

EPC STORMWATER REVIEW COMMENTS
IN ORANGE BOXES WITH BLACK TEXT

APEX WASTE SOLUTIONS GRADING AND EROSION CONTROL PLANS COUNTY OF EL PASO, STATE OF COLORADO OCTOBER 2024

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 MANUAL VOLUMES 1 AND 2, 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.

JOSHUA PALMER, P.E., COUNTY ENGINEER

DATE

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.

ENGINEER OF RECORD SIGNATURE

DATE

OWNER'S STATEMENT:

I, THE OWNER/DEVELOPER HAVE READ AND WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN.

OWNER SIGNATURE

DATE

NOTES:

- ALL CONSTRUCTION ACTIVITIES SHALL BE COORDINATED WITH EL PASO COUNTY AND THE DEVELOPER.
- CONSTRUCTION METHODS AND MATERIALS NOT SPECIFIED ON THESE PLANS SHALL MEET OR EXCEED STANDARD SPECIFICATIONS OF EL PASO COUNTY.
- ALL CONSTRUCTION WORK AND UTILITY WORK OUTSIDE OF THE PROPERTY BOUNDARIES SHALL BE PERFORMED IN COOPERATION WITH, AND IN ACCORDANCE WITH, REGULATIONS OF THE AUTHORITIES CONCERNED.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN THE NECESSARY PERMITS AND APPROVALS FROM APPROPRIATE REGULATORY AGENCIES (IF APPLICABLE) PRIOR TO COMMENCING WORK.
- BASIS OF BEARINGS IS THE SOUTHERLY LINE OF THIS PROPERTY, MONUMENTED AS SHOWN AND ASSUMED TO BEAR NORTH 82 DEGREES 11 MINUTES 18 SECONDS EAST, 562.11 FEET.

CAUTION - NOTICE TO CONTRACTORS:

ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.

WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POT-HOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

SAFETY NOTICE TO CONTRACTOR:

IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.

WARRANTY / DISCLAIMER:

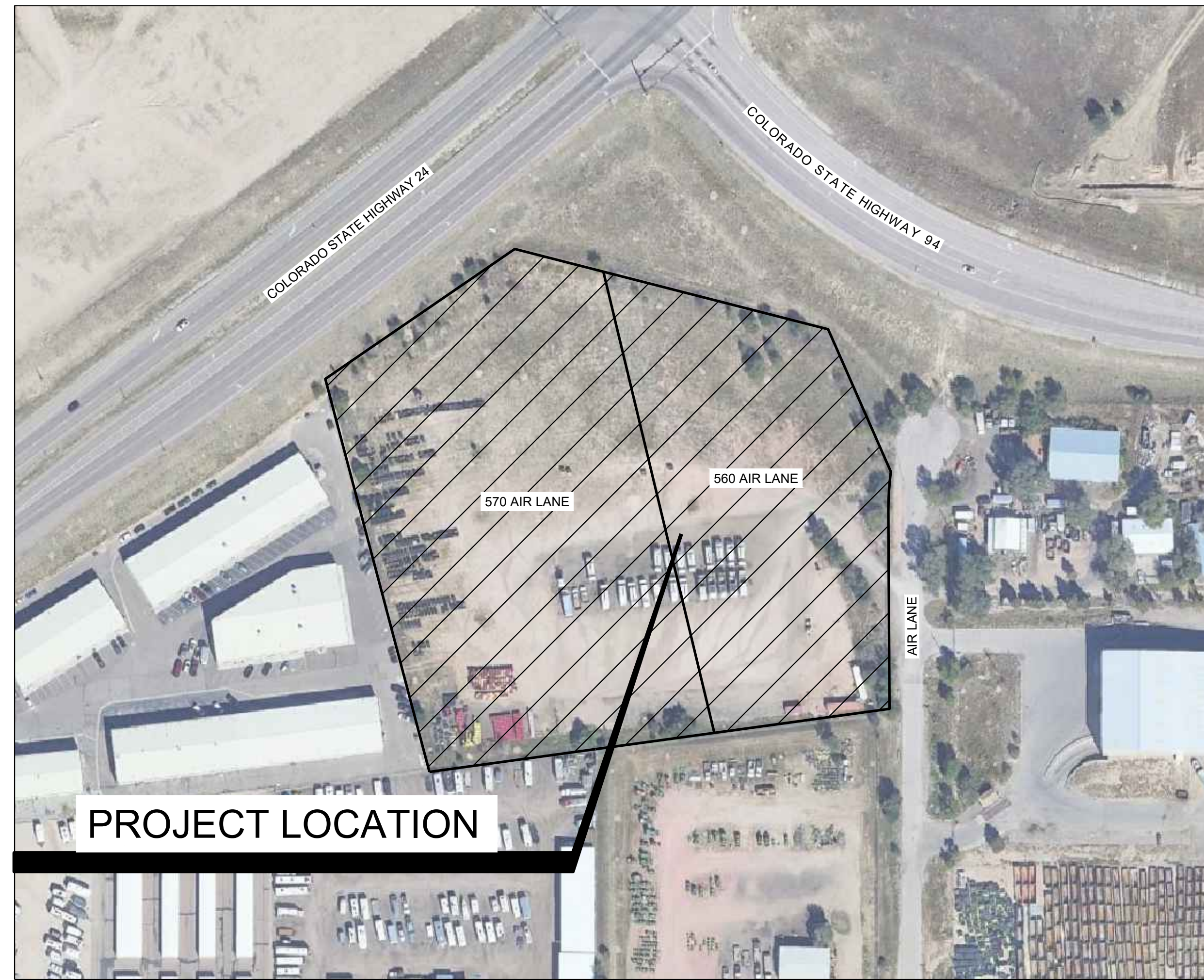
THE DESIGNS REPRESENTED IN THESE PLANS ARE IN ACCORDANCE WITH ESTABLISHED PRACTICES OF CIVIL ENGINEERING FOR THE DESIGN FUNCTIONS AND USES INTENDED BY THE OWNER AT THIS TIME. HOWEVER, NEITHER SMH CONSULTANTS NOR ITS PERSONNEL CAN OR DO WARRANTY THESE DESIGNS OR PLANS AS CONSTRUCTED, EXCEPT IN THE SPECIFIC CASES WHERE SMH CONSULTANTS INSPECTS AND CONTROLS THE PHYSICAL CONSTRUCTION ON THE SITE.

AGENCIES

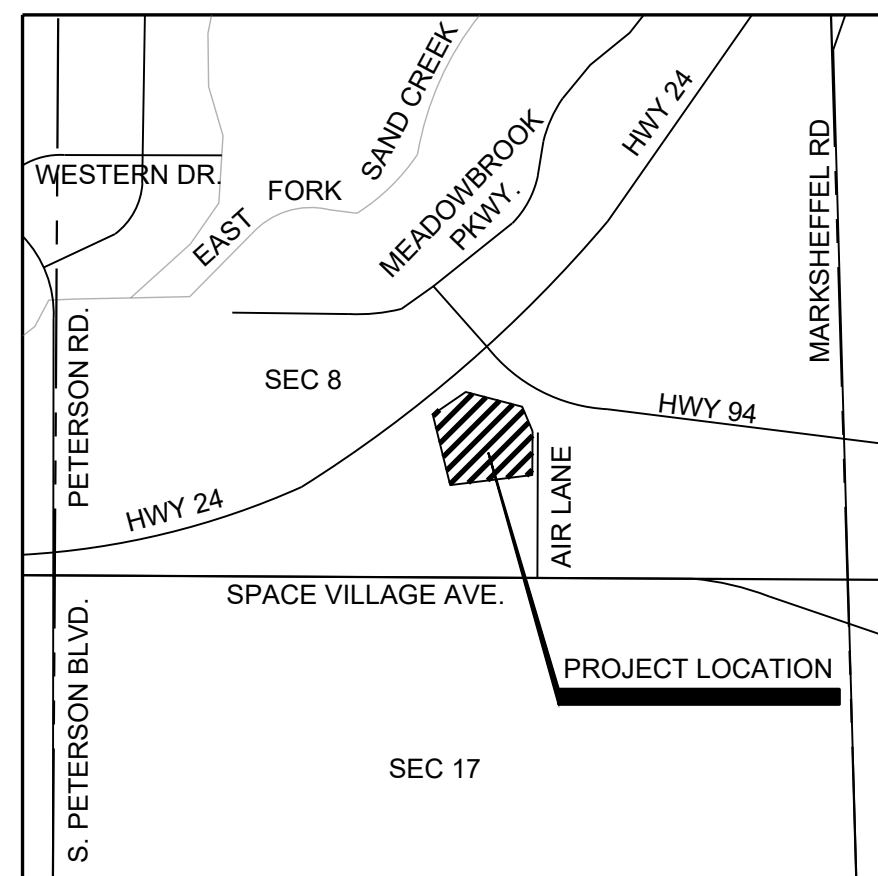
| | |
|--|--|
| OWNER/DEVELOPER: SCOTT LUKACH APEX WASTE SOLUTIONS 11681 PROGRESS LANE PARKER, CO 80134 (414) 333-3956 | SURVEYOR: TIM SLOAN SMH CONSULTANTS, P.A. 620 N TEJON ST, SUITE 201 COLORADO SPRINGS, CO 80903 (719) 465-2145 |
| CIVIL ENGINEER: BRETT LOKK SMH CONSULTANTS, P.A. 620 N TEJON STREET, SUITE 201 COLORADO SPRINGS, CO 80903 (719) 465-2145 | COUNTY ENGINEERING: EL PASO COUNTY DEPARTMENT OF PUBLIC WORKS 2880 INTERNATIONAL CIRCLE, SUITE 110 COLORADO SPRINGS, CO 80910 (719) 520-7550 |



The utilities as shown on this drawing were developed from the information available. This is not implied nor intended to be the complete inventory of utilities in this area. It is the client's responsibility to verify the location of all utilities (whether shown or not) and protect said utilities from any damage.



SITE MAP
NOT TO SCALE



VICINITY MAP
NOT TO SCALE

EL PASO COUNTY STANDARD CONSTRUCTION NOTES:

- ALL DRAINAGE AND ROADWAY CONSTRUCTION SHALL MEET THE STANDARDS AND SPECIFICATIONS OF THE CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2, AND THE EL PASO COUNTY ENGINEERING CRITERIA MANUAL.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE NOTIFICATION AND FIELD NOTIFICATION OF ALL EXISTING UTILITIES, WHETHER SHOWN ON THE PLANS OR NOT, BEFORE BEGINNING CONSTRUCTION. LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CALL 811 TO CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC)
- CONTRACTOR SHALL KEEP A COPY OF THESE APPROVED PLANS, THE GRADING AND EROSION CONTROL PLAN, THE STORMWATER MANAGEMENT PLAN (SWMP), THE SOILS AND GEOTECHNICAL REPORT, AND THE APPROPRIATE DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS AT THE JOB SITE AT ALL TIMES, INCLUDING THE FOLLOWING:
 - EL PASO COUNTY ENGINEERING CRITERIA MANUAL (ECM)
 - CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2
 - COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION
 - CDOT M AND S STANDARDS
- IT IS THE DESIGN ENGINEER'S RESPONSIBILITY TO ACCURATELY SHOW EXISTING CONDITIONS, BOTH ON-SITE AND OFF-SITE, ON THE CONSTRUCTION PLANS. ANY MODIFICATIONS NECESSARY DUE TO CONFLICTS, OMISSIONS, OR CHANGED CONDITIONS WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.
- ONCE THE ESQCP HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL 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 PCD INSPECTIONS STAFF.
- IT IS THE CONTRACTORS RESPONSIBILITY TO UNDERSTAND THE REQUIREMENTS OF ALL JURISDICTIONAL AGENCIES AND TO OBTAIN ALL REQUIRED PERMITS, INCLUDING BUT NOT LIMITED TO EL PASO COUNTY EROSION AND STORMWATER QUALITY PERMIT (ESQCP), REGIONAL BUILDING FLOODPLAIN DEVELOPMENT PERMIT, U.S. ARMY CORPS OF ENGINEERS-ISSUED 401 AND/OR 404 PERMITS, AND COUNTY AND STATE FUGITIVE DUST PERMITS.
- CONTRACTOR SHALL COORDINATE GEOTECHNICAL TESTING PER ECM STANDARDS. PAVEMENT DESIGN SHALL BE APPROVED BY EL PASO COUNTY PCD PRIOR TO PLACEMENT OF CURB AND GUTTER AND PAVEMENT
- ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE AT APPROVED CONSTRUCTION ACCESS POINTS
- ANY TEMPORARY SIGNING AND STRIPING SHALL COMPLY WITH EL PASO COUNTY AND MUTCD CRITERIA
- CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRED BY EL PASO COUNTY DPW, INCLUDING WORK WITHIN THE RIGHT-OF-WAY AND SPECIAL TRANSPORT PERMITS
- THE LIMITS OF CONSTRUCTION SHALL REMAIN WITHIN THE PROPERTY LINE UNLESS OTHERWISE NOTED. THE OWNER/DEVELOPER SHALL OBTAIN WRITTEN PERMISSION AND EASEMENTS, WHERE REQUIRED, FROM ADJOINING PROPERTY OWNER(S) PRIOR TO ANY OFF-SITE DISTURBANCE, GRADING, OR CONSTRUCTION

INDEX OF SHEETS

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| G.1 | GRADING & EROSION CONTROL TITLE SHEET |
| G.2 | INITIAL-INTERIM GRADING & EROSION CONTROL PLAN |
| G.3 | FINAL GRADING & EROSION CONTROL PLAN |
| G.4 | PERMANENT CONTROL MEASURE PLAN |
| G.5-G.6 | GRADING & EROSION CONTROL DETAILS |
| G.7 | PERMANENT CONTROL MEASURE DETAILS |

The GEC Plans are contained within the SDP. You do not need to submit them twice so you can remove them from the SDP or just submit the SDP with the GEC Plans.

STANDARD NOTES FOR EL PASO COUNTY GRADING & EROSION CONTROL PLANS:

- 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 WATERS, INCLUDING WETLANDS.
- 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 FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.
- 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. MANAGEMENT OF THE SWMP DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE DESIGNATED QUALIFIED STORMWATER MANAGER OR CERTIFIED EROSION CONTROL INSPECTOR. THE SWMP SHALL BE LOCATED ON-SITE AT ALL TIMES DURING CONSTRUCTION AND SHALL BE KEPT UP TO DATE WITH WORK PROGRESS AND CHANGES IN THE FIELD.
- ONCE THE ESQCP IS APPROVED AND A "NOTICE TO PROCEED" HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL MEASURES AS INDICATED ON THE APPROVED 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 STAFF.
- CONTROL MEASURES MUST BE INSTALLED PRIOR TO COMMENCEMENT OF ACTIVITIES THAT COULD CONTRIBUTE POLLUTANTS TO STORMWATER. CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, AND DISTURBED LAND AREAS SHALL BE INSTALLED IMMEDIATELY UPON COMPLETION OF THE DISTURBANCE.
- ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED AND REMAIN IN EFFECTIVE OPERATING CONDITION UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED AND FINAL STABILIZATION IS ESTABLISHED. ALL PERSONS ENGAGED IN LAND DISTURBANCE ACTIVITIES SHALL ASSESS THE ADEQUACY OF CONTROL MEASURES AT THE SITE AND IDENTIFY IF CHANGES TO THOSE CONTROL MEASURES ARE NEEDED TO ENSURE THE CONTINUED EFFECTIVE PERFORMANCE OF THE CONTROL MEASURES. ALL CHANGES TO TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES MUST BE INCORPORATED INTO THE STORMWATER MANAGEMENT PLAN.
- TEMPORARY STABILIZATION SHALL BE IMPLEMENTED ON DISTURBED AREAS AND STOCKPILES WHERE GROUND DISTURBING CONSTRUCTION ACTIVITY HAS PERMANENTLY CEASED OR TEMPORARILY CEASED FOR LONGER THAN 14 DAYS.
- FINAL STABILIZATION MUST BE IMPLEMENTED AT ALL APPLICABLE CONSTRUCTION SITES. FINAL STABILIZATION IS ACHIEVED WHEN ALL GROUND DISTURBING ACTIVITIES ARE COMPLETE AND ALL DISTURBED AREAS EITHER HAVE A UNIFORM VEGETATIVE COVER WITH INDIVIDUAL PLANT DENSITY OF 70 PERCENT OF PRE-DISTURBANCE LEVELS ESTABLISHED OR EQUIVALENT PERMANENT ALTERNATIVE STABILIZATION METHOD IS IMPLEMENTED. ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED UPON FINAL STABILIZATION AND BEFORE PERMIT CLOSURE.
- ALL PERMANENT STORMWATER MANAGEMENT FACILITIES SHALL BE INSTALLED AS DESIGNED IN THE APPROVED PLANS. ANY PROPOSED CHANGES THAT EFFECT THE DESIGN OR FUNCTION OF PERMANENT STORMWATER MANAGEMENT STRUCTURES MUST BE APPROVED BY THE ECM ADMINISTRATOR PRIOR TO IMPLEMENTATION.
- EARTH DISTURBANCES SHALL BE CONDUCTED IN SUCH A MANNER SO AS TO EFFECTIVELY MINIMIZE 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. PRE-EXISTING VEGETATION SHALL BE PROTECTED AND MAINTAINED WITHIN 50 HORIZONTAL FEET OF A WATERS OF THE STATE UNLESS SHOWN TO BE INFEASIBLE AND SPECIFICALLY REQUESTED AND APPROVED.
- COMPACTION OF SOIL MUST BE PREVENTED IN AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES OR WHERE FINAL STABILIZATION WILL BE ACHIEVED BY VEGETATION COVER. AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES SHALL ALSO BE PROTECTED FROM SEDIMENTATION DURING CONSTRUCTION UNTIL FINAL STABILIZATION IS ACHIEVED. IF COMPACTION PREVENTION IS NOT FEASIBLE DUE TO SITE CONSTRAINTS, ALL AREAS DESIGNATED FOR INFILTRATION AND VEGETATION CONTROL MEASURES MUST BE LOOSENED PRIOR TO INSTALLATION OF THE CONTROL MEASURE(S).
- ANY TEMPORARY OR PERMANENT FACILITY DESIGNED AND CONSTRUCTED FOR THE CONVEYANCE OF STORMWATER AROUND, THROUGH, OR FROM THE EARTH DISTURBANCE AREA SHALL BE A STABILIZED CONVEYANCE DESIGNED TO MINIMIZE EROSION AND THE DISCHARGE OF SEDIMENT OFF-SITE.
- CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO ENTER STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES. CONCRETE WASHOUTS SHALL NOT BE LOCATED IN AN AREA WHERE SHALLOW GROUNDWATER MAY BE PRESENT, OR WITHIN 50 FEET OF A SURFACE WATER BODY, CREEK OR STREAM.
- DURING DEWATERING OPERATIONS, UNCONTAMINATED GROUNDWATER MAY BE DISCHARGED ON-SITE, BUT SHALL NOT LEAVE THE SITE IN THE FORM OF SURFACE RUNOFF UNLESS AN APPROVED STATE DEWATERING PERMIT IS IN PLACE.
- EROSION CONTROL BLANKETING OR OTHER PROTECTIVE COVERING SHALL BE USED ON SLOPES STEEPER THAN 3:1.
- 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.
- 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. CONTROL MEASURES MAY BE REQUIRED BY EL PASO COUNTY ENGINEERING IF DEEMED NECESSARY, BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.
- TRACKING OF SOILS AND CONSTRUCTION DEBRIS OFF-SITE SHALL BE MINIMIZED. MATERIALS TRACKED OFF-SITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.
- THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, SOIL, AND SAND THAT MAY ACCUMULATE IN ROADS, STORM DRAINS AND OTHER DRAINAGE CONVEYANCE SYSTEMS AND STORMWATER APPURTENANCES AS A RESULT OF SITE DEVELOPMENT.
- 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.
- NO CHEMICAL(S) HAVING THE POTENTIAL TO BE RELEASED IN STORMWATER ARE TO BE STORED OR USED ON-SITE UNLESS PERMISSION FOR THE USE OF SUCH CHEMICAL(S) IS GRANTED IN WRITING BY THE ECM ADMINISTRATOR. IN GRANTING APPROVAL FOR THE USE OF SUCH CHEMICAL(S), SPECIAL CONDITIONS AND MONITORING MAY BE REQUIRED.
- BULK STORAGE OF ALLOWED PETROLEUM PRODUCTS OR OTHER ALLOWED LIQUID CHEMICALS IN EXCESS OR 55 GALLONS SHALL REQUIRE ADEQUATE SECONDARY CONTAINMENT PROTECTION TO CONTAIN ALL SPILLS ON-SITE AND TO PREVENT ANY SPILLED MATERIALS FROM ENTERING STATE WATERS, AND SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR OTHER FACILITIES.
- NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE CURB AND GUTTER OR DITCH EXCEPT WITH APPROVED SEDIMENT CONTROL MEASURES.
- OWNER/DEVELOPER AND THEIR AGENTS 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 OF THE LAND DEVELOPMENT CODE, DCM VOLUME II AND THE ECM APPENDIX I. ALL APPROPRIATE PERMITS MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION (1041, NPDES, FLOODPLAIN, 404, FUGITIVE DUST, ETC.). IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND OTHER LAWS, RULES, OR REGULATIONS OF OTHER FEDERAL, STATE, LOCAL, OR COUNTY AGENCIES, THE MOST RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.
- ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE ONLY AT APPROVED CONSTRUCTION ACCESS POINTS.
- PRIOR TO CONSTRUCTION THE PERMITTEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.
- A WATER SOURCE SHALL BE AVAILABLE ON-SITE DURING EARTHWORK OPERATIONS AND SHALL BE UTILIZED AS REQUIRED TO MINIMIZE DUST FROM EARTHWORK EQUIPMENT AND WIND.
- THE SOIL REPORT FOR THIS SITE HAS BEEN PREPARED BY NRCS, JUNE 2024, AND SHALL BE CONSIDERED A PART OF THESE PLANS.
- AT LEAST TEN (10) DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB ONE (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

PCD FILE NO: PPR2441

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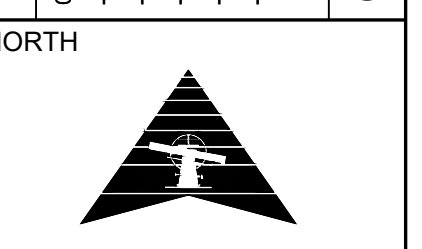
APEX WASTE SOLUTIONS

PROGRESS DOCUMENTS - NOT FOR CONSTRUCTION

EL PASO COUNTY, CO

remove on all sheets

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| REVISION | DESCRIPTION |
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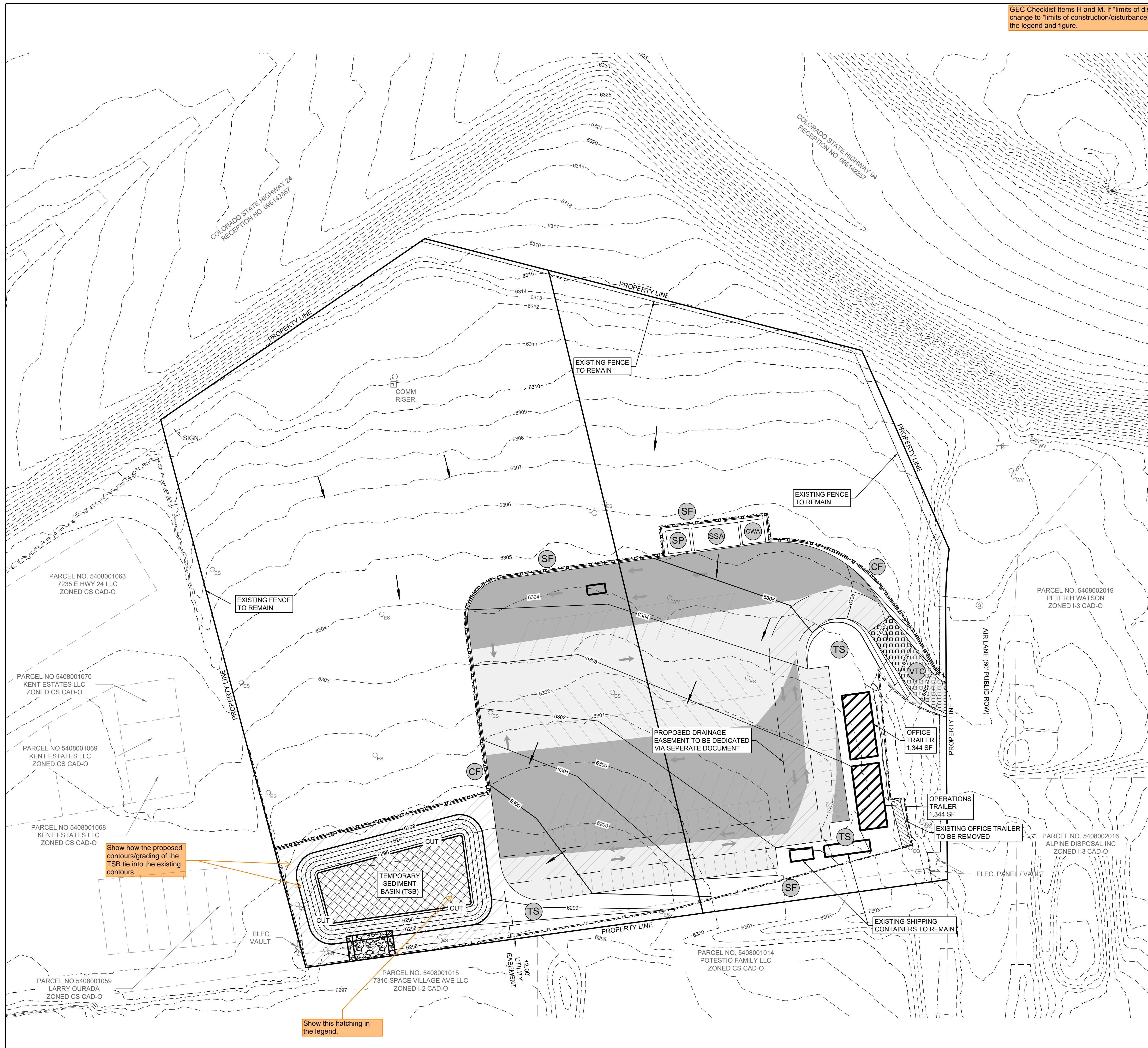
PROJECT #: 2403-0094
CHECKED BY: BML
DRAWN BY: EDM

DATE: 10/02/2024

SHEET # **G.1**

TOTAL SHEETS 7

GEC Checklist Items H and M. If "limits of disturbance" and "construction boundary" are the same, change to "limits of construction/disturbance" or otherwise show as separate line types for each on the legend and figure.



LEGEND

| | |
|--|---------------------------------------|
| | LIMITS OF DISTURBANCE |
| | CONSTRUCTION FENCE |
| | EXISTING ASPHALT MILLINGS |
| | PROPOSED ASPHALT MILLINGS |
| | PROPOSED OFFICE TRAILER |
| | EXISTING OFFICE TRAILER TO BE REMOVED |
| | VEHICLE TRACKING CONTROL |
| | PROPOSED SAND FILTER BASIN |
| | SAND FILTER BASIN FILTER AREA |
| | PROPOSED RIPRAP |
| | PROPOSED DRAINAGE EASEMENT |
| | TEMPORARY SEEDING AND MULCHING |
| | PERMANENT SEEDING AND MULCHING |
| | SILT FENCE |
| | CONCRETE WASHOUT AREA |
| | STABILIZED STAGING AREA |
| | STOCKPILE PROTECTION |
| | FLOW ARROW |
| | EXISTING FENCE TO REMAIN |
| | EXISTING CONTOURS (1' AND 5') |
| | PROPOSED CONTOURS (1' AND 5') |

GEC Checklist Item v - Label all proposed temporary construction BMPs by phase of implementation for this sheet clearly identify what is initial and what is interim.

UTILITY LEGEND

| | |
|--|-------------------------|
| | SIGN |
| | FIBER OPTIC SIGN |
| | ELECTRIC SERVICE |
| | ELECTRIC VAULT / PANEL |
| | TELEPHONE PEDESTAL |
| | SANITARY SEWER MANHOLE |
| | SANITARY SEWER CLEANOUT |
| | WATER VALVE |
| | FIRE HYDRANT |

GEC Checklist Item p - identify all areas of cut and fill.

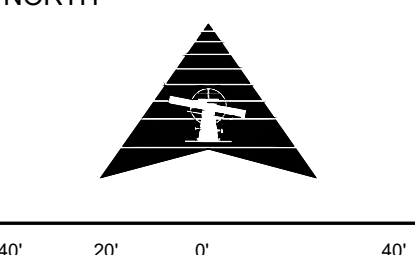
GENERAL NOTES:

- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES ADJACENT TO THE SITE. THE OMISSION FROM, OR INCLUSION OF, UTILITY LOCATIONS ON THE PLANS IS NOT TO BE CONSIDERED AS THE NON-EXISTENCE OF OR A DEFINITE LOCATION OF EXISTING UNDERGROUND UTILITIES.
- THE CONTRACTOR SHALL TAKE THE NECESSARY PRECAUTIONS TO PROTECT EXISTING UTILITIES, BUILDINGS, FENCES, AND ROADWAYS FROM DAMAGE DUE TO THIS OPERATION. ANY DAMAGE TO THE ABOVE WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE, AND ANY SERVICE DISRUPTION WILL BE SETTLED BY THE CONTRACTOR.
- GRADING SHALL BE COMPLETED TO A SUBGRADE TOLERANCE OF PLUS OR MINUS 0.2'.
- CONTRACTOR SHALL OBTAIN COPIES OF THE SOILS REPORT FROM THE GEOTECHNICAL ENGINEER AND THEY SHALL BE KEPT ONSITE DURING ALL EARTHWORK.
- THE SITE SHALL BE STRIPPED A MINIMUM OF 0.5' BELOW EXISTING GRADE, OR AS RECOMMENDED BY THE GEOTECHNICAL REPORT. ONLY APPLICABLE IN PREVIOUSLY UNDISTURBED AREAS.
- DUST CONTROL SHALL BE SUPPLIED BY THE GRADING CONTRACTOR THROUGHOUT THE DURATION OF THE PROJECT PER THE COUNTY HEALTH DEPARTMENT SPECIFICATIONS.
- LOCATION OF STORAGE FOR MAINTENANCE EQUIPMENT AND TEMPORARY DISPOSAL AREAS WILL BE ADDED TO THE GEC/SWMP BY CONTRACTOR.
- ALL NON-STRUCTURAL CONTROL MEASURES SUCH AS STREET SWEEPING, GOOD HOUSEKEEPING, AND ETC. SHALL BE EMPLOYED BY THE CONTRACTOR AS NECESSARY AND OUTLINED IN THE SWMP.
- MAXIMUM CUT/FILL SLOPES SHALL NOT EXCEED 4:1.
- ALL FILL MATERIAL SHALL BE APPROVED BY A LICENSED ENGINEER.
- ALL STRIPPED TOPSOIL SHALL BE STOCKPILED FOR RE-USE IF POSSIBLE.
- LOCATION OF PORTABLE TOILET, STABILIZED STAGING AREA, AND SITE (CONTACTS AND PERMITS) AND WASHOUT POSTING TO BE ADDED TO THIS PLAN AND SWMP BY CONTRACTOR.
- CONSTRUCTION DISTURBANCE LIMITS AND SILT FENCE OFFSET FOR CLARITY, CONTRACTOR TO ENSURE CCM'S ARE PLACED DOWNSTREAM OF DISTURBED AREAS TO PREVENT SEDIMENT FROM LEAVING SITE. NO BATCH PLANTS WILL BE UTILIZED ON SITE.
- ON-SITE VEGETATION IS NATIVE GRASSES AND WEEDS. THERE IS NO NOTABLE VEGETATION OTHERWISE.
- CONTRACTOR SHALL PROTECT ALL AREAS OUTSIDE OF THE CONSTRUCTION LIMITS WITH SILT FENCE OR OTHER METHOD TO PROTECT UNDISTURBED AREAS FROM EROSION.
- THERE ARE NO SPRINGS, STREAMS, WETLANDS AND OTHER SURFACE WATERS, INCLUDING AREAS THAT REQUIRE MAINTENANCE OF PRE-EXISTING VEGETATION WITHIN 50 FEET OF A RECEIVING WATER FOR THIS PROJECT.

Show how the proposed contours/grading of the TSB tie into the existing contours.

Show this hatching in the legend.

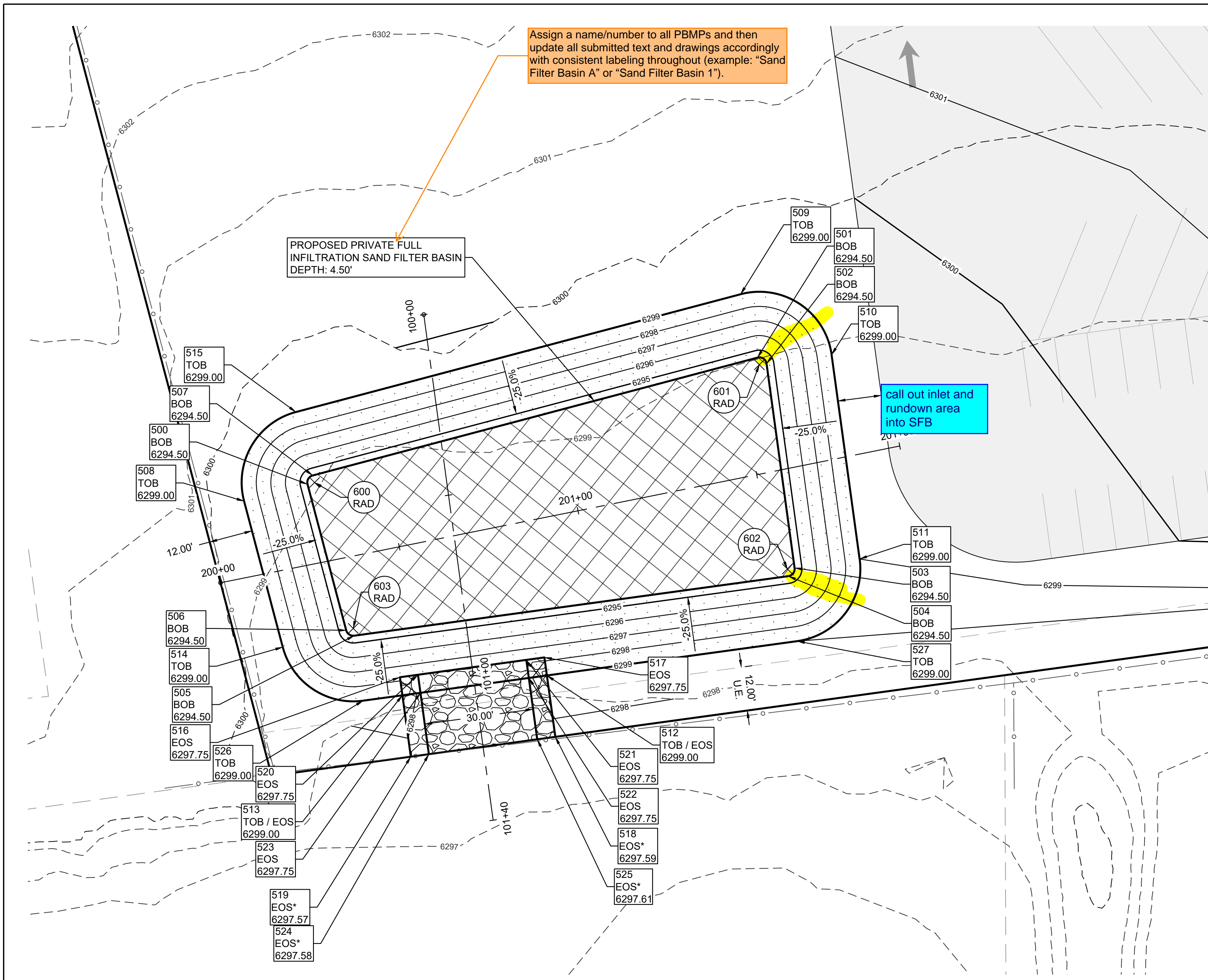
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| REVISION DESCRIPTION (DESCRIPTION) | |
| REVISION DATE | 00/00/00 |
| NORTH | |



PROJECT #: 2403-0094
CHECKED BY: BML
DRAWN BY: EDM

DATE: 10/02/2024

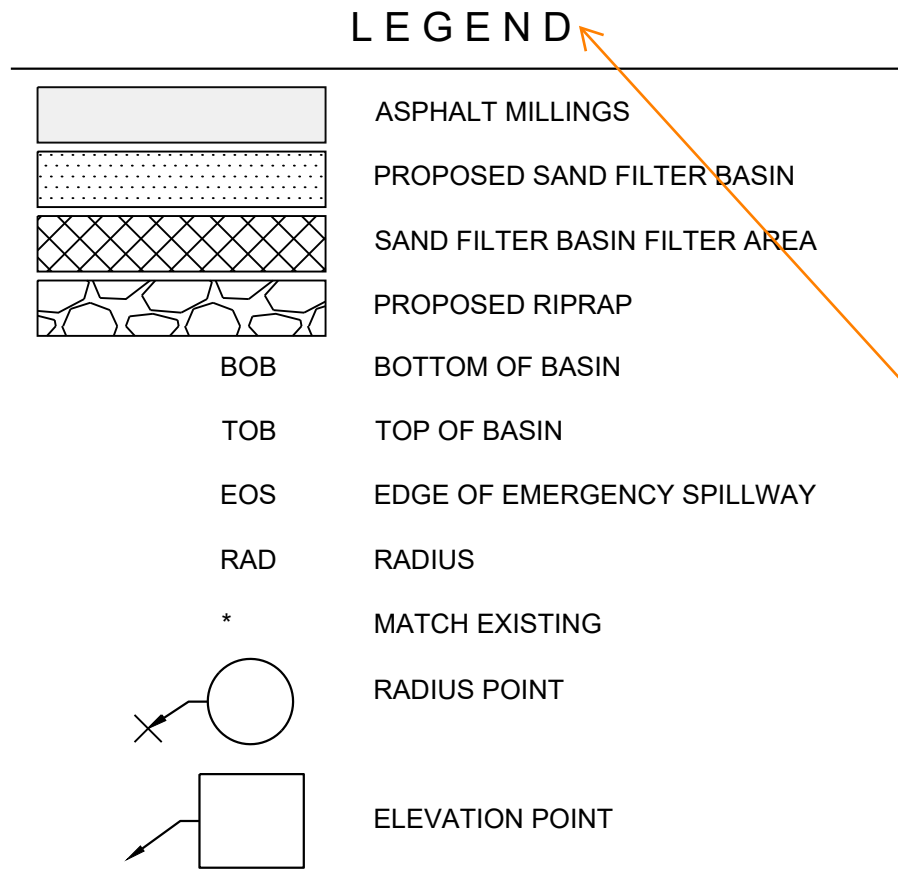
SHEET # **G.2**



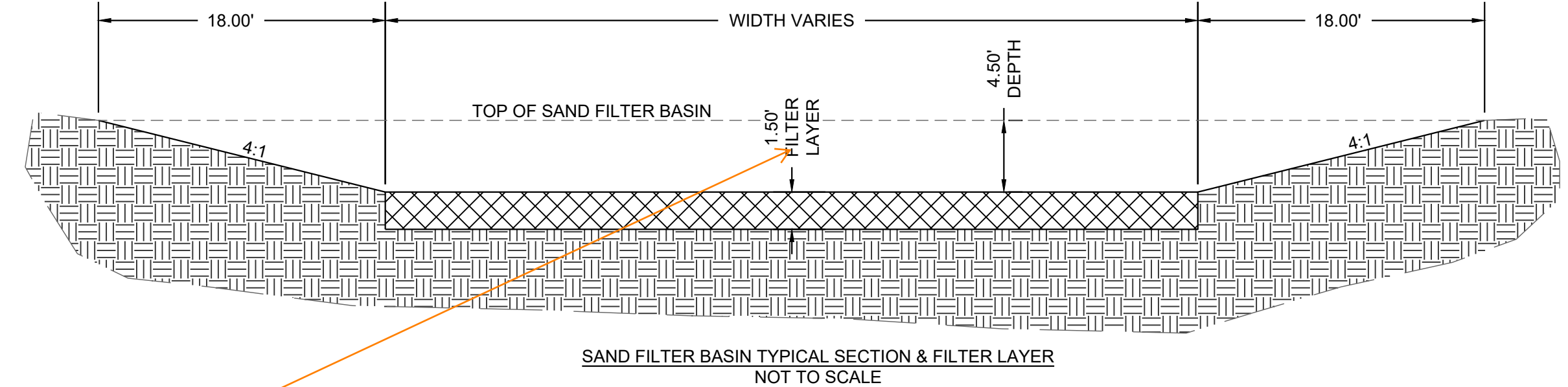
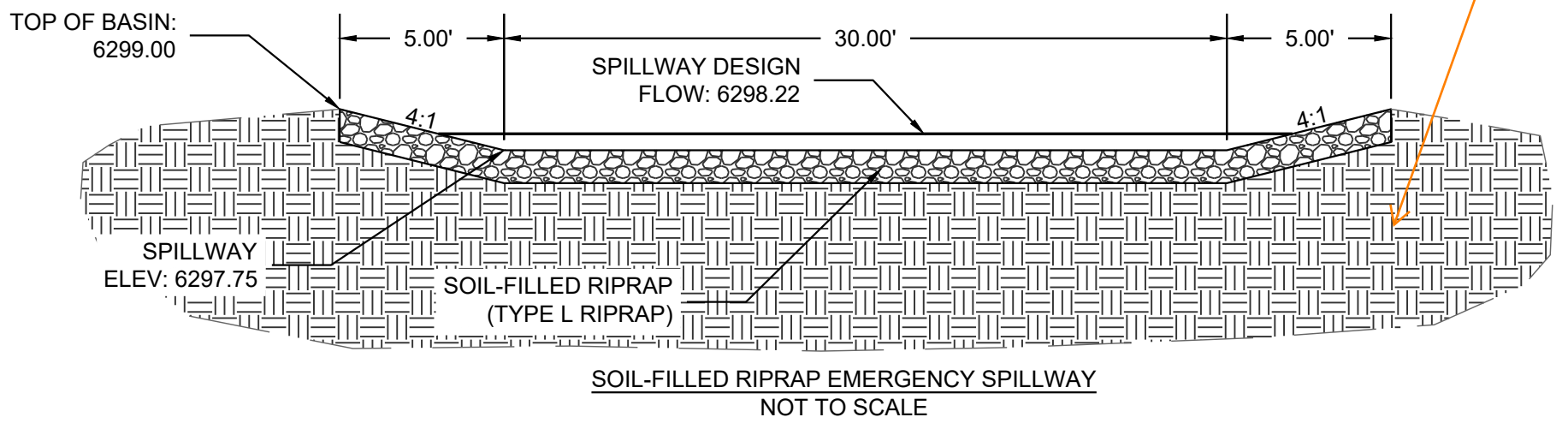
| SAND FILTER BASIN COORDINATES | | | | |
|-------------------------------|----------|---------|-----------|-------------|
| POINT # | NORTHING | EASTING | ELEVATION | DESCRIPTION |
| 500 | 2079.94 | 1009.84 | 6294.50 | BOB |
| 501 | 2114.70 | 1133.20 | 6294.50 | BOB |
| 502 | 2113.04 | 1135.70 | 6294.50 | BOB |
| 503 | 2057.02 | 1143.38 | 6294.50 | BOB |
| 504 | 2054.76 | 1141.67 | 6294.50 | BOB |
| 505 | 2038.44 | 1022.65 | 6294.50 | BOB |
| 506 | 2039.90 | 1020.45 | 6294.50 | BOB |
| 507 | 2082.39 | 1011.26 | 6294.50 | BOB |
| 508 | 2075.33 | 992.44 | 6299.00 | TOB |
| 509 | 2132.10 | 1128.59 | 6299.00 | TOB |
| 510 | 2115.48 | 1153.53 | 6299.00 | TOB |
| 511 | 2059.46 | 1161.22 | 6299.00 | TOB |
| 512 | 2027.51 | 1075.47 | 6299.00 | TOB / EOS |
| 513 | 2022.08 | 1035.85 | 6299.00 | TOB / EOS |
| 514 | 2035.29 | 1003.05 | 6299.00 | TOB |
| 515 | 2099.79 | 1006.65 | 6299.00 | TOB |
| 516 | 2027.03 | 1035.17 | 6297.75 | EOS |
| 517 | 2032.47 | 1074.79 | 6297.75 | EOS |
| 518 | 2010.67 | 1077.78 | 6297.59 | EOS* |
| 519 | 2005.23 | 1038.16 | 6297.57 | EOS* |
| 520 | 2027.71 | 1040.12 | 6297.75 | EOS |
| 521 | 2031.66 | 1069.86 | 6297.75 | EOS |
| 522 | 2026.83 | 1070.52 | 6297.75 | EOS |
| 523 | 2022.76 | 1040.80 | 6297.75 | EOS |
| 524 | 2005.91 | 1043.11 | 6297.58 | EOS* |
| 525 | 2009.99 | 1072.83 | 6297.61 | EOS* |
| 526 | 2020.60 | 1025.10 | 6299.00 | TOB |
| 527 | 2036.93 | 1144.12 | 6299.00 | TOB |

| RADIUS POINTS | | | | |
|---------------|----------|---------|----------------|-------------|
| POINT # | NORTHING | EASTING | RADIUS' | DESCRIPTION |
| 600 | 2080.45 | 1011.77 | 2.00' / 20.00' | RAD |
| 601 | 2112.77 | 1133.72 | 2.00' / 20.00' | RAD |
| 602 | 2056.75 | 1141.40 | 2.00' / 20.00' | RAD |
| 603 | 2040.42 | 1022.38 | 2.00' / 20.00' | RAD |

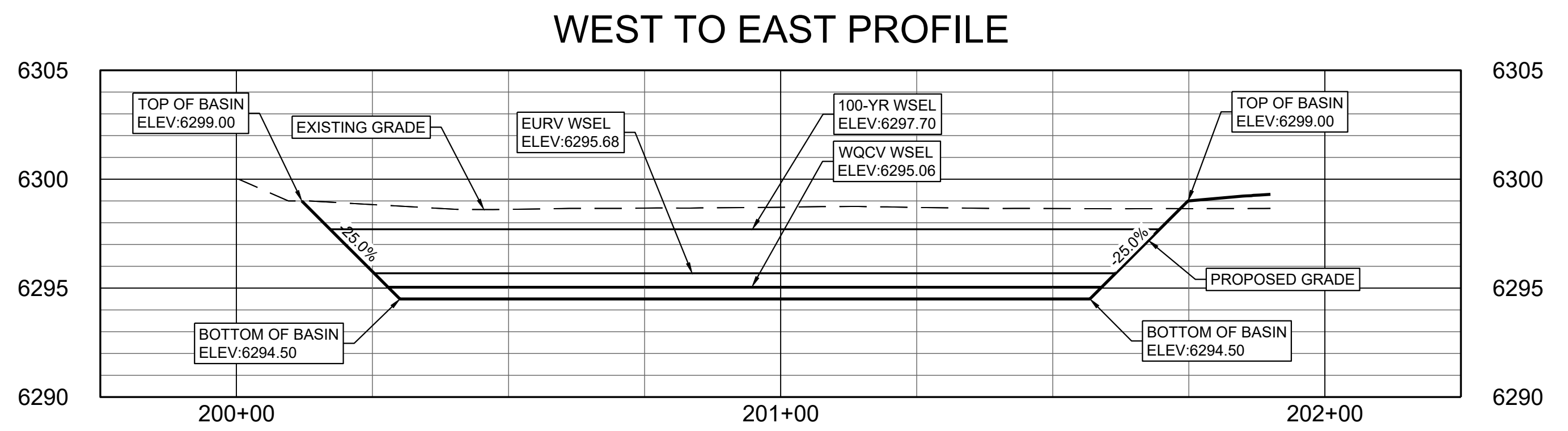
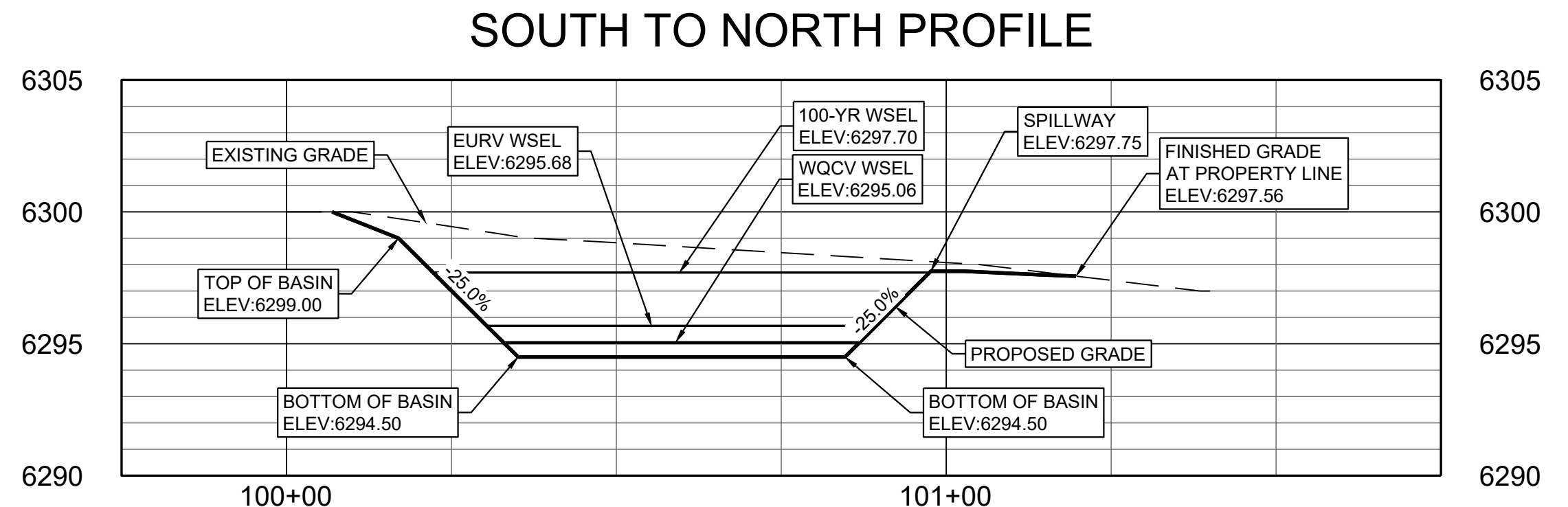
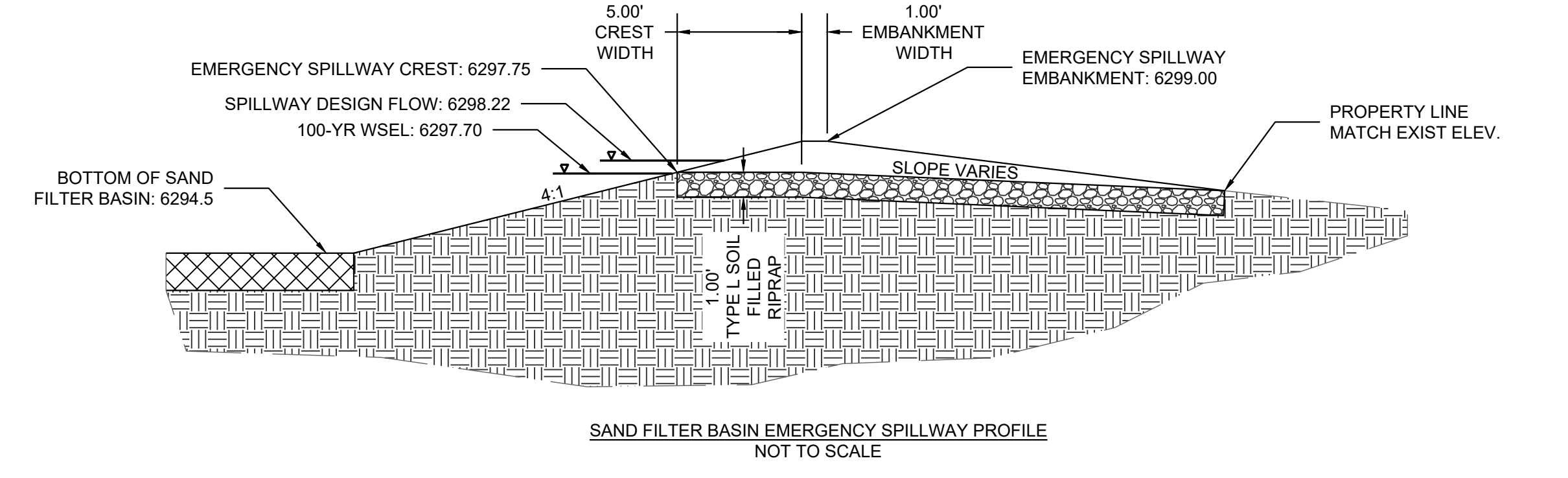
*FOR LISTED RADII VALUES: BOP RADIUS / TOP RADIUS



Provide this hatching in the legend



Provide filter layer specifications



PERMANENT CONTROL MEASURE PLAN

| | |
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| REVISION DESCRIPTION (DESCRIPTION) | |
| REVISION DATE | |
| 000000 | |

NORTH

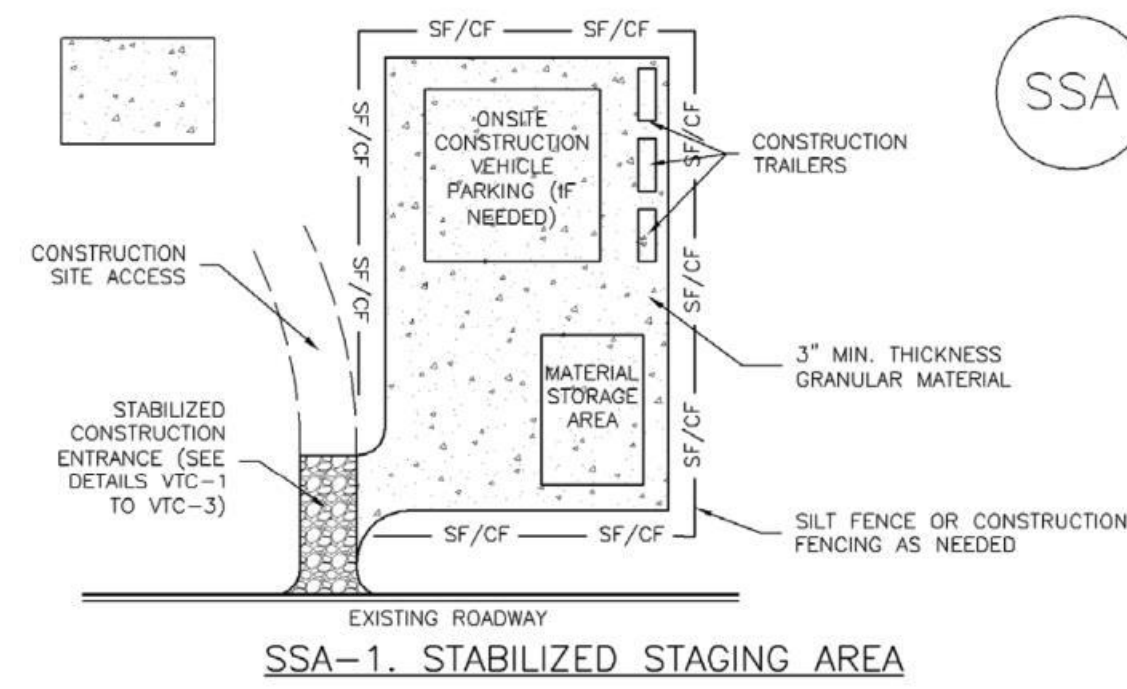
PROJECT #: 2403-0094
CHECKED BY: BML
DRAWN BY: EDM

DATE: 10/02/2024

SHEET # **G.4**

TOTAL SHEETS 7

Stabilized Staging Area (SSA) SM-6



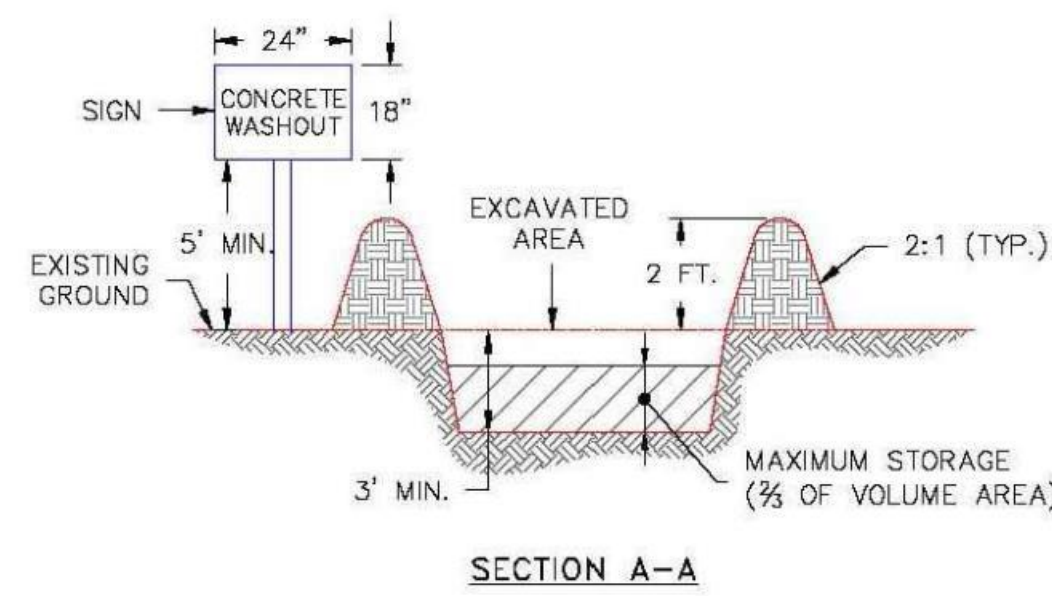
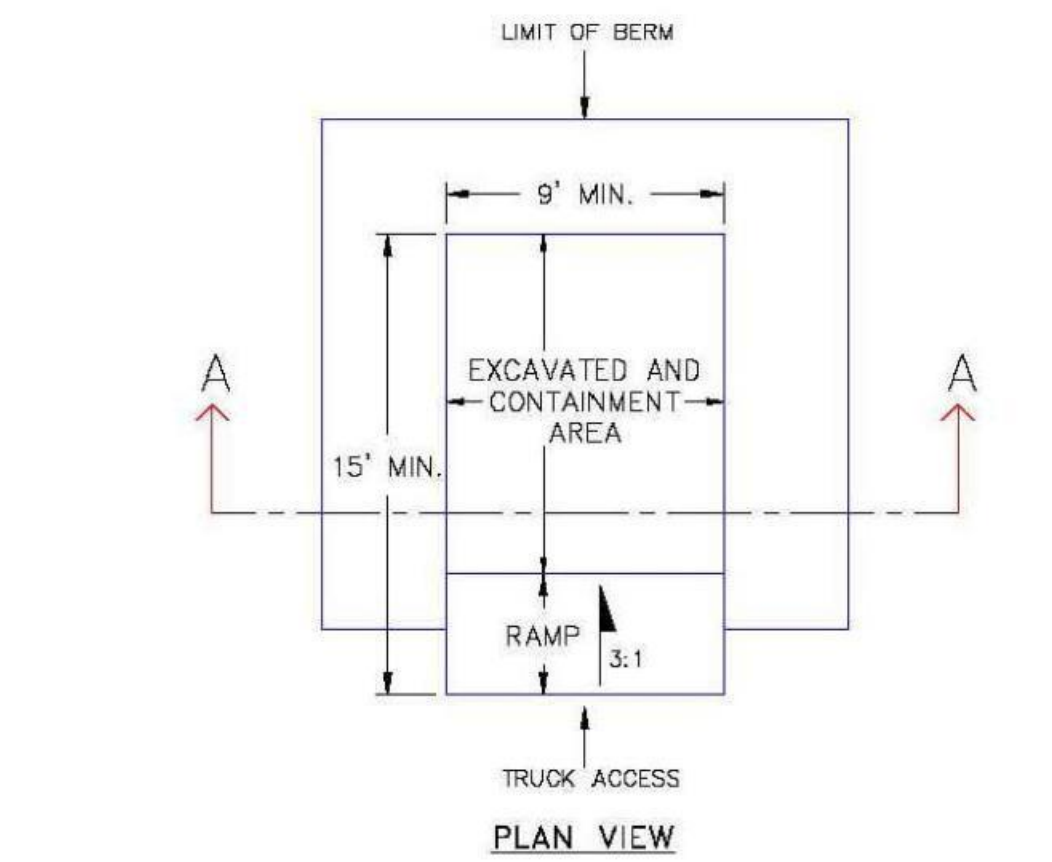
- STABILIZED STAGING AREA INSTALLATION NOTES**
- SEE PLAN VIEW FOR LOCATION OF STAGING AREA(S). CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.
 - STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.
 - STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.
 - THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.
 - UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, MSHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.
 - ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.
- STABILIZED STAGING AREA MAINTENANCE NOTES**
- INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
 - FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
 - WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
 - ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

November 2010 Urban Drainage and Flood Control District
Urban Storm Drainage Criteria Manual Volume 3 SSA-3

SM-6 Stabilized Staging Area (SSA)

- STABILIZED STAGING AREA MAINTENANCE NOTES**
- STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.
 - THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.
- NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.
- NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.
- (DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

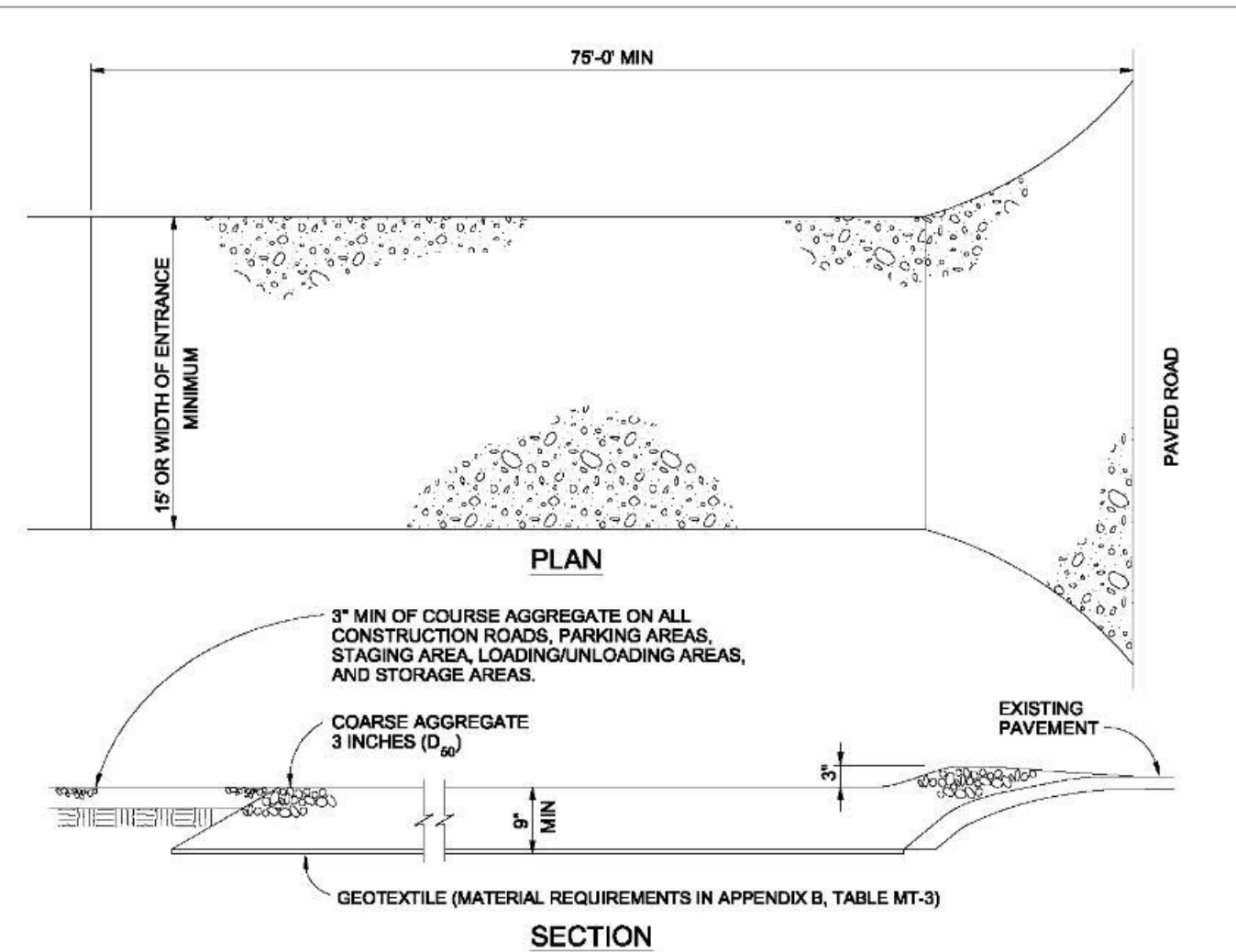
SSA-4 Urban Drainage and Flood Control District
Urban Storm Drainage Criteria Manual Volume 3 November 2010



- NOTES:**
- SIGN MATERIAL, EXCAVATION, AND RESTORATION ARE INCLUDED IN THE COST OF THE CONCRETE WASHOUT STRUCTURE.
 - EROSION BALES MAY BE USED AS AN ALTERNATIVE FOR THE BERM.

1/1/08
DATE APPROVED: John A. McCarty
DEPARTMENT OF TRANSPORTATION

Concrete Washout Structure
Standard Drawing
REVISION DATE: 7/17/07
FILE NAME: SD_3-84



VEHICLE TRACKING NOTES

INSTALLATION REQUIREMENTS

- ALL ENTRANCES TO THE CONSTRUCTION SITE ARE TO BE STABILIZED PRIOR TO CONSTRUCTION BEGINNING.
- 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.
- AREAS TO BE STABILIZED ARE TO BE PROPERLY GRADED AND COMPACTED PRIOR TO LAYING DOWN GEOTEXTILE AND STONE.
- CONSTRUCTION ROADS, PARKING AREAS, LOADING/UNLOADING ZONES, STORAGE AREAS, AND STAGING AREAS ARE TO BE STABILIZED.
- 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

- REGULAR INSPECTIONS ARE TO BE MADE OF ALL STABILIZED AREAS, ESPECIALLY AFTER STORM EVENTS.
- STONES ARE TO BE REAPPLIED PERIODICALLY AND WHEN REPAIR IS NECESSARY.
- SEDIMENT TRACKED ONTO PAVED ROADS IS TO BE REMOVED DAILY BY SHOVELING OR SWEEPING. SEDIMENT IS NOT TO BE WASHED DOWN STORM SEWER DRAINS.
- STORM SEWER INLET PROTECTION IS TO BE IN PLACE, INSPECTED, AND CLEANED IF NECESSARY.
- OTHER ASSOCIATED SEDIMENT CONTROL MEASURES ARE TO BE INSPECTED TO ENSURE GOOD WORKING CONDITION.

City of Colorado Springs
Stormwater Quality

Figure VT-2
Vehicle Tracking
Application Examples

MULCHING NOTES

INSTALLATION REQUIREMENTS

- ALL DISTURBED AREAS MUST BE MULCHED WITHIN 21 DAYS AFTER FINAL GRADE AND SEEDED AREAS ARE TO BE MULCHED WITHIN 24 HOURS AFTER SEEDING.
- MATERIAL USED FOR MULCH CAN BE CERTIFIED CLEAN, WEED- AND SEED-FREE LONG STEMMED FIELD OR MARSH HAY, OR STRAW OF OATS, BARLEY, WHEAT, RYE, OR TRITICALE CERTIFIED BY THE COLORADO DEPARTMENT OF AGRICULTURE WEED FREE FORAGE CERTIFICATION PROGRAM.
- HYDRAULIC MULCHING MATERIAL SHALL CONSIST OF VIRGIN WOOD FIBER MANUFACTURED FROM CLEAN WHOLE WOOD CHIPS. WOOD CHIPS CANNOT CONTAIN ANY GROWTH OR GERMINATION INHIBITORS OR BE PRODUCED FROM RECYCLED MATERIAL. GRAVEL CAN ALSO BE USED.
- MULCH IS TO BE APPLIED EVENLY AT A RATE OF 2 TONS PER ACRE.
- MULCH IS TO BE ANCHORED EITHER BY CRIMPING (TUCKING MULCH FIBERS 4 INCHES INTO THE SOIL), USING NETTING (USED ON SMALL AREAS WITH STEEP SLOPES), OR WITH A TACKIFIER.
- HYDRAULIC MULCHING AND TACKIFIERS ARE NOT TO BE USED IN THE PRESENCE OF FREE SURFACE WATER.

MAINTENANCE REQUIREMENTS

- REGULAR INSPECTIONS ARE TO BE MADE OF ALL MULCHED AREAS.
- MULCH IS TO BE REPLACED IMMEDIATELY IN THOSE AREAS IT HAS BEEN REMOVED, AND IF NECESSARY THE AREA SHOULD BE RESEDED.

City of Colorado Springs
Stormwater Quality

Figure MU-1
Mulching
Construction Detail and Maintenance Requirements

RECOMMENDED ANNUAL GRASSES

| SPECIES (COMMON NAME) | GROWTH SEASON | SEEDING DATE | POUNDS OF PURE LIVE SEED (PLS) (PLS/ACRE) | PLANTING DEPTH (INCHES) |
|-----------------------|---------------|---------------------|---|-------------------------|
| 1. OATS | COOL | MARCH 16 - APRIL 30 | 35-50 | 1-2 |
| 2. SPRING WHEAT | COOL | MARCH 16 - APRIL 30 | 25-35 | 1-2 |
| 3. SPRING BARLEY | COOL | MARCH 16 - APRIL 30 | 25-35 | 1-2 |
| 4. ANNUAL RYEGRASS | COOL | MARCH 16 - JUNE 30 | 15-15 | 1-2 |
| 5. MILLET | WARM | MAY 16 - JULY 15 | 3-15 | 1/2-3/4 |
| 6. SUDANGRASS | WARM | MAY 16 - JULY 15 | 5-10 | 1/2-3/4 |
| 7. SORGHUM | WARM | MAY 16 - JULY 15 | 5-10 | 1/2-3/4 |
| 8. WINTER WHEAT | COOL | SEPTEMBER 1 - 30 | 20-35 | 1-2 |
| 9. WINTER BARLEY | COOL | SEPTEMBER 1 - 30 | 20-35 | 1-2 |
| 10. WINTER RYE | COOL | SEPTEMBER 1 - 30 | 20-35 | 1-2 |
| 11. TRITICALE | COOL | SEPTEMBER 1 - 30 | 25-40 | 1-2 |

THIS TABLE WAS TAKEN FROM UDFCD FOR RECOMMENDED ANNUAL GRASSES FOR THE DENVER METROPOLITAN AREA. THIS TABLE MAY BE USED UNLESS A SITE-SPECIFIC SEED MIX IS REQUESTED AND APPROVED.

TABLE TS-1

TEMPORARY SEEDING NOTES

INSTALLATION REQUIREMENTS

- DISTURBED AREAS ARE TO BE SEEDED WITHIN 21 DAYS AFTER CONSTRUCTION ACTIVITY OR GRADING ENDS IF SEASON ALLOWS.
- IF NECESSARY, SOIL IS TO BE CONDITIONED FOR PLANT GROWTH BY APPLYING TOPSOIL, FERTILIZERS, OR LIME.
- SOIL IS TO BE TILLED IMMEDIATELY PRIOR TO APPLYING SEEDS. COMPACT SOILS ESPECIALLY NEED TO BE LOOSENED.
- SEEDING DEPTH IS TO BE 4 INCHES FOR SLOPES FLATTER THAN 2:1, AND 1 INCH FOR SLOPES STEEPER THAN 2:1.
- ANNUAL GRASSES LISTED IN TABLE TS-1 ARE TO BE USED FOR TEMPORARY SEEDING. SEED MIXES ARE NOT TO CONTAIN ANY NOXIOUS WEED SEEDS INCLUDING RUSSIAN OR CANADIAN THISTLE, KNAPWEED, PURPLE LOOSESTRIKE, EUROPEAN BINDWEED, JOHNSON GRASS, AND LEAFY SPURGE.
- TABLE TS-1 ALSO PROVIDES REQUIREMENTS FOR SEEDING RATES, SEEDING DATES, AND PLANTING DEPTHS FOR THE APPROVED TYPES OF ANNUAL GRASSES.
- SEEDING IS TO BE APPLIED USING MECHANICAL TYPE DRILLS EXCEPT WHERE SLOPES ARE STEEP OR ACCESS IS LIMITED THEN HYDRAULIC SEEDING MAY BE USED.
- ALL SEEDED AREAS ARE TO BE MULCHED (SEE FACTSHEET ON MULCHING).
- IF HYDRAULIC SEEDING IS USED THEN HYDRAULIC MULCHING SHALL BE DONE SEPARATELY TO AVOID SEEDS BECOMING ENCAPSULATED IN THE MULCH.

MAINTENANCE REQUIREMENTS

- REGULAR INSPECTIONS ARE TO BE MADE OF ALL SEEDED AREAS TO ENSURE GROWTH.
- AREAS WHERE GROWTH IS NOT OCCURRING QUICKLY OR THE MULCH HAS BEEN REMOVED SHALL BE RE-SEEDED AS SOON AS POSSIBLE AND RE-MULCHED IF NEEDED.
- SEEDED AREAS ARE NOT TO BE DRIVEN OVER WITH CONSTRUCTION EQUIPMENT OR VEHICLES.

City of Colorado Springs
Stormwater Quality

Figure TS-1
Temporary Seeding
Construction Detail and Maintenance Requirements

SILT FENCE NOTES
INSTALLATION REQUIREMENTS
1. SILT FENCES SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
2. WHEN JOINTS ARE NECESSARY, SILT FENCE GEOTEXTILE SHALL BE SPLICED TOGETHER ONLY AT SUPPORT POST AND SECURELY SEALED.
3. 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.
4. THE FILTER MATERIAL SHALL BE FASTENED SECURELY TO METAL OR WOOD POSTS USING WIRE TIES, OR TO WOOD POSTS WITH 3/4" LONG #9 HEAVY-DUTY STAPLES. THE SILT FENCE GEOTEXTILE SHALL NOT BE STAPLED TO EXISTING TREES.
5. WHILE NOT REQUIRED, WIRE MESH FENCE MAY BE USED TO SUPPORT THE GEOTEXTILE. WIRE FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 3/4" LONG. TIE WIRES OR HOOD RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 6" AND SHALL NOT EXTEND MORE THAN 3' ABOVE THE ORIGINAL GROUND SURFACE.
6. 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.
7. 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 INPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE.
MAINTENANCE REQUIREMENTS
1. CONTRACTOR SHALL INSPECT SILT FENCES IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL. DAMAGED, COLLAPSED, UNTRENCHED OR INEFFECTIVE SILT FENCES SHALL BE PROMPTLY REPAIRED OR REPLACED.
2. SEDIMENT SHALL BE REMOVED FROM BEHIND SILT FENCE WHEN IT ACCUMULATES TO HALF THE EXPOSED GEOTEXTILE HEIGHT.
3. SILT FENCES SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED AS APPROVED BY THE CITY.

City of Colorado Springs
Stormwater Quality

Figure SF-2
Silt Fence
Construction Detail and Maintenance Requirements

Top View of Silt Fence Posts Detail

Refer to "Top View of Silt Fence Posts Detail"

City of Colorado Springs
Stormwater Quality

Figure SF-3
Silt Fence Joint Tying
Construction Detail and Maintenance Requirements

CONTRACTOR SHALL ANCHOR PORTABLE TOILET TO THE GROUND, AT A MINIMUM OF TWO OPPOSING CORNERS (ON A DIAGONAL) USING U-SHAPED REBAR STAKES

CONTRACTOR SHALL ANCHOR PORTABLE TOILET TO THE GROUND, AT A MINIMUM OF TWO OPPOSING (DIAGONAL) CORNERS. TOILET CONTAINMENT PANS MAY BE USED IN PLACE OF A TRAILER AT THE GEC INSPECTOR'S DISCRETION. TOILET CONTAINMENT PANS MUST BE ANCHORED IN PLACE AND MUST NOT BE USED WITHIN THE CITY R.O.W.

INSTALLATION NOTES
1. PORTABLE TOILETS SHALL BE PLACED A MINIMUM OF 10 FEET BEHIND ALL CURBS, SIDEWALKS, AND OTHER IMPERVIOUS AREAS; 50 FEET FROM STORM INLETS, AND 100 FEET FROM WATERWAYS.
2. PORTABLE TOILETS IN THE RIGHT-OF-WAY ARE REQUIRED TO BE PLACED ON MOBILE TRAILERS AND MUST BE ANCHORED OR WEIGHTED DOWN. PORTABLE TOILETS MAY BE INSTALLED IN ACCORDANCE WITH NOTE #1 IN STAGING AREAS/YARDS.
3. PORTABLE TOILETS SHALL BE SECURELY ANCHORED TO THE GROUND USING U-SHAPED REBAR STAKES, OR OTHER EFFECTIVE ANCHORING.
4. ANCHORING SHALL BE POSITIONED ON AT LEAST TWO OPPOSING (DIAGONAL) CORNERS.
5. TOILET CONTAINMENT PANS MAY BE USED IN PLACE OF A TRAILER AT THE GEC INSPECTOR'S DISCRETION. TOILET CONTAINMENT PANS MUST BE ANCHORED IN PLACE AND MUST NOT BE USED WITHIN THE CITY R.O.W.

MAINTENANCE NOTES
1. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN CONTROL MEASURES IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
2. PORTABLE TOILETS SHALL BE SERVICED AT THE NECESSARY INTERVALS TO ELIMINATE THE POSSIBILITY OF OVERFLOW.
3. WHEN THE PORTABLE TOILETS ARE REMOVED, ANY DISTURBED AREAS ASSOCIATED WITH THE INSTALLATION, MAINTENANCE, AND/OR REMOVAL OF THE TOILETS MUST BE PERMANENTLY STABILIZED.

City of Colorado Springs
Stormwater Quality

Figure SM-3
Construction Fence (CF)
Construction Fence (CF)

BASIN GEOMETRY:
LENGTH (L) ≥ 2
WIDTH (W) ≥ 2

REQUIRED VOLUME TO CREST OF EMERGENCY SPILLWAY = 1800 CUBIC FEET PER ACRE OF DRAINAGE AREA

8" (OR LARGER) PVC PERFORATED RISER PIPE, PERFORATIONS VERTICALLY SPACED 4" APART AND SIZED TO DRAIN VOLUME BELOW EMERGENCY SPILLWAY IN 40 HOURS (SEE FIGURE SB-2 FOR PERFORATION SIZING)

100 YR (OR LARGER) EMERGENCY SPILLWAY CREST (BEYOND) (SHALL BE DESIGNED SO THAT EMBANKMENT FAILURE SHALL NOT OCCUR IN 100 YR EVENT)

3 OR FLATTER

3 OR FLATTER

8" (OR LARGER) PVC OUTLET PIPE 0.5% MIN SLOPE

8" (OR LARGER) PVC 90° ELBOW

RIPPRAP APRON

SEDIMENT BASIN NOTES
INSTALLATION REQUIREMENTS
1. SEDIMENT BASINS SHALL BE INSTALLED BEFORE ANY CLEARING AND/OR GRADING IS UNDERTAKEN.
2. THE AREA UNDER WHICH THE EMBANKMENT IS TO BE INSTALLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF ALL VEGETATION AND ROOT MAT.
3. THE OUTLET OF THE BASIN SHALL BE DESIGNED TO DRAIN ITS VOLUME IN 40 HOURS.
4. THE OUTLET IS TO BE LOCATED AT THE FURTHEST DISTANCE FROM THE INLET OF THE BASIN. BAFFLES MAY BE NEEDED TO INCREASE THE FLOW LENGTH AND SETTLING TIME.
5. EMBANKMENT MATERIAL SHALL CONSIST OF SOIL WITH A MINIMUM OF 15% PASSING A #200 SIEVE. EXCAVATED SOIL CAN BE USED IF IT MEETS THIS REQUIREMENT.
6. EMBANKMENT IS TO BE COMPACTED TO AT LEAST 90% OF MAXIMUM DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT ACCORDING TO ASTM D 698.
7. WHEN A BASIN IS INSTALLED NEAR A RESIDENTIAL AREA, FOR SAFETY REASONS, A SIGN SHALL BE POSTED AND THE AREA SECURED WITH A FENCE.
MAINTENANCE REQUIREMENTS
1. CONTRACTOR SHALL INSPECT SEDIMENT BASINS AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL.
2. SEDIMENT BASINS SHALL BE CLEANED OUT BEFORE SEDIMENT HAS FILLED HALF THE VOLUME OF THE BASIN.
3. SEDIMENT BASINS SHALL REMAIN OPERATIONAL AND PROPERLY MAINTAINED UNTIL THE SITE AREA IS PERMANENTLY STABILIZED WITH ADEQUATE VEGETATIVE COVER AND/OR OTHER PERMANENT STRUCTURE AS APPROVED BY THE CITY.

Provide SB-2, need the full sediment basin detail. We need the specific dimensions and sizes for components.

City of Colorado Springs
Stormwater Quality

Figure SB-1
Sediment Basin
Construction Detail and Maintenance Requirements

PERIMETER CONTROL

PERIMETER CONTROL

STOCKPILE PROTECTION PLAN

STOCKPILE PROTECTION ELEVATION

INSTALLATION NOTES
1. INSTALL PERIMETER CONTROL AROUND STOCKPILE ON DOWNGRADIENT SIDE. PERIMETER CONTROL MUST BE SUITABLE TO SITE CONDITIONS AND INSTALLED ACCORDING TO THE RELEVANT DETAIL.
2. FOR STOCKPILES ON THE INTERIOR PORTION OF A CONSTRUCTION SITE, WHERE OTHER DOWNGRADIENT CONTROLS INCLUDING PERIMETER CONTROL ARE IN PLACE, STOCKPILE PERIMETER CONTROLS MAY NOT BE REQUIRED.

MAINTENANCE NOTES
1. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN CONTROL MEASURES IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
2. IF PERIMETER CONTROLS MUST BE MOVED TO ACCESS STOCKPILE, REPLACE PERIMETER CONTROLS BY THE END OF THE WORK DAY.
3. ACCUMULATED SEDIMENT MUST BE REMOVED ACCORDING TO PERIMETER CONTROL DETAIL.

City of Colorado Springs
Stormwater Quality

Figure SP
Stockpile Protection
Construction Detail and Maintenance Requirements

PLASTIC CAP, TYP.

STUDDED STEEL TEE POST

5' MIN.

1' MIN.

10' MAX SPACING

EXISTING GRADE

ORANGE RESIN NET CONSTRUCTION FENCE OR APPROVED EQUAL

STUDDED STEEL TEE POST

4' MIN.

CF-1. PLASTIC MESH CONSTRUCTION FENCE

CONSTRUCTION FENCE INSTALLATION NOTES
1. SEE PLAN VIEW FOR: -LOCATION OF CONSTRUCTION FENCE.
2. CONSTRUCTION FENCE SHOWN SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
3. CONSTRUCTION FENCE SHALL BE COMPOSED OF ORANGE, CONTRACTOR-GRADE MATERIAL THAT IS AT LEAST 4' HIGH. METAL POSTS SHOULD HAVE A PLASTIC CAP FOR SAFETY.
4. STUDDED STEEL TEE POSTS SHALL BE UTILIZED TO SUPPORT THE CONSTRUCTION FENCE. MAXIMUM SPACING FOR STEEL TEE POSTS SHALL BE 10'.
5. CONSTRUCTION FENCE SHALL BE SECURELY FASTENED TO THE TOP, MIDDLE, AND BOTTOM OF EACH POST.

CONSTRUCTION FENCE MAINTENANCE NOTES
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. CONSTRUCTION FENCE SHALL BE REPAIRED OR REPLACED WHEN THERE ARE SIGNS OF DAMAGE SUCH AS RIPS OR SACS. CONSTRUCTION FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.
5. WHEN CONSTRUCTION FENCES ARE REMOVED, ALL DISTURBED AREAS ASSOCIATED WITH THE INSTALLATION, MAINTENANCE, AND/OR REMOVAL OF THE FENCE SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED, OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.
NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.
(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

City of Colorado Springs
Stormwater Quality

Figure CF-1
Construction Fence (CF)
Construction Fence (CF)

T-4 SAND FILTERS

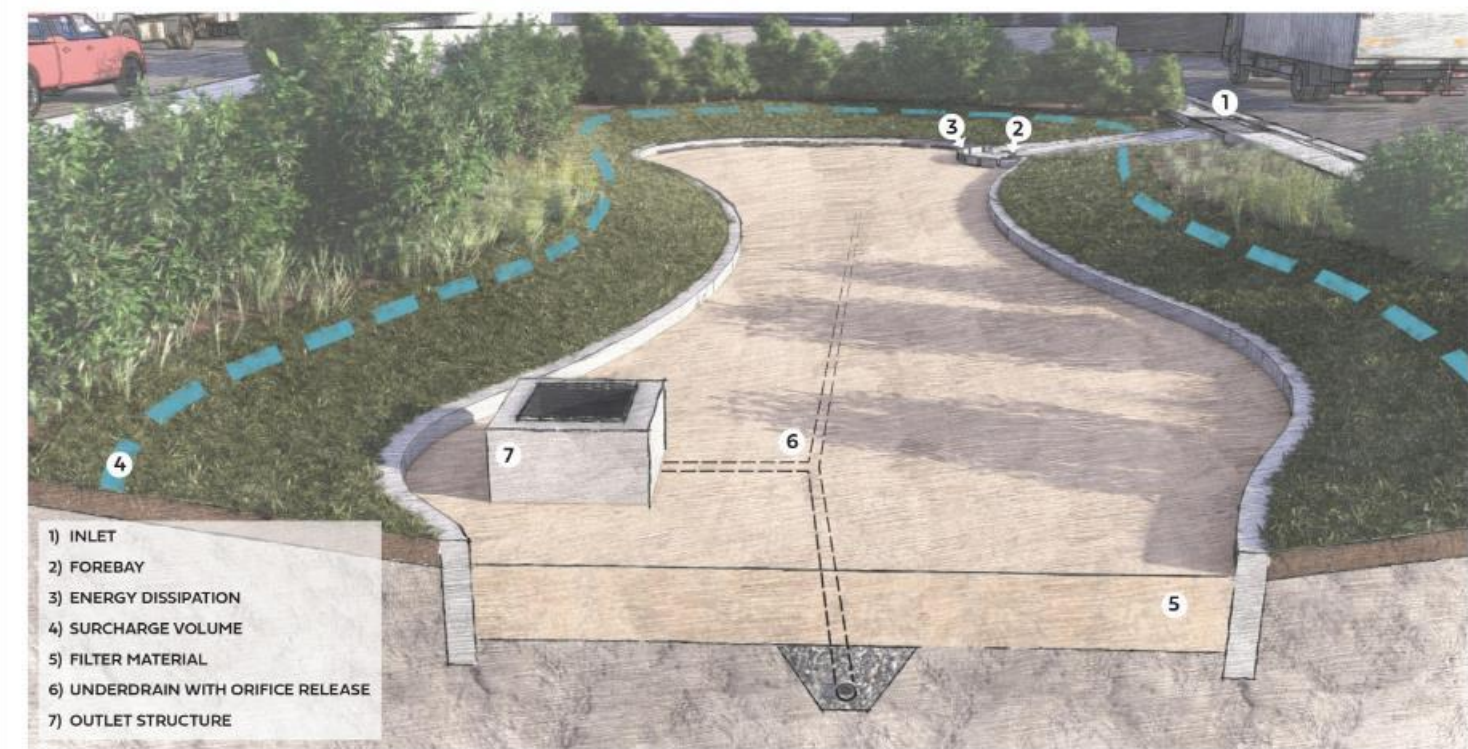


Figure SF-1. Sand Filter Components

DESCRIPTION

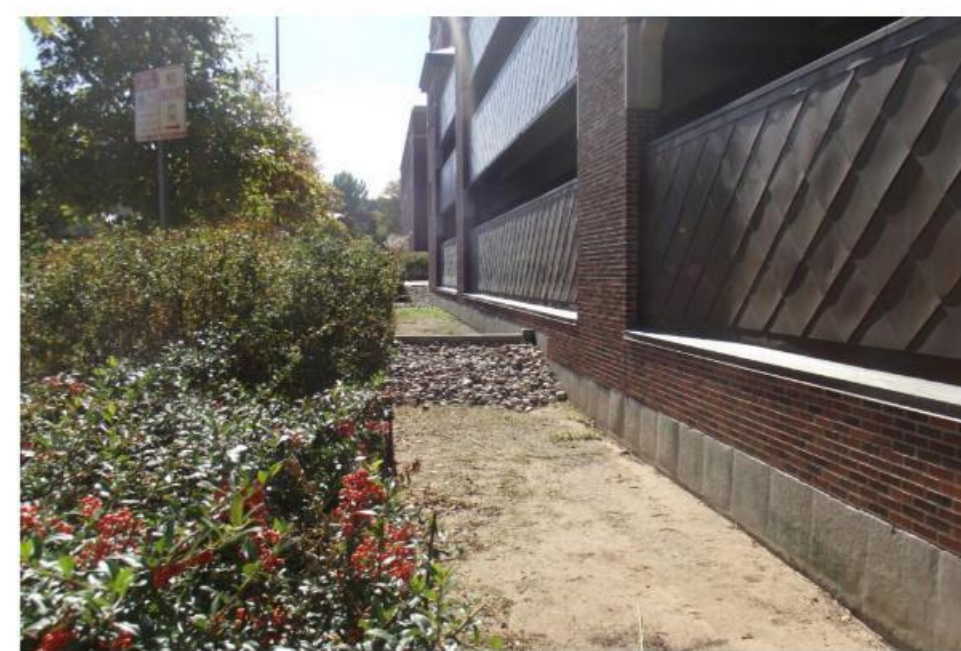
A sand filter treats runoff by filtration and also provides infiltration when unlined systems are used. A sand filter consists of a surcharge zone underlain by a sand bed, often with an underdrain system (Urbanas 1999). During a storm, runoff collects in the surcharge zone and gradually infiltrates into the underlying sand bed, filling the void spaces of the sand. The underdrain gradually releases the runoff that is filtered through the sand bed and discharges the runoff to a nearby channel, swale, or storm drain. When suitable based on site conditions, a partial or full infiltration section can be used to infiltrate some or all of the runoff from the water quality design event.

A sand filter is similar to bioretention in terms of filtration and infiltration treatment mechanisms but differs in that it is not specifically designed for vegetative growth. The absence of vegetation in a sand filter allows for active maintenance of the surface of the filter (i.e., raking to loosen the surface layer or to remove accumulated sediments). For this reason, sand filter criteria allow for a larger contributing area and greater depth of storage than bioretention but will also require more frequent maintenance at the surface of the filter to ensure adequate infiltration. A sand filter can be designed to include the Excess Urban Runoff Volume (EURV) and 100-year flood storage volume, released through a surface-release outlet structure. Sand filters can be placed in a vault for subsurface applications. However, these types of installations are more difficult to inspect and maintain and should only be used if surface treatment is infeasible.

TABLE SF-1. SF OVERVIEW

| SAND FILTERS | |
|---|------------|
| MS4 Permit Applicability (Dependent on design and level of treatment) | |
| Meets Runoff Reduction Standard | Potential' |
| Meets WQCV Capture Standard | Yes |
| Meets Pollutant Removal Standard | Yes |
| Typical Effectiveness for Targeted Pollutants | |
| Sediment/Solids | High |
| Total Phosphorus | Medium |
| Total Nitrogen | Low |
| Total Metals | High |
| Bacteria | Medium |
| Common Applications | |
| Runoff Reduction (General) | Potential' |
| Used for Pretreatment | No |
| Integrated with Flood Control | Yes |

'Depends on design including full-infiltration, partial infiltration or no-infiltration section.



Photograph SF-1. This sand filter, constructed on two sides of a parking garage, is accessible for maintenance, yet screened from public view by a landscape buffer.

BENEFITS OF SAND FILTERS

- Filtration processes effectively remove a range of pollutants, including phosphorus.
- Filter surface area does not require irrigation.
- Straightforward maintenance procedures.

LIMITATIONS OF SAND FILTERS

- Less attractive than vegetated bioretention systems unless additional aesthetic or vegetative screening is provided.
- Not suitable for installation while construction or major landscaping activities are taking place in the watershed.
- Susceptible to clogging if not properly equipped with a forebay and regularly maintained.
- Typical lined installations do not provide significant volume reduction.
- Ammonification and nitrification of organic nitrogen may occur in the media, resulting in nitrate export (Barrett 2003; Clary et al. 2020).

SCM COMPONENTS

The primary components of a sand filter include inlet(s), energy dissipation and forebay(s), the surcharge volume, filter material, an underdrain (for no- and partial-infiltration sections), and an outlet structure (Figure SF-1 and Table SF-2). The primary outlet for the Water Quality Capture Volume (WQCV) is typically an underdrain or infiltration into the underlying soil. Surface outlet structures are provided to convey flows that exceed the WQCV design volume and for facilities designed to manage the EURV and 100-year design events.

TABLE SF-2. SF COMPONENTS

| COMPONENT | INTENT |
|---------------------------------|--|
| Inlet | Allows stormwater to enter the SCM. |
| Forebay | Facilitates removal of trash and coarse sediments. |
| Energy Dissipation | Minimizes potential for erosion of sand filter surface. Often incorporated into forebay. |
| Surcharge Volume | Provides temporary storage volume needed for attenuation of design flows. |
| Filter Material | Removes pollutants in runoff by filtration through porous media (sand). |
| Underdrain with Orifice Release | Collects and slowly releases the WQCV over 12 hours to reduce erosion in the receiving stream and enhance treatment by increasing contact time with the media. |
| Outlet Structure | Conveys stormwater flows that exceed the design volume. |

SITE CONSIDERATIONS

When the tributary watershed includes ongoing phased construction, sparsely vegetated areas, or steep slopes in sandy soils, consider another stormwater control measure (SCM) or provide robust pretreatment before runoff from these areas reach the sand filter. Sand filters are susceptible to clogging and are better suited to stable watersheds without excessive sediment loading.

See Section 3.0 Site Assessment and Section 4.3 Filtration and Infiltration Section Development of this chapter to determine the section of the sand filter based on site-specific conditions.

Sand filters are often used in industrial settings, where pollutants may be present that warrant use of a lined system to prevent subsurface pollutant mobilization.

COMMUNITY VALUES

Sand filters are highly functional SCMs that are well suited for industrial and large-scale commercial land uses that have generally lower aesthetic expectations. With an exposed sand bed and lack of vegetation, a sand filter is not the best SCM option for highly visible sites such as boutique commercial or mixed-use development, where aesthetics are important to business owners and property managers. Sand filters are also not generally ideal options for low-density residential or park and open space-type sites, where a more naturalistic aesthetic is generally expected. However, if properly screened with shrubs or other site elements (e.g., site walls, raised planters), a sand filter can be made inconspicuous and may be successfully integrated into almost any type of land use. When located in a visible area, frequent inspection and maintenance are critical to public acceptance because an unmaintained sand filter can become an unattractive weed patch with sediment and trash deposits.

While successfully integrating a sand filter into certain types of sites may be aesthetically challenging, their straightforward design and function provides some distinct advantages over other SCMs that require vegetation, including water conservation and a simplified maintenance regime. If creatively located and designed and well maintained, sand filters can be an appropriate and effective stormwater quality treatment solution for a wide variety of sites.

MAINTENANCE

Periodic maintenance for sand filters includes removing sediment, scarifying the filter surface, and removal and/or replacement of the top layer of the media. More detailed maintenance recommendations for sand filters are provided in Chapter 6 of this manual. During design, the following should be considered to ensure ease of maintenance over the long-term:

- Provide forebays for inlets to remove coarse sediments and trash in a manner that can be easily accessed for maintenance.
- Provide energy dissipation to minimize erosion of the filter bed.
- Do not put a filter sock on the underdrain. This is not necessary and can cause the sand filter to clog, resulting in ponded water for extended periods.
- Install cleanouts to enable camera inspection immediately following construction to ensure the underdrain pipe was not crushed during construction. Cleanouts also facilitate maintenance over the life of the facility. Consider locating cleanouts in the side slopes of the basin and above the depth of ponding to prevent short circuiting of flow through the cleanouts to the underdrain.
- For facilities with side slopes, consider vegetated side slopes to pre-treat runoff by filtering (straining). This will reduce the frequency of maintenance. Use native vegetation to limit the need for irrigation of side slopes to the initial establishment period, with supplemental irrigation as needed during prolonged drought periods. Side slopes also may be stabilized with alternative permeable, non-erosive cover such as appropriately sized aggregate,

provided that the material is designed to stay in place under design conditions up to and including the 100-year event.

- If a sand filter is located in an underground vault, design the vault in a way that allows for routine scarification of the filter surface and eventual media replacement. Multiple access manholes are typically required, and vaults must be designed with adequate clearance for access by equipment and maintenance personnel (an underground sand filter is a confined space). In some installations, grates can be used instead of solid covers, allowing for easier inspection and maintenance. Design of sand filter vaults is not addressed in detail in this fact sheet and requires additional design considerations to address issues such as biofouling, multi-chamber pretreatment considerations and other factors (DC DOEE 2020, Davis et al. 2022).
- When screening is provided for aesthetic reasons, maintenance access must still be provided.

DESIGN PROCEDURES AND CRITERIA

The following steps outline the design procedure and criteria for a sand filter:

1. **Subsurface Exploration and Determination of a No-Infiltration, Partial Infiltration or Full Infiltration Section:** See Section 3.0 Site Assessment and Section 4.0 Filtration and Infiltration Systems of this chapter to determine the most appropriate section design for the sand filter based on site conditions. Given that sand filters are often used in industrial settings where subsurface pollutant mobilization should be avoided, lined systems (no-infiltration sections) should be considered based on site conditions.
2. **Inlets, Energy Dissipation, Forebays and Pretreatment:** Use inlet features that create sheet flow or shallow flow conditions to evenly distribute flow. Provide energy dissipation and a forebay at all locations where concentrated flows enter the sand filter. The only inlets that do not require energy dissipation and a forebay are sheet flow inlets to the sand filter. All piped or channeled inlets to sand filters require energy dissipation and forebays, ranging from concrete pads for smaller facilities to more formal structures for larger installations. See Section 5.0 SCM Inflow Features of this chapter for additional guidance. In addition to properly sized forebay(s), other types of pretreatment such as grass buffers, hydrodynamic separators, and trash collection devices may also be considered. Underground sand filters in vaults must have a separate pretreatment sedimentation chamber or pretreatment device.
3. **Design Storage Volume:** Calculate the storage volume provided above the sand bed of the basin equal to the WQCV based on a 12-hour drain time, after accounting for runoff-reduction SCMs in the contributing watershed. Determine the required WQCV or EURV (watershed inches of runoff) using Figure 3-2 of Chapter 3 of this manual (for WQCV) or equations provided in the Storage chapter of Volume 2 (for EURV).



Photograph SF-2. Underground sand filter at Denver Botanic Gardens has a grated top, which enables inspection and maintenance.



Photograph SF-3. Sand filter with incorporation of minor event flood attenuation provides water quality and detention for a substation.

4. **Sand Filter Geometry:** Sand filter geometry considerations include minimum surface area, side slope conditions and maximum ponding depth:

- **Minimum Filter Surface Area:** Use equation SF-1 to calculate the minimum filter area for the WQCV, which is the flat surface area of the sand filter. Sediment will deposit on the filter area of the sand filter. Therefore, if the filter area is too small, the filter may clog prematurely. If clogging of the filter is of particular concern, increasing the filter area will decrease the frequency of maintenance. Equation SF-1 provides the minimum filter area, allowing for some of the volume to be stored beyond the area of the filter. Note that the total volume must also equal or exceed the design volume.

$$A_p = 0.0125 \cdot A \cdot I \quad \text{Equation SF-1}$$

Where:

A_p = minimum filter area (flat surface area) (ft²)

A = area tributary to the sand filter (ft²)

I = imperviousness of area tributary to the sand filter (percent expressed as a decimal)

- **Side Slopes:** The side slopes of the basin should be stable and maintainable. For vegetated side slopes, a slope no steeper than 4:1 (horizontal: vertical) is recommended. Use vertical walls where side slopes are steeper than 3:1. Using milder side slopes is an effective way to manage the maximum ponding depth of the WQCV in the SCM when space constraints allow.

When side slopes use alternative permeable, non-erosive cover such as the aggregate shown in Photograph SF-3, the engineer must perform analysis to demonstrate the cover material placed on the slope will resist movement from tractive forces under design conditions. This analysis should consider the condition when the sand filter is filling and the side slopes may be exposed to overland runoff, as well as the condition when the facility is full and the spillway is operating.

- **Maximum Ponding Depth:** The maximum recommended ponding depth is governed by the minimum filter area and basin geometry. For Full Spectrum Detention (FSD) facilities, limiting the WQCV depth to 18 inches will generally help to avoid excessive depths for the EURV and 100-year storage volume. Greater WQCV depths will require more frequent maintenance and may drive the depths of the EURV and 100-year storage volumes to undesirable levels for FSD facilities. Particularly in publicly accessible urban areas, consider surrounding land use and public safety when greater ponding depths are included in the design.

5. **Underdrain System, Impermeable Liner, and Geotextile Separator Fabric:** See Section 4.0 Filtration and Infiltration Systems of this chapter for guidance and criteria based on the type of filtration and infiltration

SAND FILTER MEDIA AMENDMENTS

An area of evolving research for sand filter media includes various amendments that enhance performance for specific pollutants (e.g., bacteria, metals, nutrients). For example, iron-enhanced sand filter designs target phosphorus removal (MPCA 2022; Erickson and Gulliver 2010). Other examples include calcite/limestone, zeolite, aluminum-based media, fly ash, olivine and various proprietary media (Davis et al. 2022). Research has also included layering of various media types to target specific pollutants (Prabhukumar et al. 2015).

Designers may consider use of novel amendments to improve water quality performance, provided that the functions and performance of media are maintained or improved. For example, novel amendments should not cause increases in nutrient or metals export or decrease the infiltration rate relative to MHPD's recommended media.

system selected. Underdrain systems in sand filter basins consist of a slotted PVC pipe placed within a layer of drain gravel beneath the filter sand.

6. **Filter Material:** Provide, at a minimum, an 18-inch layer of AASHTO M43 fine aggregate (filter sand), as shown in Table 4-5 in Section 4.3.3 of this chapter. Maintain a flat surface on the top of the sand bed.
7. **Outlet:** Drain the underdrain to the outlet structure and use an orifice plate to drain the WQCV over approximately 12 hours. Section 6.0 SCM Outflow Features of this chapter includes conceptual details for the underdrain and orifice outlet for attenuating both the WQCV and larger volumes via full spectrum detention. For facilities that are designed to treat the EURV and/or 100-year flood, flows greater than the WQCV are orifice-controlled and released to the surface, rather than forced through the sand filter. Provide a spillway for larger events that will convey overflows to the receiving drainage system without adversely affecting adjacent structures or infrastructure. Use the simplified orifice equation in Section 6.1 of this chapter or the MHPD-Detention workbook to size the orifice. MHPD-Detention also aids with the design of outlet controls for larger runoff events.

CONSTRUCTION CONSIDERATIONS

Proper construction of sand filters involves careful attention to material specifications and construction details. During construction, implement these practices:

- Protect area from excessive sediment loading during construction. The portion of the site draining to the sand filter must be stabilized before allowing flow into the sand filter.
- When using an impermeable liner, ensure enough slack in the liner to allow for backfill, compaction, and settling without tearing the liner as described in Section 4.0 Filtration and Infiltration Systems of this chapter. Concrete spray-on liners may also be used.
- Avoid application of herbicides for weed control within the sand filter and areas draining directly into the sand filter (e.g., embankments).

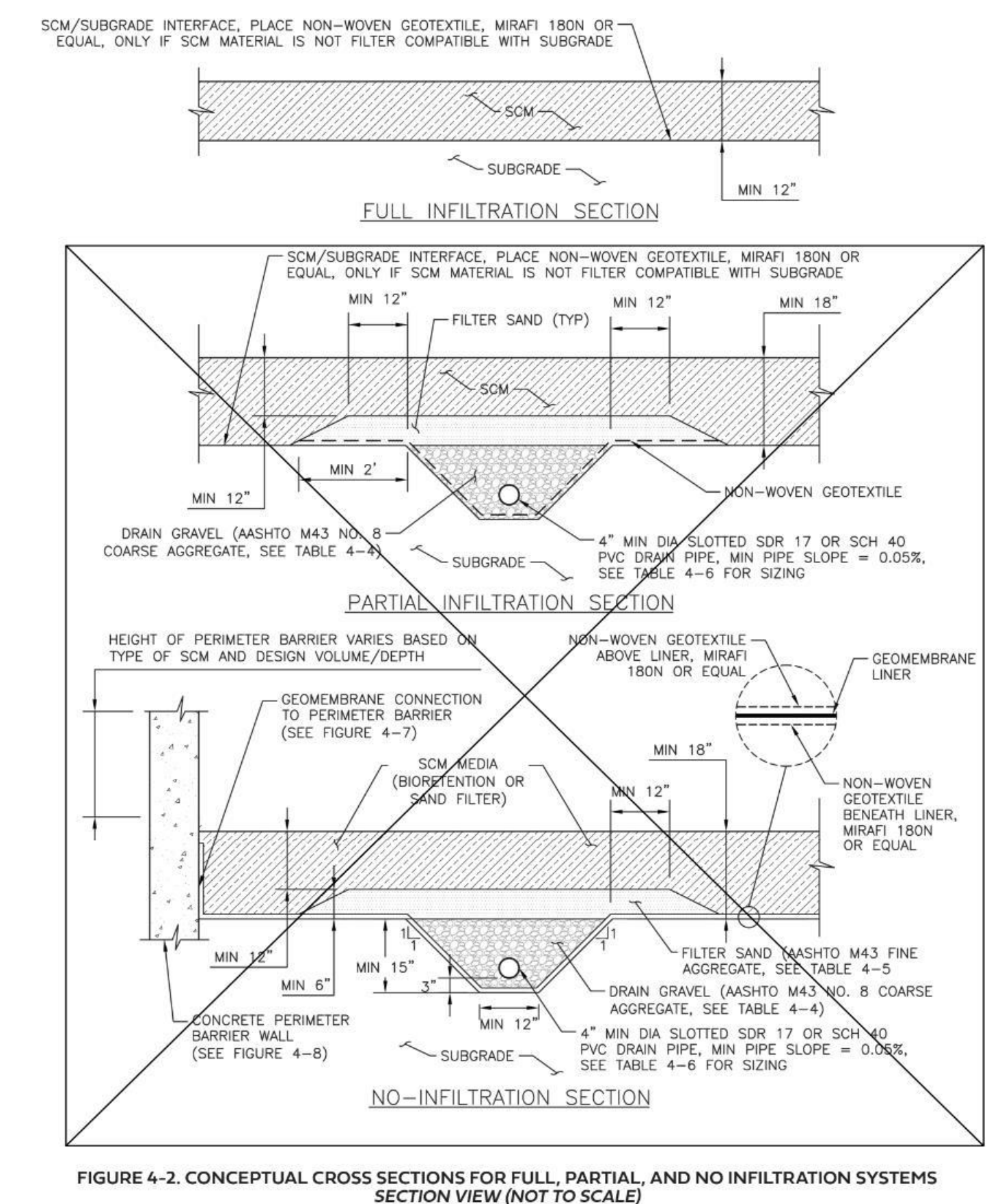


FIGURE 4-2. CONCEPTUAL CROSS SECTIONS FOR FULL, PARTIAL, AND NO INFILTRATION SYSTEMS SECTION VIEW (NOT TO SCALE)

| REVISION DATE | REVISION DESCRIPTION (DESCRIPTION) |
|---------------|------------------------------------|
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NORTH



PROJECT #: 2403-0094
CHECKED BY: BML
DRAWN BY: EDM

DATE: 10/02/2024

SHEET # **G.7**

V1_Grading & Erosion Control Plan.pdf Markup Summary

eschoenheit (11)

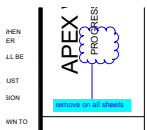


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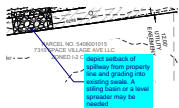
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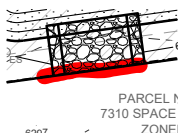


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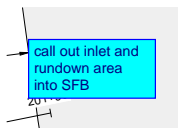


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depict setback of spillway from property line and grading into existing swale. A stiling basin or a level spreader may be needed

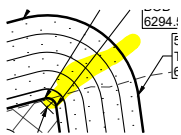


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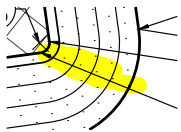


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call out inlet and rundown area into SFB

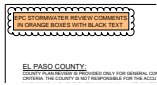


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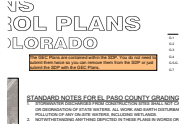


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Mikayla Hartford (14)



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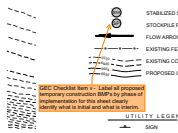
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The GEC Plans are contained within the SDP. You do not need to submit them twice so you can remove them from the SDP or just submit the SDP with the GEC Plans.



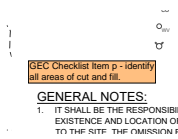
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GEC Checklist Items H and M. If "limits of disturbance" and "construction boundary" are the same, change to "limits of construction/disturbance" or otherwise show as separate line types for each on the legend and figure.



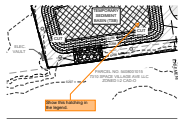
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GEC Checklist Item v - Label all proposed temporary construction BMPs by phase of implementation for this sheet clearly identify what is initial and what is interim.



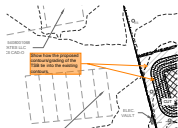
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GEC Checklist Item p - identify all areas of cut and fill.



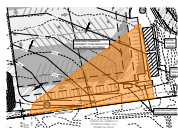
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Show this hatching in the legend.

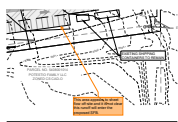


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Show how the proposed contours/grading of the TSB tie into the existing contours.

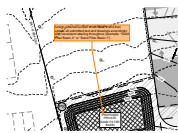


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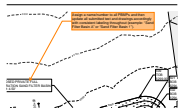
Author: Mikayla Hartford
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This area appears to sheet flow off-site and it is not clear this runoff will enter the proposed SFB.



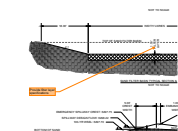
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Assign a name/number to all PBMPs and then update all submitted text and drawings accordingly with consistent labeling throughout (example: "Sand Filter Basin A" or "Sand Filter Basin 1").



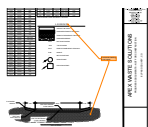
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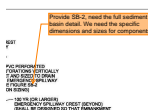
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Provide filter layer specifications



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Provide this hatching in the legend



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Provide SB-2, need the full sediment basin detail. We need the specific dimensions and sizes for components.