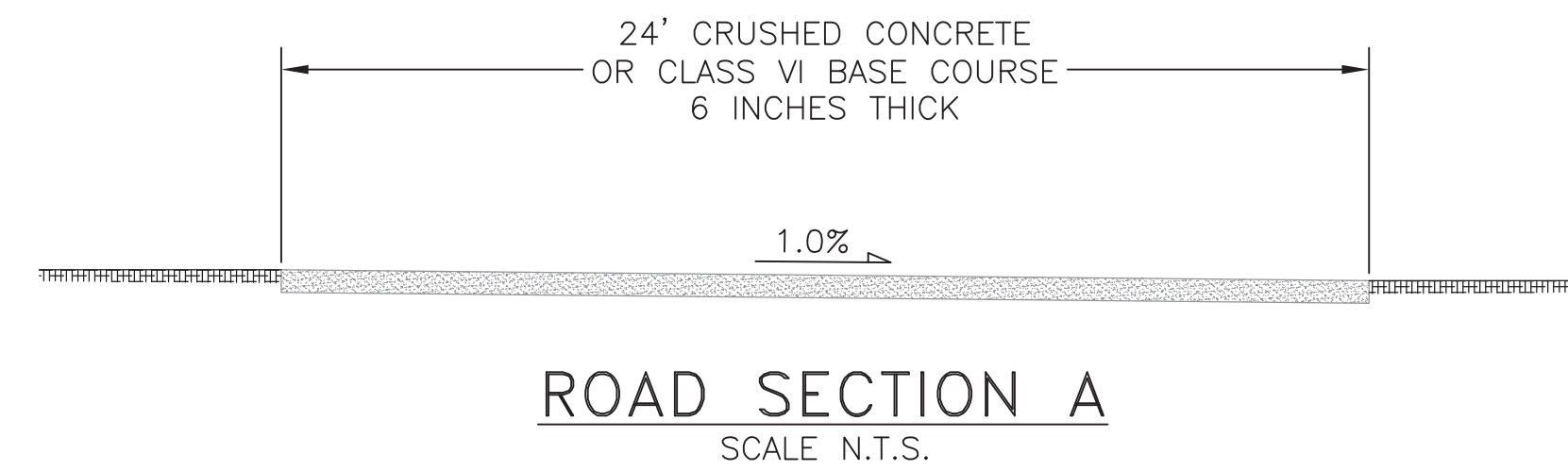
Project No.:	112.88
Scale:	AS NOTED
Date:	07/07/17
Design:	RMM
Drawn:	RMM
Check:	JPM
Revised:	



NOTES

1. W - WIDTH SHALL BE 6' FOR LOCAL, 8' FOR COLLECTORS, AND 10' FOR ARTERIAL ROADS.
2. T - SQUARED-OFF RETURN TO BE POURED MONOLITHICALLY, 8" PCC FOR LOCAL ROADS, 9" FOR COLLECTORS WITH 6x6 - 4.4 W.W.F. OR #4 REINFORCING BAR @ 18" EACH WAY.
3. [Hatched Area] = 3" MINIMUM ASPHALT DEPTH (2 LIFTS).
4. DESIGN TO SPECIFY ELEVATIONS AT PI AND PCR.

SCALE: NOT TO SCALE



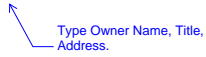
Project No.: 112.88
Scale: AS NOTED
Date: 07/07/17
Design: RMM
Drawn: RMM
Check: JPM
Revised:

8/11/11 DATE APPROVED:	Typical Cross Pan Layout Detail Standard Drawing	
André P. Brackin DEPARTMENT OF TRANSPORTATION	REVISION DATE: 12/8/15 FILE NAME: SD_2-26	

# Markup Summary

dsdlaforce (4)

THE OWNER WILL COMPLY WITH THE REQUIREMEI



**Subject:** Callout  
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**Author:** dsdlaforce  
**Date:** 7/24/2017 8:33:39 AM

Type Owner Name, Title, Address.

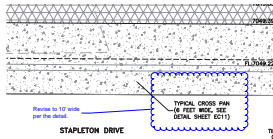
EL PASO COUNTY:

COUNTY PLAN REVIEW IS PROVIDED ONLY FOR C  
COUNTY IS NOT RESPONSIBLE FOR THE ACCUR  
ELEVATIONS WHICH SHALL BE CONFIRMED AT THI

**Subject:** Text Box  
**Page Label:** 10  
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**Author:** dsdlaforce  
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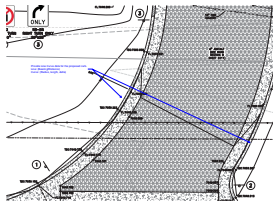
Since the retaining wall is greater than 4 ft, add a note that a building permit is required.

Since the retaining wall is greater than 4 ft, add a note that a building permit is required.



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**Date:** 7/27/2017 12:19:45 PM

Revise to 10' wide per the detail.



**Subject:** Callout  
**Page Label:** 11  
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Provide Line Curve data for the proposed curb.  
Line: (Bearing/Distance)  
Curve: (Radius, length, delta)