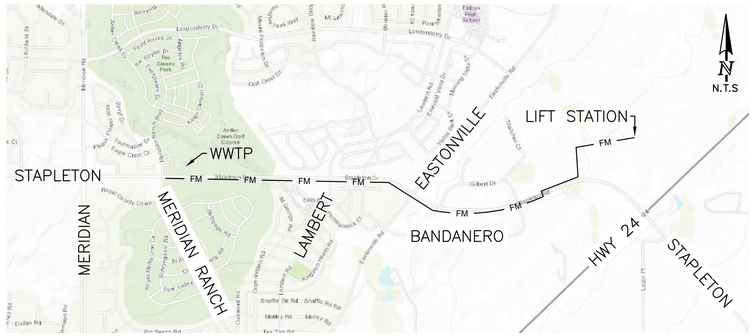
WATERBURY SANITARY FORCE MAIN

EL PASO COUNTY, CO

UTILITY CONSTRUCTION SET

APRIL 2026



VICINITY MAP

CONTACT INFORMATION:

OWNER:	ACM ALF VIII JV SUB II LLC 8350 EAST CRESCENT PARKWAY, SUITE 200, GREENWOOD, CO 80111 JASON POCK (303) 984-9800 EXT 107
CIVIL ENGINEER:	TERRA NOVA ENGINEERING, INC. 721 S. 23RD STREET COLORADO SPRINGS, COLORADO 80904 QUENTIN ARMIJO, P.E., (719) 635-6422
COUNTY ENGINEERING DIVISION	EL PASO COUNTY DEPARMENT OF PUBLIC WORKS JALAL SALEH P.E. (719) 520-6300 JALALSALEH@ELPASOCO.COM ZACHARY JANNUSCH (719) 500-3170 ZACHARYJANNUSCH@ELPASOCO.COM
METRO DISTRICT	WATERBURY METROPOLITAN DISTRICT #1 ADAM NOEL (719)-447-1777 WOODMEN HILLS METROPOLITAN DISTRICT 8046 EASTONVILLE RD, PEYTON, CO 80831 CODY RITTER (719) 495-2500
GAS DEPARMENT	BLACK HILLS ENERGY GEORGE PETERSON (719) 393-6625
ELECTRIC DEPARMENT	MOUNTAIN VIEW ELECTRIC ASSOCIATION DARYL EDWARDS (719) 495-2283
FIRE DEPARMENT	FALCON FIRE STATION 3 / HEADQUARERS (719) 495-4050
TELEPHONE COMPANY	A.T.&T. LOCATORS (719) 635-3674 CENTURY LINK LOCATORS 811

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UTILITY DISTRICT GENERAL NOTES

(ALL GENERAL NOTES MAY NOT BE APPLICABLE TO THIS PROJECT)

GENERAL NOTES:

1. ALL UTILITY CONSTRUCTION TO BE CONDUCTED IN CONFORMANCE WITH THE CURRENT WOODMEN HILLS METROPOLITAN DISTRICT (WHMD, THE DISTRICT) SPECIFICATIONS.
2. ALL PLANS ON THE JOB SITE SHALL BE SIGNED BY THE DISTRICT AND THE DISTRICT'S ENGINEER. ANY REVISION TO THE PLANS SHALL BE SO NOTED WITH THE OLD DRAWING MARKED NOT 'VALID.'
3. ALL STATIONING IS CENTERLINE UNLESS OTHERWISE NOTED. ALL ELEVATIONS ARE CENTERLINE UNLESS OTHERWISE NOTED.
4. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE DISTRICT. THE DISTRICT RESERVES THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO ITS STANDARDS AND SPECIFICATIONS.
5. ALL OVER-LOT GRADING MUST BE COMPLETED TO WITHIN ONE (1) FOOT OF FINAL GRADE PRIOR TO INSTALLATION OF WATER AND WASTEWATER INFRASTRUCTURE.
6. ALL WATER AND SEWER SERVICE LOCATIONS SHALL BE CLEARLY MARKED ON EITHER THE CURB HEAD OR THE FACE OF THE CURB, WITH AN 'S' FOR SEWER AND A 'W' FOR WATER.
7. DUCTILE IRON PIPES, INCLUDING FITTINGS, VALVES, AND FIRE HYDRANTS, SHALL BE WRAPPED WITH POLYETHYLENE TUBING, DOUBLE BONDED AT EACH JOINT, AND ELECTRICALLY ISOLATED. BONDING AND ANODE CONNECTIONS SHALL BE THOROUGHLY COATED WITH BITUMINOUS COATINGS.
8. ALL DUCTILE IRON PIPE LESS THAN TWELVE INCHES (12') AND FITTINGS SHALL HAVE CATHODIC PROTECTION USING TWO (2) NO. 6 WIRES WITH 17 LB. MAGNESIUM ANODES EVERY 400 FEET AND 9 LB. MAGNESIUM ANODES AT EACH FITTING. ALL DUCTILE IRON PIPE TWELVE INCHES (12') AND GREATER AND FITTINGS SHALL HAVE CATHODIC PROTECTION USING TWO (2) NO. 6 WIRES WITH 17 LB. MAGNESIUM ANODES EVERY 300 FEET AND 9 LB. MAGNESIUM ANODES AT EACH FITTING.
9. ALL PIPE MATERIAL, BACKFILL, AND INSTALLATION SHALL CONFORM TO THE APPLICABLE SPECIFICATIONS OF THE DISTRICT, COLORADO DEPARTMENT OF TRANSPORTATION, EL PASO COUNTY DEPARTMENT OF TRANSPORTATION, COLORADO SPRINGS UTILITIES, AND THE GEOTECHNICAL ENGINEER.
10. COMPACTION TESTS SHALL BE 95% STANDARD PROCTOR AS DETERMINED BY ASTM D698, UNLESS OTHERWISE APPROVED BY THE DISTRICT OR HIGHER STANDARD AS IMPOSED BY ANOTHER AGENCIES HAVING RIGHT-OF-WAY JURISDICTION. THIS SHALL INCLUDE ALL VALVES, FIRE HYDRANT RUNS, WATER & SEWER SERVICE LINES, AND MANHOLES. ALL REPORTS SHALL BE SUBMITTED TO THE DISTRICT FOR REVIEW AND APPROVAL.
11. THE LOCATION OF ALL EXISTING UTILITIES SHOWN ON THE DRAWINGS ARE APPROXIMATE ONLY. THE LOCATION OF ALL UTILITIES SHALL BE FIELD VERIFIED PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES. THE DISTRICT SHALL BE NOTIFIED OF ANY DEVIATIONS TO THE LINE AND/OR GRADE AS DEPICTED ON THE PLANS. CONTRACTOR SHALL SUBMIT TO THE DISTRICT AND THE ENGINEER OF RECORD A REPORT OF THE FIELD-VERIFIED INFORMATION PRIOR TO THE START OF CONSTRUCTION.
12. ALL BENDS SHALL BE FIELD STAKED PRIOR TO THE START OF CONSTRUCTION.
13. BENDS, DEFLECTION, AND CUT PIPE LENGTHS SHALL BE USED TO HOLD HORIZONTAL ALIGNMENT OF SEWER AND WATER LINES TO NO MORE THAN 0.5' FROM THE DESIGNED ALIGNMENT. CONSTRUCTION STAKES TO BE AT TWENTY-FIVE FEET (25') INTERVALS ALONG CURVES TO ENSURE LOCATION OF PIPELINE CONSTRUCTION.
14. AT ALL LOCATIONS WHERE CAP AND STUB IS NOTED ON DRAWINGS, PROVIDE A PLUG AT THE END OF THE PIPE JOINT NEAREST THE SPECIFIED STATION. PROVIDE A REVERSE ANCHOR AT ALL WATER LINE PLUGS.
15. ALL UNUSED, SALVAGED WATER UTILITY MATERIAL SHALL BE RETURNED TO THE METROPOLITAN DISTRICT AS REQUESTED.
16. AT THE CONTRACTOR'S EXPENSE, ALL UTILITY MAINS SHALL BE SUPPORTED AND PROTECTED SUCH THAT THEY SHALL FUNCTION CONTINUOUSLY DURING CONSTRUCTION OPERATIONS. SHOULD A UTILITY MAIN FAIL AS A RESULT OF THE CONTRACTOR'S OPERATION, IT SHALL BE REPLACED IMMEDIATELY BY THE CONTRACTOR OR BY THE DISTRICT AT FULL COST OF LABOR AND MATERIALS TO THE CONTRACTOR/DEVELOPER.
17. PUMPING OR BYPASS OPERATIONS SHALL BE REVIEWED AND APPROVED BY BOTH THE DISTRICT AND THE DISTRICT ENGINEER PRIOR TO EXECUTION.
18. THE CONTRACTOR SHALL REPLACE OR REPAIR DAMAGE TO ALL SURFACE IMPROVEMENTS, INCLUDING BUT NOT LIMITED TO FENCES, LANDSCAPING, CURB AND GUTTER, AND/OR ASPHALT THAT MAY BE CAUSED DURING CONSTRUCTION.
19. ALL CONTRACTORS WORKING ON OR NEAR A WATER OR SEWER FACILITY (TO INCLUDE SERVICE LINES) SHALL HAVE LIABILITY INSURANCE NAMING THE DISTRICT AS AN ADDITIONAL INSURED AND SHALL PROVIDE A CURRENT COPY OF WORKERS COMPENSATION INSURANCE ON FILE WITH THE DISTRICT. NO WORK CAN PROCEED WITHOUT CURRENT CERTIFICATES ON FILE AT THE DISTRICTS' OFFICE.
20. THE CONTRACTOR SHALL NOTIFY THE DISTRICT AND ALL AFFECTED UTILITY COMPANIES ADJACENT TO THE PROPOSED UTILITY CONSTRUCTION A MINIMUM OF 48 HOURS AND A MAXIMUM OF 96 HOURS PRIOR TO THE START OF CONSTRUCTION. A WEEKLY CONSTRUCTION MEETING SHALL BE REQUIRED WITH THE CONTRACTOR, DISTRICT ENGINEER AND ALL OTHER PARTIES AS DEEMED NECESSARY BY THE DISTRICT.
21. COMMENCEMENT OF CONSTRUCTION OF WATER/SEWER SYSTEMS WITHIN METROPOLITAN DISTRICT:
    A) PRIOR TO THE START OF CONSTRUCTION, A PRECONSTRUCTION MEETING IS REQUIRED A MINIMUM OF 48 HOURS IN ADVANCE OF COMMENCEMENT OF WORK. A REPRESENTATIVE OF THE OWNER OR DEVELOPER, A REPRESENTATIVE OF THE CONTRACTOR, AND DESIGN ENGINEER ARE REQUIRED TO ATTEND. CONTACT THE DISTRICT TO SCHEDULE THE PRECONSTRUCTION MEETING. NO PRECONSTRUCTION MEETING CAN BE SCHEDULED BEFORE FOUR (4) SIGNED/APPROVED PLAN SETS ARE RECEIVED BY THE DISTRICT.
    B) THE CONTRACTOR IS REQUIRED TO NOTIFY THE DISTRICT A MINIMUM OF 48 HOURS AND A MAXIMUM OF 2 WEEKS PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL ALSO NOTIFY AFFECTED UTILITY COMPANIES AT LEAST 48 HOURS PRIOR TO THE START OF CONSTRUCTION ADJACENT TO THE KNOWN UTILITY LINES.
22. TESTING OF FACILITIES:
    A) THE CONTRACTOR SHALL NOTIFY THE DISTRICT A MINIMUM OF 48 HOURS AND A MAXIMUM OF 96 HOURS PRIOR TO THE START OF ANY TESTING.
    B) ALL SECTIONS OF WATER LINE ARE TO MEET THE FOLLOWING PRESSURE TESTING REQUIREMENTS
    - TEST 100% OF ALL LINES.
    - MUST PASS PRESSURE TEST TO 200 PSI FOR TWO HOURS (UNLESS OTHERWISE APPROVED ON THE PLANS).

    C) ALL SANITARY SEWER FACILITIES ARE TO MEET THE FOLLOWING TESTING REQUIREMENTS:
    - ALL LINES SHALL BE JET CLEANED PRIOR TO VACUUM OR PRESSURE TESTING.
    - ALL MANHOLES SHALL BE VACUUM TESTED WITH DISTRICT STAFF PRESENT PRIOR TO CCTV INSPECTION.
    - SEWER MAINS TO BE PRESSURE TESTED PRIOR TO CCTV INSPECTION.
    - ALL LINES SHALL BE CCTV INSPECTED AND VIDEO SHALL TO BE SUBMITTED TO THE DISTRICT FOR REVIEW AND APPROVAL.
23. PRELIMINARY ACCEPTANCE SHALL BE DEFINED AS THE POINT IN TIME THAT THE DISTRICT ACCEPTS THE FACILITY FOR USE. ALL SURFACE IMPROVEMENTS AND RESTORATION SHALL BE COMPLETED WITHIN 30 DAYS OF COMMENCEMENT. SHOULD THE CONTRACTOR FAIL TO COMPLETE ALL SURFACE IMPROVEMENTS AND RESTORATION WITHIN 30 DAYS OF COMMENCEMENT OF SERVICE, THE DISTRICT, AT THEIR DISCRETION, MAY ELECT TO COMPLETE THE IMPROVEMENTS AT THE CONTRACTOR'S COST.
24. FINAL ACCEPTANCE BY THE DISTRICT OF ANY LINE OR SYSTEM SHALL NOT OCCUR UNTIL COMPLETION OF FINAL ASPHALT LAYERS AND/OR FINAL COMPLETION AND/OR RESTORATION OF ALL SURFACE IMPROVEMENTS. THE WARRANTY PERIOD FOR ALL FACILITIES PRIOR TO FINAL ACCEPTANCE SHALL BE 24 MONTHS COMMENCING AFTER PRELIMINARY ACCEPTANCE.
25. ACCEPTANCE
    A) THE DISTRICT MAY GIVE PRELIMINARY ACCEPTANCE ONCE ALL OF THE TESTS ON ALL THE LINES HAVE BEEN COMPLETED AND A WALK-THROUGH HAS OCCURRED.
    B) A SECOND ACCEPTANCE MAY OCCUR ONCE THE FIRST LIFT OF ASPHALT GOES DOWN AND A SECOND WALK-THROUGH OF THE SYSTEM OCCURS. IF ALL FACILITIES ARE CLEAN AND ACCESSIBLE, A FINAL ACCEPTANCE MAY OCCUR (THE DISTRICT MAY REQUIRE CLEANING AND RE-VIDEO OF THE SYSTEM, DEPENDING ON THE SEVERITY OF THE CONTAMINATION).
26. ALL WATER AND SEWER MAINS, INCLUDING SERVICE LINES, SHALL HAVE "AS-BUILT" DRAWINGS PREPARED AND APPROVED PRIOR TO PRELIMINARY ACCEPTANCE BY THE DISTRICT.
27. ALL COMMERCIAL/BUSINESS DEVELOPMENTS SHALL HAVE AN EIGHT INCH (MIN.) WATER MAIN LOOPED THROUGH THE PROPOSED PROPERTY WITH GATE VALVES LOCATED WHERE THE MAIN ENTERS THE PROPERTY LINE. AN EIGHT-INCH SEWER MAIN SHALL BE INSTALLED FOR SERVICE TO COMMERCIAL/BUSINESS DEVELOPMENTS, AND A MANHOLE SHALL BE LOCATED WHERE THE MAIN ENTERS THE PROPERTY. THE END OF THE MAINS SHALL BE MARKED WITH THE APPROPRIATE COLORED CARSONITE MARKER ALONG WITH TRACER WIRE.
28. AFTER REVIEW AND APPROVAL OF PLANS FOR THE EXTENSION OF LINES, FACILITIES, AND/OR SERVICES, CONSTRUCTION MUST HAVE COMMENCED WITHIN 18 MONTHS FOR RESIDENTIAL SUBDIVISIONS AND 12 MONTHS FOR ANY COMMERCIAL INSTALLATIONS.
29. INSPECTION FEES: CALL THE DISTRICT (719-495-2500) FOR FEE SCHEDULE.

WATER SYSTEM INSTALLATION NOTES:

30. ALL WATER AND FORCE MAIN PIPE SHALL BE AWWA C900 PVC, OR APPROVED EQUAL, PRESSURE CLASS 200. ALL WATER AND FORCE MAIN FITTINGS SHALL HAVE MECHANICAL RESTRAINTS AND THRUST BLOCKS. ALL WATER AND FORCE MAIN PIPE SHALL HAVE A MINIMUM COVER DEPTH OF FIVE-AND-ONE-HALF (5.5) FEET.
31. ALL WATER VALVES ASSOCIATED WITH THE POTABLE WATER SYSTEM SHALL BE OPEN CLOCKWISE. ALL VALVES INSTALLED IN LANDSCAPED AREAS AND/OR NOT WITHIN PAVED STREETS SHALL BE MARKED WITH CARSONITE MARKERS. ALL VALVES ASSOCIATED WITH THE RAW WATER SYSTEM SHALL BE OPEN COUNTERCLOCKWISE AND MARKED WITH CARSONITE MARKERS AS APPLICABLE.
32. THE DEVELOPER OR HIS ENGINEER SHALL LOCATE ALL FIRE HYDRANTS AND SERVICE STUB-OUTS FOR FUTURE DEVELOPMENT. ANY REQUIRED REALIGNMENT, HORIZONTAL OR VERTICAL, SHALL BE AT THE EXPENSE OF THE DEVELOPER. FIRE HYDRANT LOCATION SHALL BE REVIEWED AND APPROVED BY THE APPLICABLE FIRE AUTHORITY.
33. FIRE HYDRANTS SHALL BE OPEN RIGHT WITH 7/8"X 7/8" SQUARE TAPERED ALONG WITH SERVICE CAPS. LUBRICATION TYPE: GREASE. ACCEPTABLE BRAND IS KENNEDY GUARDIAN (K81D, K81A, AND K81AM). EACH FIRE HYDRANT LOCATION SHALL ALSO BE USED AS TEST STATION.
34. ALL MAIN LINES (PVC & DUCTILE IRON) SHALL BE INSTALLED WITH COATED #12 TRACER WIRE WITH TEST STATIONS AT INTERVALS NO GREATER THAN FIVE HUNDRED FEET (500') (VALVE BOXES CAN BE USED AT INTERSECTIONS AND SERVICE STUBS).
35. CONTRACTOR SHALL MAKE CONNECTIONS TO EXISTING WATER LINE WITHOUT SHUTDOWN, OR ELSE NOTIFY THE DISTRICT OF ANY SERVICE SHUTDOWNS NECESSARY TO CONNECT TO EXISTING LINES.
36. IRRIGATION SERVICES SHALL HAVE A STOP-AND-WASTE CURB STOP VALVE INSTALLED ALONG WITH TRACER WIRE EXTENDING BACK TO THE MAIN LINE.
37. COMMENCEMENT OF USE OF WATER LINES AND/OR SYSTEMS:
    A) NO WATER FACILITY SHALL BE PLACED IN SERVICE UNTIL AFTER THE COMPLETION OF ALL PRESSURE TESTING, FLUSHING, BAC-T TESTING, AND COMPACTION TESTING, AND AS-BUILT DRAWINGS ARE SUBMITTED AND APPROVED BY THE DISTRICT.
    B) NO WATER FACILITY SHALL BE PLACED IN SERVICE UNTIL ALL SERVICE LINES ARE COMPLETED AND THE FIRST LIFT OF ASPHALT IS COMPLETED OVER THE LINE. IN THE CASE WHERE NO ASPHALT IS TO BE PLACED OVER THE LINE, SURFACE IMPROVEMENTS SHALL BE COMPLETED PRIOR TO USE OF THE FACILITY.
    C) ALL EASEMENTS (PLATTED OR DEEDED) ARE DEDICATED, EXECUTED BY THE DISTRICT, AND RECORDED.

WASTEWATER SYSTEM INSTALLATION NOTES:

38. SANITARY SEWER LENGTHS ARE MH CENTER - MH CENTER. ALL SANITARY SEWER PIPES SHALL BE SDR 35 PVC OR APPROVED EQUAL. SEWER LINES MAY NOT EXCEED 7% GRADE FOR ANY SIZE WITHOUT PRIOR APPROVAL OF THE DISTRICT. ALL NEWLY CONSTRUCTED RESIDENTIAL SANITARY SEWER TAPS SHALL USE PRE-MANUFACTURED, INLINE PVC PUSH-ON WYES. SINGLE SADDLE TAP ALLOWED ON EXISTING MAINS. MULTIPLE SADDLE TAPS ON EXISTING MAINS MUST BE APPROVED BY THE DISTRICT ON A CASE BY CASE BASIS
39. ALL SANITARY SEWER MANHOLES SHALL BE WRAPPED WITH RU116 - RUBR-NEK JOINT WRAP, OR APPROVED EQUAL, AND COATED.
40. ALL SEWER LINES MUST BE BEDDED WITH SQUEEGEE OR 3/4" CRUSHED ROCK.
41. COMMENCEMENT OF USE OF SEWER LINES AND/OR SYSTEMS:
    A) NO SANITARY SEWER FACILITY SHALL BE PLACED IN SERVICE UNTIL THE COMPLETION OF ALL JET CLEANING, PRESSURE TESTING, VACUUM TESTING, CCTV INSPECTION, AND COMPACTION TESTING, AND AS-BUILT DRAWINGS ARE SUBMITTED AND APPROVED BY THE DISTRICT.
    B) NO SANITARY SEWER FACILITY SHALL BE PLACED IN SERVICE UNTIL ALL SERVICE LINES ARE COMPLETED AND THE FIRST LIFT OF ASPHALT IS COMPLETED OVER THE LINE. IN THE CASE WHERE NO ASPHALT IS TO BE PLACED OVER THE LINE, ANY REQUIRED SURFACE IMPROVEMENTS SHALL BE COMPLETED PRIOR TO USE OF THE FACILITY.
    C) ALL NECESSARY EASEMENTS (PLATTED OR DEEDED) ARE DEDICATED, EXECUTED BY THE DISTRICT, AND RECORDED.
    D) DOWNSTREAM PLUG CAN BE REMOVED ONCE THE FIRST LIFT OF ASPHALT IS DOWN AND THE ABOVE REQUIREMENTS ARE MET.

NOTES

1. ALL EXISTING UNDERGROUND AND ABOVE GROUND UTILITY LOCATIONS, INVERTS AND SIZES ARE APPROXIMATE ONLY AND MUST BE FIELD VERIFIED PRIOR TO CONSTRUCTION. TIE IN POINTS CROSSINGS SHALL BE POTHOLED AND LOCATIONS, INVERTS, AND SIZES SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. THESE PLANS ARE FOR THE SANITARY FORCE MAIN THAT LEAVES THE LIFT STATION. THE DESIGN OF THE LIFT STATION ITSELF IS NOT INCLUDED (SEE SEPARATE PLANS).
3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES ALONG THE SITE. THE OMISSION FROM OR THE 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.
4. THE CONTRACTOR WILL 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.
5. THERE ARE AS-BUILT PLANS FOR THE INTERSECTION OF STAPLETON DRIVE AND MERIDIAN RANCH BLVD UNDER MERIDIAN RANCH FILING 1, PHASE 1 ON EDARP. THESE PLANS ARE ON A DIFFERENT VERTICAL DATUM THAN THIS PLAN SET.
6. PER HR GREEN REFERENCES IN CALLOUTS REFER TO PRELIMINARY PLANS PREPARED BY HR GREEN, TITLED GRANDVIEW RESERVE DUAL FORCE MAINS CONSTRUCTION DOCUMENTS, 06/07/2024.
7. THE EXISTING GROUND SURFACE CONTOURS ARE LIDAR DATA FROM DATASET: 2018 3DEP EAST CO EL PASO, COLLECTED IN 2018, COORDINATE SYSTEM STATE PLANE 1983 (NAD83). THE LIDAR CONTOURS ARE SHOWN IN 2' INTERVALS BROWN LINES. THESE CONTOURS DO NOT LINE UP EXACTLY WITH THE WATERBURY SURVEYS OR SITE PLAN AND ARE APPROXIMATE.
8. CONTRACTOR TO OBTAIN WORK IN THE ROW PERMIT FROM EL PASO COUNTY PRIOR TO CONSTRUCTION.
9. NO CLEAN OUTS OR TRACER TEST STATIONS SHALL BE INSTALLED IN CURB AND GUTTER OR CROSS PANS. THE PROPOSED LOCATIONS SHOWN ARE APPROXIMATE.
10. FORCE MAIN SPECIFIC NOTES:
    10.1. FOLLOW WHMD STANDARD SPECIFICATIONS, UNLESS OTHERWISE NOTED ON THESE PLANS.
    10.2. PIPE MATERIAL WILL BE C900 DR 14 PVC.
    10.3. ALL FITTINGS SHALL BE DUCTILE IRON. PROVIDE PE WRAP AND CATHODIC PROTECTION AT EACH FITTING.
    10.4. INSTALL BEDDING PER "TYPICAL TRENCH DETAIL" ON SHEET 16.
    10.5. INSTALL CASING PER PER "CASING PIPE DETAIL" ON SHEET 16.
    10.6. TRACER TEST STATIONS SHALL BE AT GRADE. USE CP METAL TEST STATION (OR SIMILAR) WITH LOCKING LIDS. TEST STATIONS CAN ALSO BE PLACED IN OTHER FORCE MAIN STRUCTURES AT THE SAME LOCATION (SUCH AS VAULTS). SET UTILITY MARKER POSTS AT TEST STATIONS IN OVERLAND SECTIONS.
    10.7. INSTALL CLEAN OUTS PER DETAIL ON SHEET 15.
    10.8. WHMD DOES NOT ALLOW HIGH DEFLECTION COUPLINGS.
    10.9. ALL PIPE IN LOWERINGS SHALL BE FULLY RESTRAINED.
    10.10. IF GROUNDWATER IS ENCOUNTERED IN THE TRENCH, WHMD REQUIRES 3/4" ROCK BEDDING 12" BELOW AND 6" ABOVE THE SANITARY PIPE. WHMD DOES NOT ALLOW FLOW FILL BACKFILL OF TRENCHES.
11. THE FOLLOWING PERMITS ARE EXPECTED TO BE REQUIRED FOR CONSTRUCTION (NOT ALL INCLUSIVE): WETLAND/NATION WIDE PERMIT, ESQCP, APPROVAL FRO CDPHE, NPDES AND DEWATERING PERMITS, EPC ROW USE AND CONSTRUCTION PERMITS, AND FLOODPLAIN DEVELOPMENT PERMIT.
12. TRAFFIC CONTROL: A TRAFFIC CONTROL PLAN WILL BE REQUIRED FOR CONSTRUCTION. CONTRACTOR TO CONTACT EPC AT LEAST 2 WEEKS PRIOR TO THE START OF CONSTRUCTION TO ALLOW PUBLIC NOTIFICATION OF ROAD CLOSURES.
13. THE TRENCH ALIGNMENT CROSSES NUMEROUS PUBLIC USE AREAS SUCH AS TRAILS, ACCESS ROADS, AND PARKING AREAS. THESE PUBLIC USE AREAS SHOULD BE KEPT OPEN AS MUCH AS FEASIBLE DURING CONSTRUCTION.
14. AS-BUILT PLANS OF THE CONSTRUCTED FORCE MAIN ARE REQUIRED. COPIES SHALL BE PROVIDED TO THE WOODMEN HILLS METRO DISTRICT AND WATERBURY METRO DISTRICT.

REMOVALS AND REPLACEMENT NOTES

1. ALL ITEMS NOTED FOR REMOVAL AND REPLACEMENT SHALL BE REPLACED IN KIND. CONTRACTOR SHALL FIELD VERIFY. CONTRACTOR SHALL COORDINATE AND CONFIRM WITH RESPECTIVE ENTITIES IF EXISTING CONDITIONS WOULD ALLOW FOR SALVAGE AND RESET.
2. DAMAGED PAVEMENT FROM CONSTRUCTION ACTIVITIES SHALL BE REMEDIED TO ROAD OWNER'S APPROVAL.
3. ROADWAY REPLACEMENT/PATCHING/CONSTRUCTION SHALL COMPLY TO SPECIFICATIONS OF EPC, CDOT, OR RESPECTIVE AGENCY/OWNER WITH JURISDICTION OVER THE ROAD.
4. PAVEMENT/ROADWAY TYPICAL SECTIONS FOR RESTORATION – CONTRACTOR SHALL FIELD VERIFY, IF EXISTING SECTION DIFFERS FROM BELOW, MATCH EXISTING.
    4.1. STAPLETON RD FROM JUDGE ORR TO HWY 24: 6.5" HMA (IN MULTIPLE LIFTS NO THICKER THAN 3") OVER 12" THICK CLASS 6 BASE COURSE; MIN. 2% CROSS SLOPE FROM CROWN; 4" TOP SOIL ON SIDE SLOPES.
    4.2. STAPLETON RD FROM HWY 24 TO EASTONVILLE RD: 8" HMA (IN MULTIPLE LIFTS NO THICKER THAN 3") OVER PREPARED SUBGRADE; MIN 2% CROSS SLOPE FROM CROWN; MATCH EXISTING DEPTH OF TOP SOIL ON SIDE SLOPES.
    4.3. STAPLETON DR FROM EASTONVILLE RD TO MERIDIAN RANCH BLVD: 6.5" HMA (IN MULTIPLE LIFTS NO THICKER THAN 3") OVER 12" THICK CLASS 6 BASE COURSE; MIN 2% CROSS SLOPE FROM CROWN; 4" TOP SOIL ON SIDE SLOPES.
    4.4. EASTONVILLE RD CROSSING: 5" HMA OVER 10" ABC CLASS 6.
    4.5. OTHER ROAD CROSSINGS: MATCH EXISTING SECTION.

BENCHMARKS

1. THE TOP OF A 1-1-/2' ALUMINUM SURVEYORS CAP STAMPED JR LD PLS 31161, AT THE MOST EASTERLY CORNER OF LOT 36 AS PLATED IN 4-WAY RANCH FILING NO. 1 RECORDED UNDER RECEPTION NO. 206712416 RECORDS OF EL PASO COUNTY, COLORADO ELEV= 6931.92
2. THE TOP OF A 1-1-/2' ALUMINUM SURVEYORS CAP STAMPED JR LD PLS 82820, ATTHE MOST NORHERLY CORNER OF LOT 42 AS PLATED IN 4-WAY RANCH FILING NO. 1 RECORDED UNDER RECEPTION NO. 206712416 RECORDS OF EL PASO COUNTY, COLORADO ELEV= 6973.99

BASIS OF BEARING

THE NORH LINE OF SECTION 28, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE SIXTH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO BEINGMONUMNETED AT EACH END BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PSINC LS 30087 AND ASSUMED TO BEAR S89°47'04"E A DISTANCE OF 5,285.07 FEET

APPROVALS:

ENGINEER'S STATEMENT:

THESE DETAILED PLANS AND SPECIFICATIONS WERE PREPARED UNDER MY DIRECTION AND SUPERVISION. SAID PLANS AND SPECIFICATIONS HAVE BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR DETAILED ROADWAY, DRAINAGE, GRADING AND EROSION CONTROL PLANS AND SPECIFICATIONS, AND SAID PLANS AND SPECIFICATIONS ARE IN CONFORMITY WITH APPLICABLE MASTER DRAINAGE PLANS AND MASTER TRANSPORTATION PLANS. SAID PLANS AND SPECIFICATIONS MEET THE PURPOSES FOR WHICH THE PARTICULAR ROADWAY, AND DRAINAGE FACILITIES ARE DESIGNED AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARATION OF THESE DETAILED PLANS AND SPECIFICATIONS.

QUENTIN ARMIJO, COLORADO P.E. #37170 — DATE
FOR AND ON THE BEHALF OF TERRA NOVA ENGINEERING, INC

OWNER'S STATEMENT:

I, THE OWNER/DEVELOPER, HAVE READ AND WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN AND ALL OF THE REQUIREMENTS SPECIFIED IN THESE DETAILED PLANS AND SPECIFICATIONS.

ANDREW R. KLEIN AUTHORIZED REPRESENTATIVE — DATE
ACM ALF VIII JV SUB II LLC
8350 EAST CRESCENT PARKWAY, SUITE 200,
GREENWOOD, CO 80111

WATERBURY METROPOLITAN DISTRICT NO. 1

THESE CONSTRUCTION DOCUMENTS HAVE BEEN REVIEWED AND APPROVED FOR SANITARY SEWER, WATER MAIN AND ASSOCIATED UTILITY SERVICE CONSTRUCTION.

FOR AND ON BEHALF OF THE WATERBURY METRO. DISTRICT NO. 1 — DATE

WOODMEN HILLS METROPOLITAN DISTRICT WASTEWATER DESIGN APPROVAL

DATE: _____ BY: _____

PROJECT NO.: _____

IN CASE OF ERRORS OR OMISSIONS WITH THE WATER DESIGN AS SHOWN ON THIS DOCUMENT THE STANDARDS AS DEFINED IN THE 'RULES AND REGULATIONS FOR INSTALLATION OF WASTEWATER MAINS AND SERVICES' SHALL RULE.

APPROVAL EXPIRES 180 DAYS FROM DESIGN APPROVAL.

EL PASO COUNTY

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 DIRECTORS DISCRETION.

JOSHUA J. PALMER — DATE
COUNTY ENGINEER / ECM ADMINISTRATOR

CDR264

REVISIONS

NO.	DESCRIPTION	DATE

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PREPARED FOR:
ACM ALF VIII JV SUB II LLC
ATTN: JASON POCK
8350 E CRESCENT PKWY, #200,
GREENWOOD, CO 80111
303-984-9800

Terra Nova Engineering, Inc.
Creative Civil Engineering Solutions
721 S. 23RD STREET
COLORADO SPRINGS, CO 80904
OFFICE: 719-635-6422
FAX: 719-635-6426
www.tnesinc.com

WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
COVER SHEET

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY QNA
H-SCALE AS SHOWN
V-SCALE N/A
JOB NO. 2604.00
DATE ISSUED 04/03/26
SHEET NO. 1 OF 36

STANDARD NOTES FOR EL PASO COUNTY CONSTRUCTION PLANS

1. 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.

2. 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).

3. 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:
a. EL PASO COUNTY ENGINEERING CRITERIA MANUAL (ECM)
b. CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2
c. COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION
d. CDOT M & S STANDARDS

4. 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, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING. ANY MODIFICATIONS NECESSARY TO MEET CRITERIA AFTER-THE-FACT WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.

5. IT IS THE DESIGN ENGINEER'S RESPONSIBILITY TO ACCURATELY SHOW EXISTING CONDITIONS, BOTH ONSITE AND OFFSITE, ON THE CONSTRUCTION PLANS. ANY MODIFICATIONS NECESSARY DUE TO CONFLICTS, OMISSIONS, OR CHANGED CONDITIONS WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.

6. CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT (PCD) -INSPECTIONS, PRIOR TO STARTING CONSTRUCTION.

7. IT IS THE CONTRACTOR'S 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 CONTROL 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.

8. CONTRACTOR SHALL NOT DEVIATE FROM THE PLANS WITHOUT FIRST OBTAINING WRITTEN APPROVAL FROM THE DESIGN ENGINEER AND PCD. CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER IMMEDIATELY UPON DISCOVERY OF ANY ERRORS OR INCONSISTENCIES.

9. ALL STORM DRAIN PIPE SHALL BE CLASS III RCP UNLESS OTHERWISE NOTED AND APPROVED BY PCD.

10. 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.

11. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE AT APPROVED CONSTRUCTION ACCESS POINTS.

12. SIGHT VISIBILITY TRIANGLES AS IDENTIFIED IN THE PLANS SHALL BE PROVIDED AT ALL INTERSECTIONS. OBSTRUCTIONS GREATER THAN 18 INCHES ABOVE FLOWLINE ARE NOT ALLOWED WITHIN SIGHT TRIANGLES.

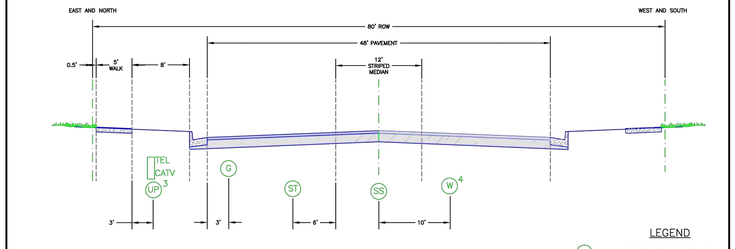
13. SIGNING AND STRIPING SHALL COMPLY WITH EL PASO COUNTY DOT AND MUTCD CRITERIA.

14. CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRED BY EL PASO COUNTY DOT, INCLUDING WORK WITHIN THE RIGHT-OF-WAY AND SPECIAL TRANSPORT PERMITS.

15. 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.

16. EL PASO COUNTY DOES NOT OWN AND IS NOT RESPONSIBLE FOR THE UNDERDRAINS OR GROUNDWATER DISCHARGE SYSTEMS SHOWN ON THESE PLANS AND ASSUMES NO LIABILITY FOR WATER RIGHTS ADMINISTRATION BY APPROVING THESE PLANS. MAINTENANCE AND WATER RIGHTS ARE THE RESPONSIBILITY OF THE DEVELOPER AND METROPOLITAN DISTRICT.

Replace this detail with standard detail SD_4-6



8/11/11
DATE APPROVED:

André P. Brackin
DEPARTMENT OF TRANSPORTATION

Urban NonResidential Collector Roadway
Utility Placement Cross Section

REVISION DATE: 3/15/12
FILE NAME: SD_4-3

EL PASO COUNTY DEPARTMENT OF TRANSPORTATION

LEGEND

EXISTING CONTOUR – 2' LIDAR
EXISTING CONTOUR – 2' WATERBURY FIL 1 DESIGN (6900)
LIMITS OF DISTURBANCE/ CONSTRUCTION BOUNDARY
PROPERTY LINES
DIRECTION OF SURFACE FLOW
100-Y FEMA FLOODPLAIN
EXISTING WETLANDS
WATER LINE (W)
SANITARY FORCE MAIN (FM)
GRAVITY SANITARY SEWER LINE (SS)
GAS LINE (GAS)
UNDERGROUND ELECTRICAL LINE (UE)
DATA LINE (TEL)
FIBER OPTIC LINE (FO)
STORM SEWER LINE (ST)
EXISTING FENCE
PROPOSED PR
EXISTING EX
TRACER TEST STATION
FORCE MAIN CLEANOUT
FORCE MAIN AIR/VAC VALVE

Define proposed FM permanent easement line/s.

Define proposed FM temporary construction easement line/s.

Submit all recorded easements as applicable.

EROSION CONTROL LEGEND

KEY	TITLE	SYMBOL	IMPLEMENTATION PHASE
SF	SILT FENCE	SF	INITIAL
SSA	STABILIZED STAGING AREA		INITIAL
VTC	VEHICLE TRACKING CONTROL		INITIAL
SP	STOCKPILE MANAGEMENT WITH PROTECTION	SF	INITIAL
CWA	CONCRETE WASHOUT AREA		INITIAL
SR	SURFACE ROUGHENING		INITIAL
TSB	TEMPORARY SEDIMENT BASIN	NONE	INITIAL
PT	PORTABLE TOILET	NONE	INITIAL
IP	INLET PROTECTION		INTERIM
SM	PERMANENT SEEDING AND MULCHING PS – DRILL SEED, HAND SEED, OR HYDROSEED; SEED MIX PER COLORADO SPRINGS STORMWATER CONSTRUCTION MANUAL (DECEMBER 2020), TABLE 5-2 MU – MECHANICALLY CRIMP MULCH OR HYDROMULCH		FINAL
DW	DEWATERING OPERATIONS		AS NEEDED

Define paved streets and show and label all paved streets (crossings or parallel streets) on all sheets (a gray shaded symbol would work).

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WATERBURY SANITARY FORCE MAIN

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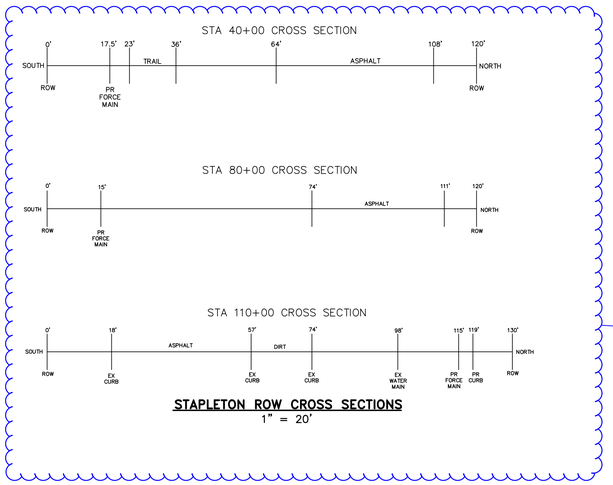
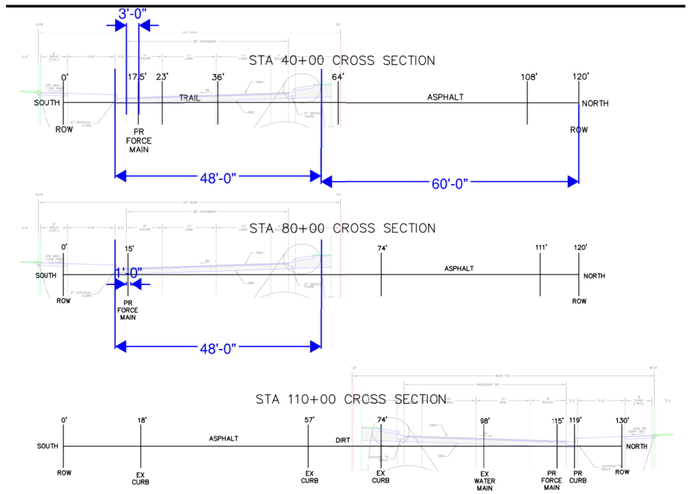
SHEET NO. 2 OF 36

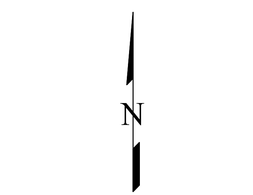


STAPLETON ROW CROSS SECTIONS
1" = 20'

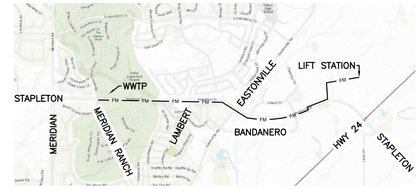
You are NOT showing the cross sections overlaid on your your horizontal lines (please see the example below, this example is not to scale and it is for illustration only), these are lines, please show and label the overlaid cross sections. Please use 4 lanes Principle Arterial Cross sections. Please center the FM on the 6' wide shoulder (3' on each side, see below). Jeff comment



STAPLETON ROW CROSS SECTIONS
1" = 20'

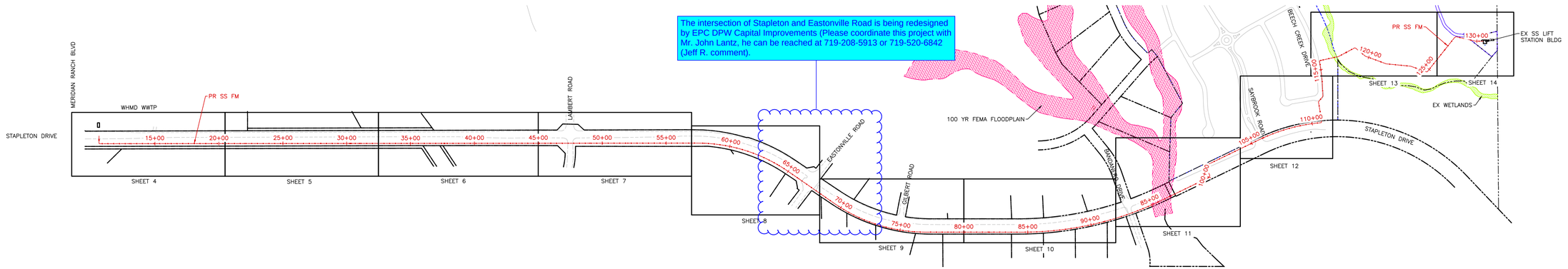


SCALE: 1"=400'



KEY MAP
1" = 3000' ±

The intersection of Stapleton and Eastonville Road is being redesigned by EPC DPW Capital Improvements (Please coordinate this project with Mr. John Lantz, he can be reached at 719-208-5913 or 719-520-6842 (Jeff R. comment).



THIS DESIGN WAS PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF TERRA NOVA ENGINEERING, INC.

QUENTIN ARMIJO
COLORADO P.E. NO. 37170

REVISIONS

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WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
OVERVIEW SHEET

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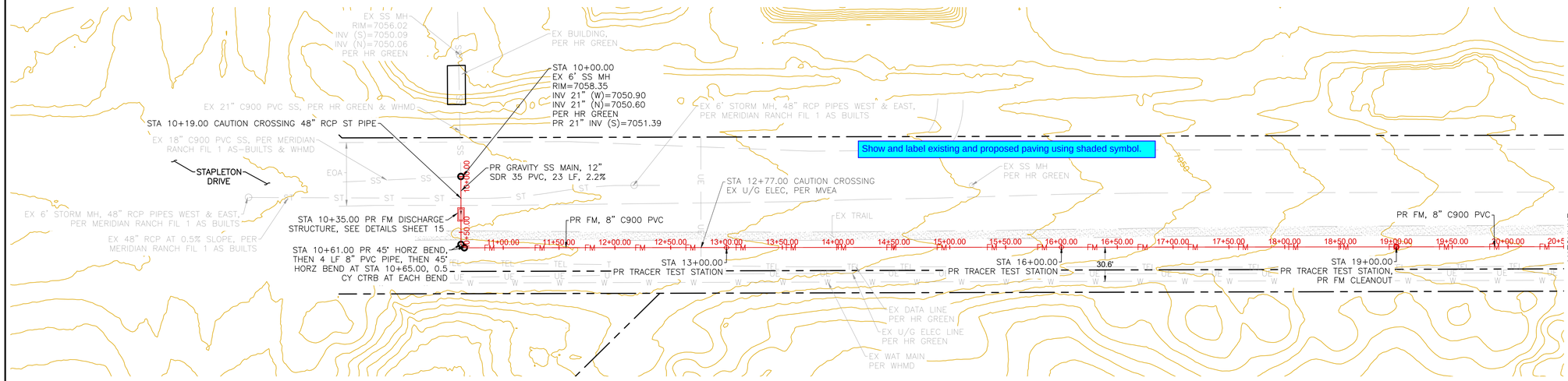
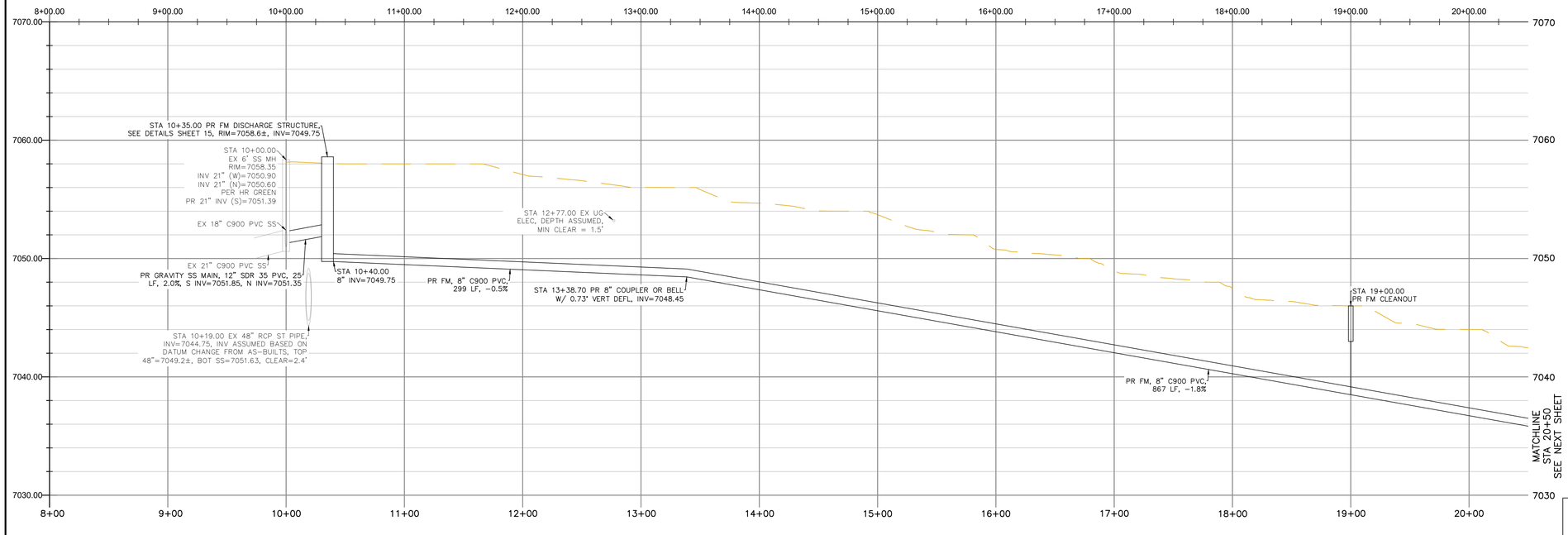
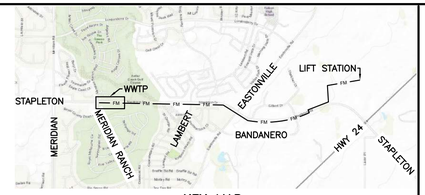
DATE ISSUED 04/03/26
SHEET NO. 3 OF 36

Add the following note "the open cut shall not exceed 250 LF per day, the developer can not open ground if he/she can not back fill it at the end of the same day and make it safe to the public (No open cut to remain open after working hours).".



Show and label existing and proposed paving using shaded symbol.





KEY MAP
1" = 3000' ±

GENERAL NOTES:

1. NO UNRESTRAINED JOINTS WITHIN 15' OF FITTINGS, ALL DIRECTIONS.
2. CONTRACTOR TO SUPPORT ALL EXPOSED UTILITIES DURING CONSTRUCTION.
3. ANY PAVEMENT REMOVED SHALL BE REPLACED IN KIND.
4. ANY TRAIL REMOVED SHALL BE REPLACED IN KIND.
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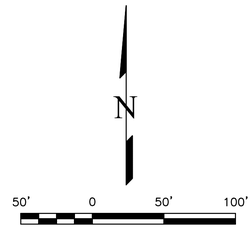

HORZ SCALE: 1"=50'
VERT SCALE: 1" = 5'

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WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
SANITARY FORCE MAIN PLAN & PROFILE

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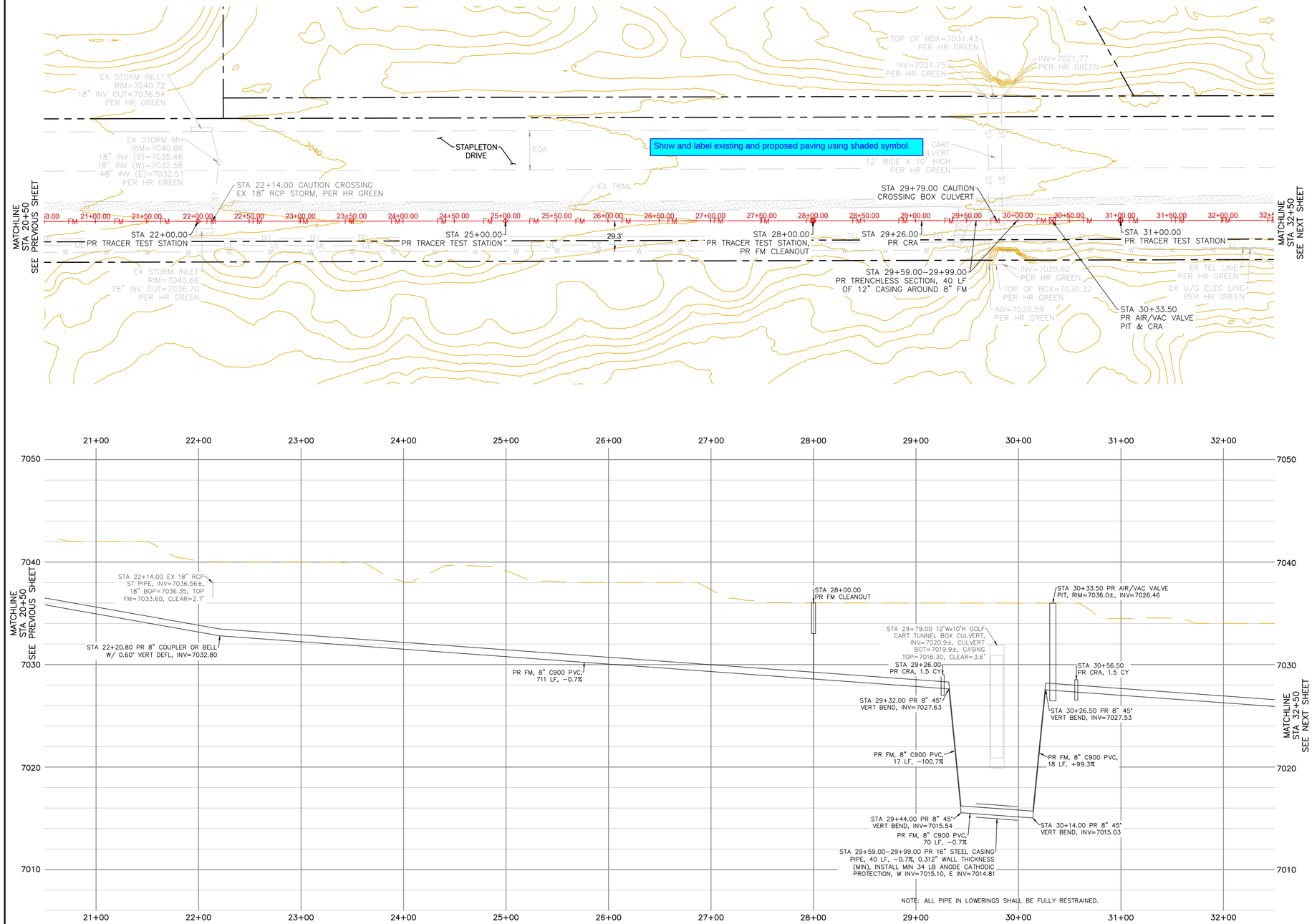
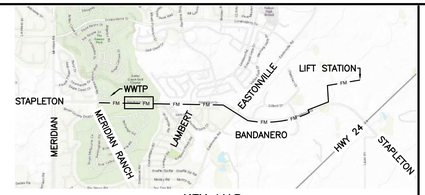
SHEET NO.	4 OF 36





KEY MAP
1" = 3000' ±

GENERAL NOTES:

1. NO UNRESTRAINED JOINTS WITHIN 15' OF FITTINGS, ALL DIRECTIONS.
2. CONTRACTOR TO SUPPORT ALL EXPOSED UTILITIES DURING CONSTRUCTION.
3. ANY PAVEMENT REMOVED SHALL BE REPLACED IN KIND.
4. ANY TRAIL REMOVED SHALL BE REPLACED IN KIND.
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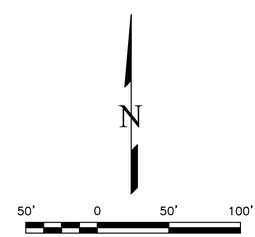

HORZ SCALE: 1"=50'
VERT SCALE: 1" = 5'

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QUENTIN ARMIJO
COLORADO P.E. NO. 37170

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Terra Nova Engineering, Inc. Creative Civil Engineering Solutions
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WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
SANITARY FORCE MAIN PLAN & PROFILE

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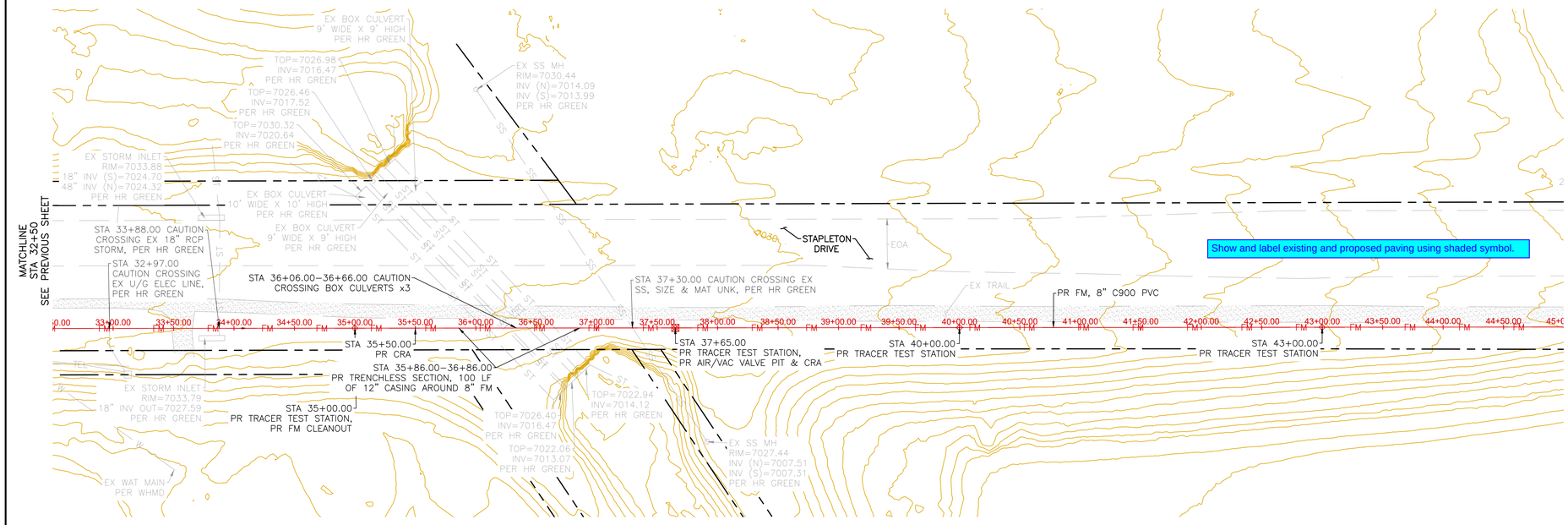

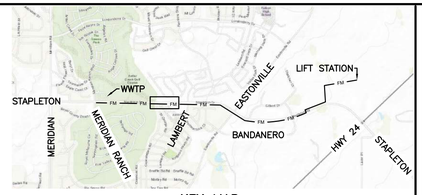

KEY MAP
1" = 3000' ±

GENERAL NOTES:

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2. CONTRACTOR TO SUPPORT ALL EXPOSED UTILITIES DURING CONSTRUCTION.
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N

50' 0 50' 100'

HORZ SCALE: 1"=50'
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WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
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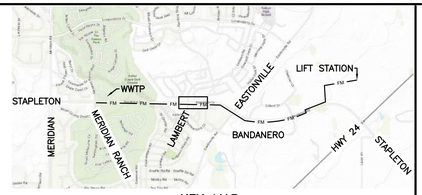

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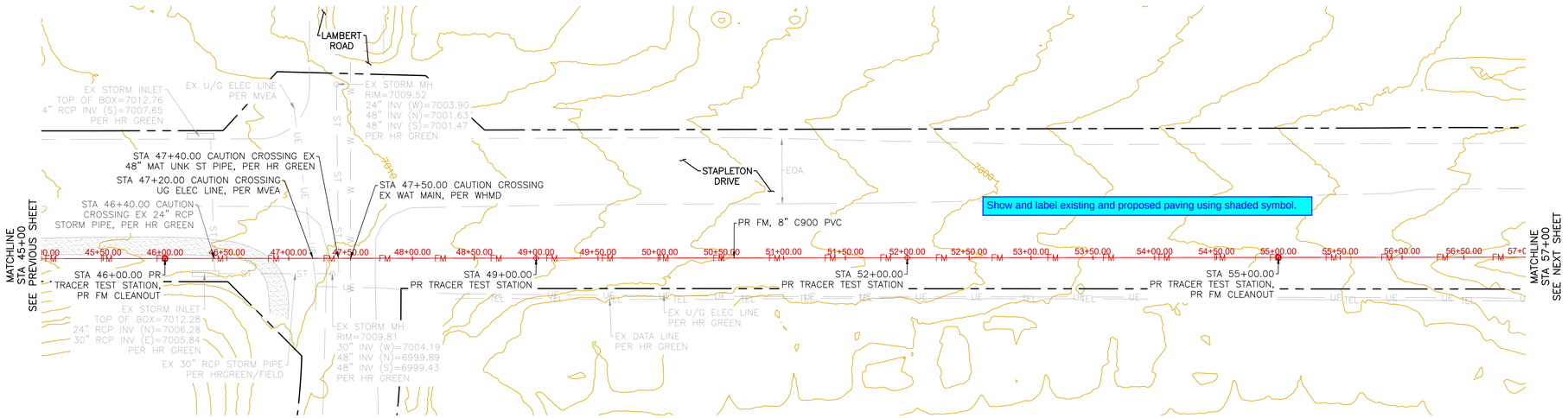

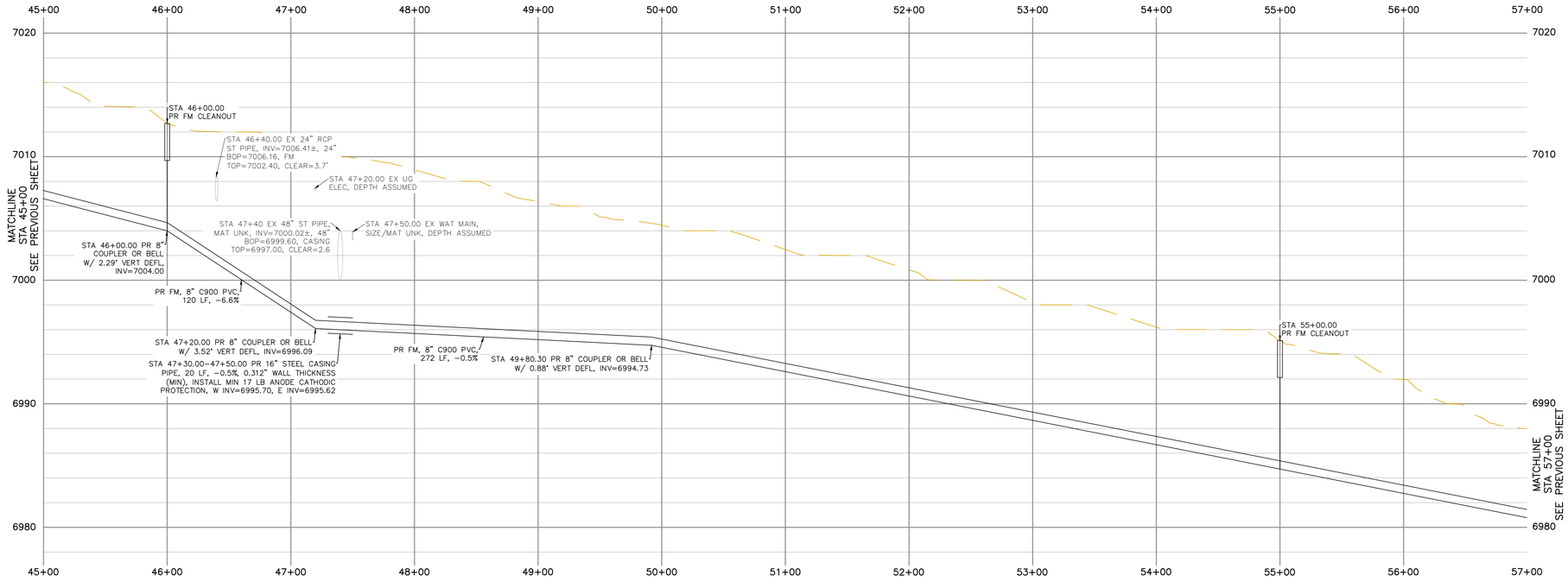

GENERAL NOTES:

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N

50' 0 50' 100'

HORZ SCALE: 1"=50'
VERT SCALE: 1" = 5'

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QUENTIN ARMIJO
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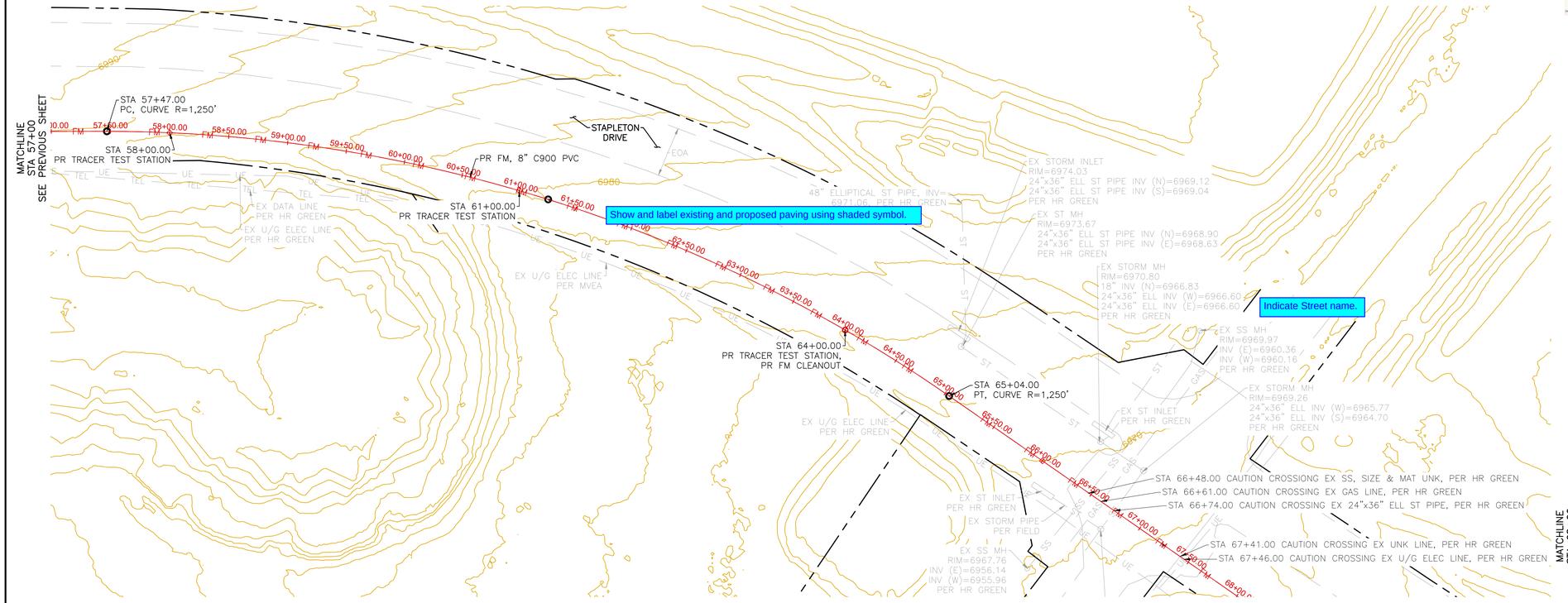
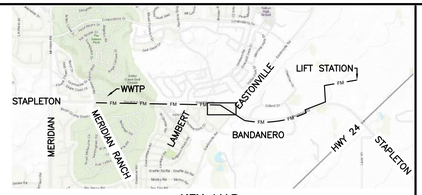
WATERBURY SANITARY FORCE MAIN

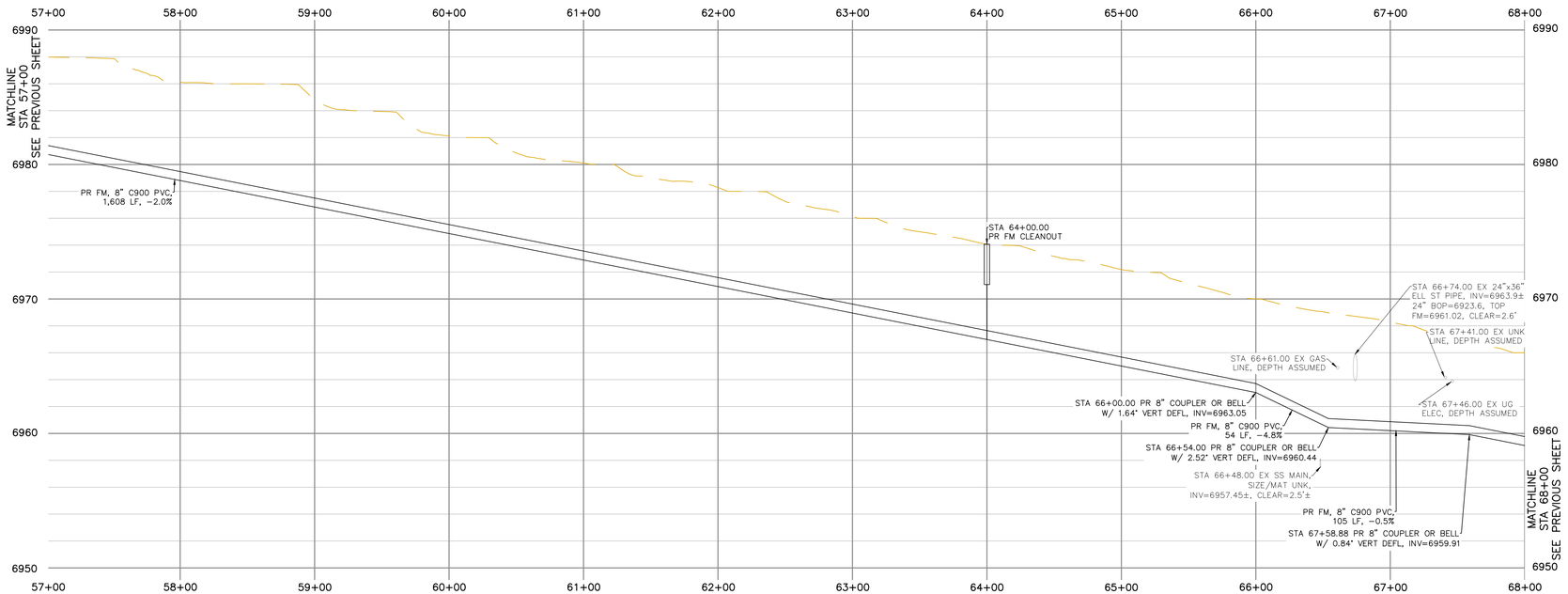
UTILITY CONSTRUCTION SET
SANITARY FORCE MAIN PLAN & PROFILE

DESIGNED BY	DLF
DRAWN BY	DLF
CHECKED BY	QNA
H-SCALE	AS SHOWN
V-SCALE	N/A
JOB NO.	2604.00
DATE ISSUED	04/03/26
SHEET NO.	7 OF 36





KEY MAP
1" = 3000' ±



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N

50' 0 50' 100'

HORZ SCALE: 1"=50'
VERT SCALE: 1" = 5'

THIS DESIGN WAS PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF TERRA NOVA ENGINEERING, INC.

QUENTIN ARMIJO
COLORADO P.E. NO. 37170

REVISIONS

NO.	DESCRIPTION	DATE

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PREPARED FOR:
ACM ALF VIII JV SUB II LLC
ATTN: JASON POCK
8350 E CRESCENT PKWY, #200,
GREENWOOD, CO 80111
303-984-9800

Terra Nova Engineering, Inc.
Creative Civil Engineering Solutions
721 S. 23RD STREET
COLORADO SPRINGS, CO 80904
OFFICE: 719-635-6422
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JOB NO.	2604.00
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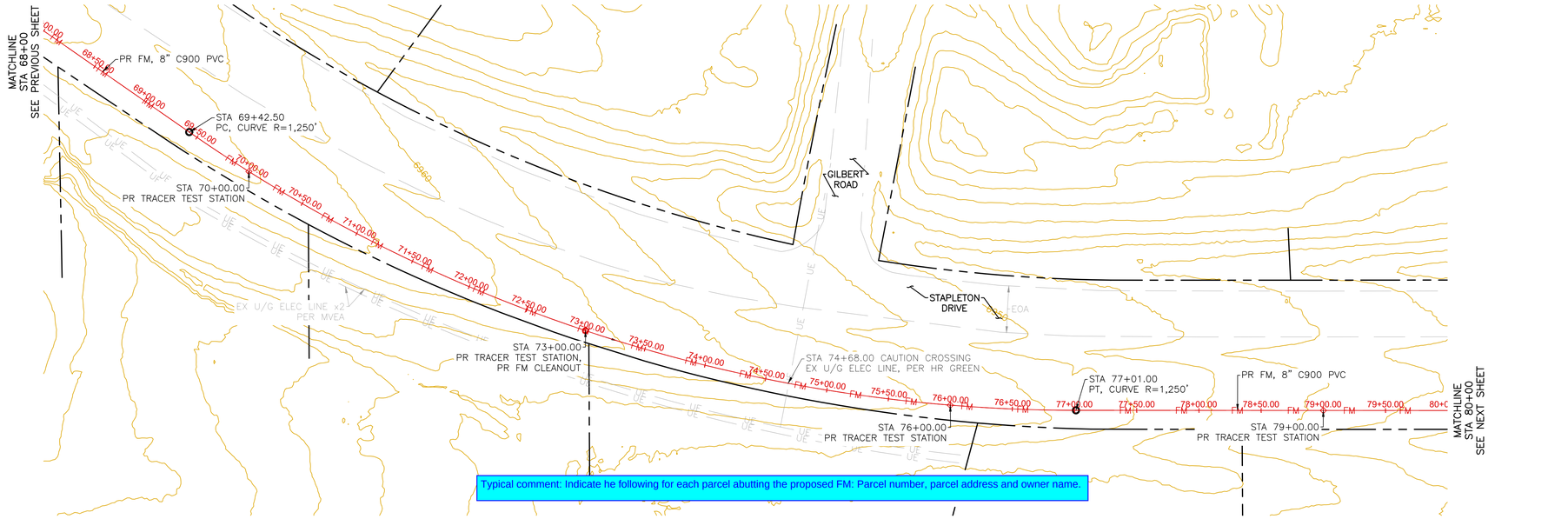
SHEET NO.	8 OF 36



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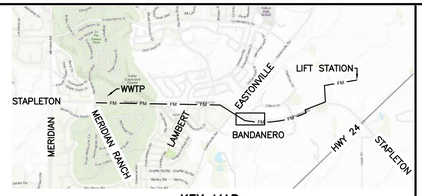

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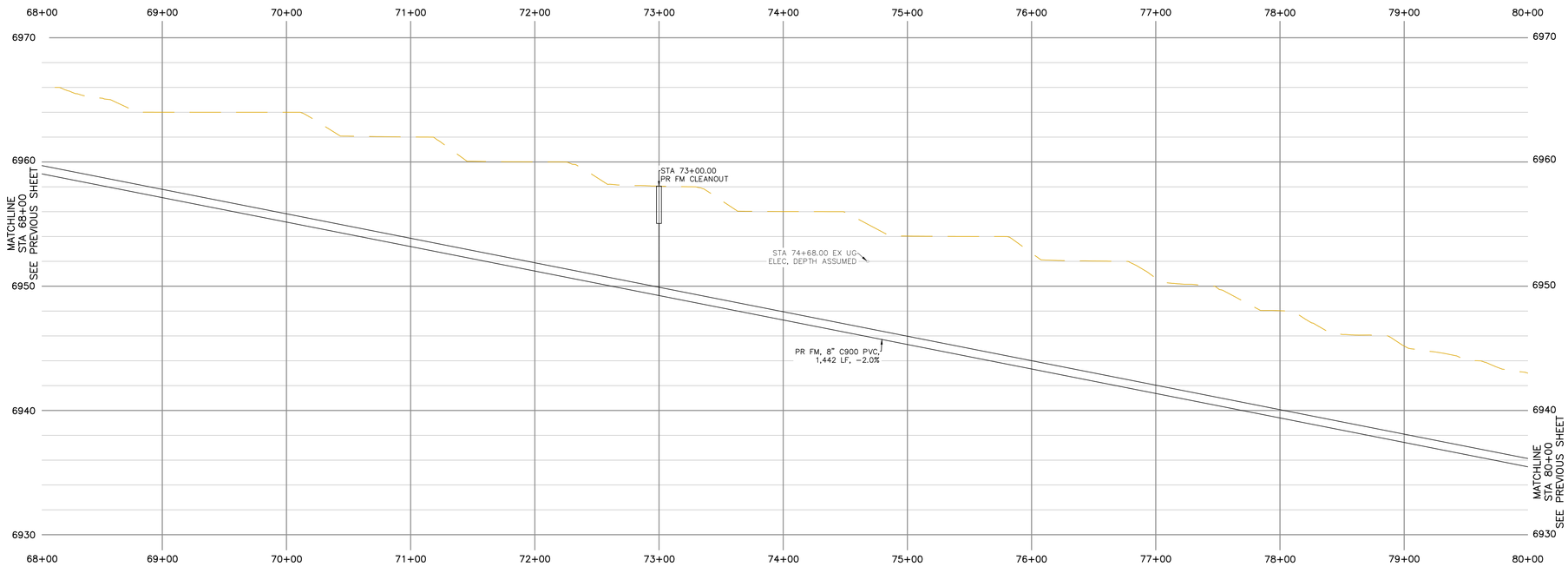

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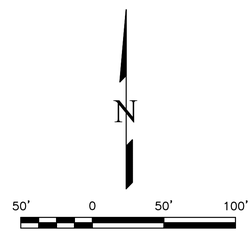

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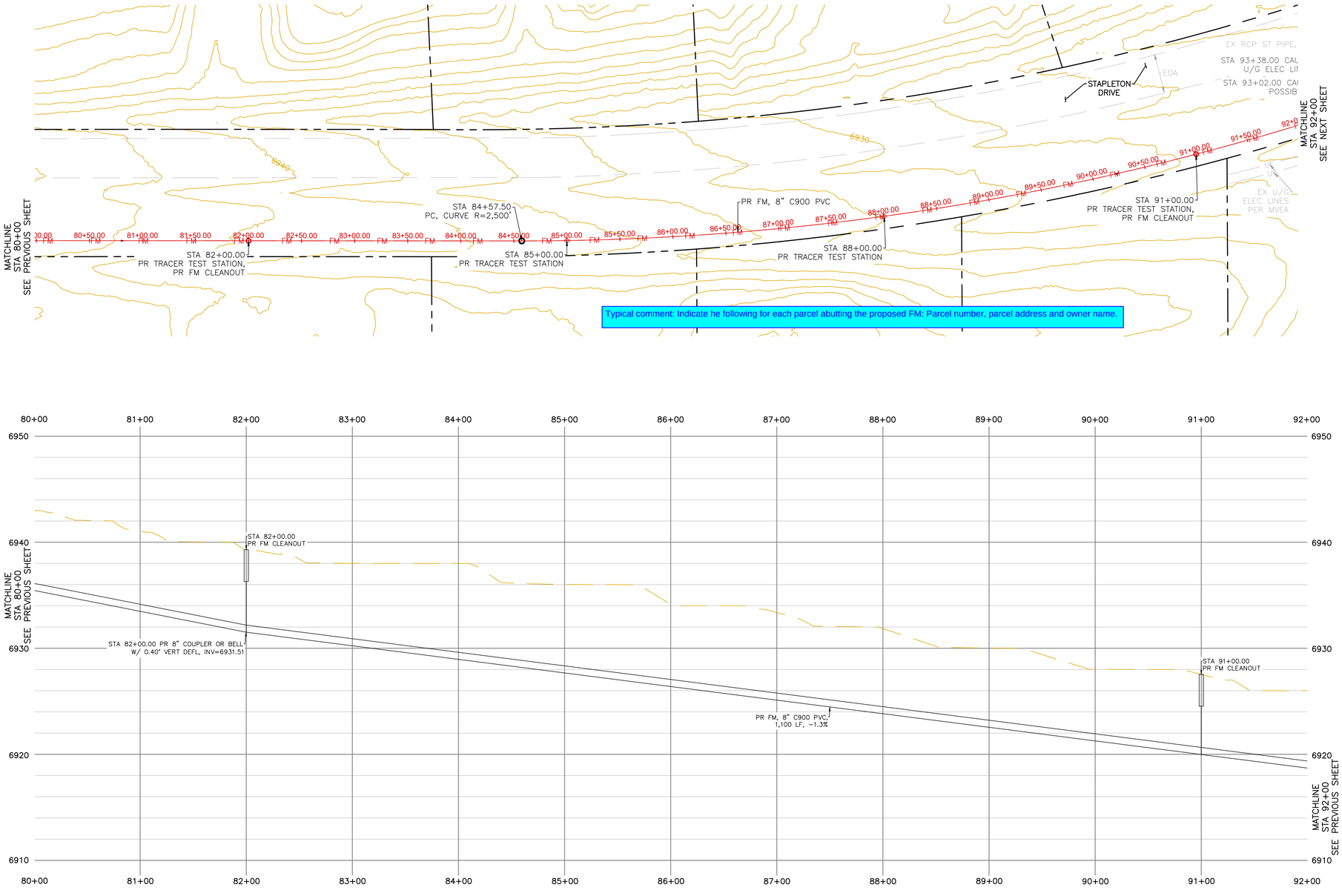

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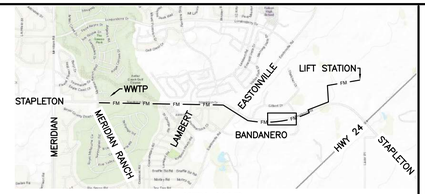

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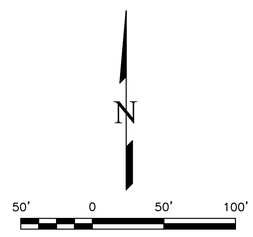

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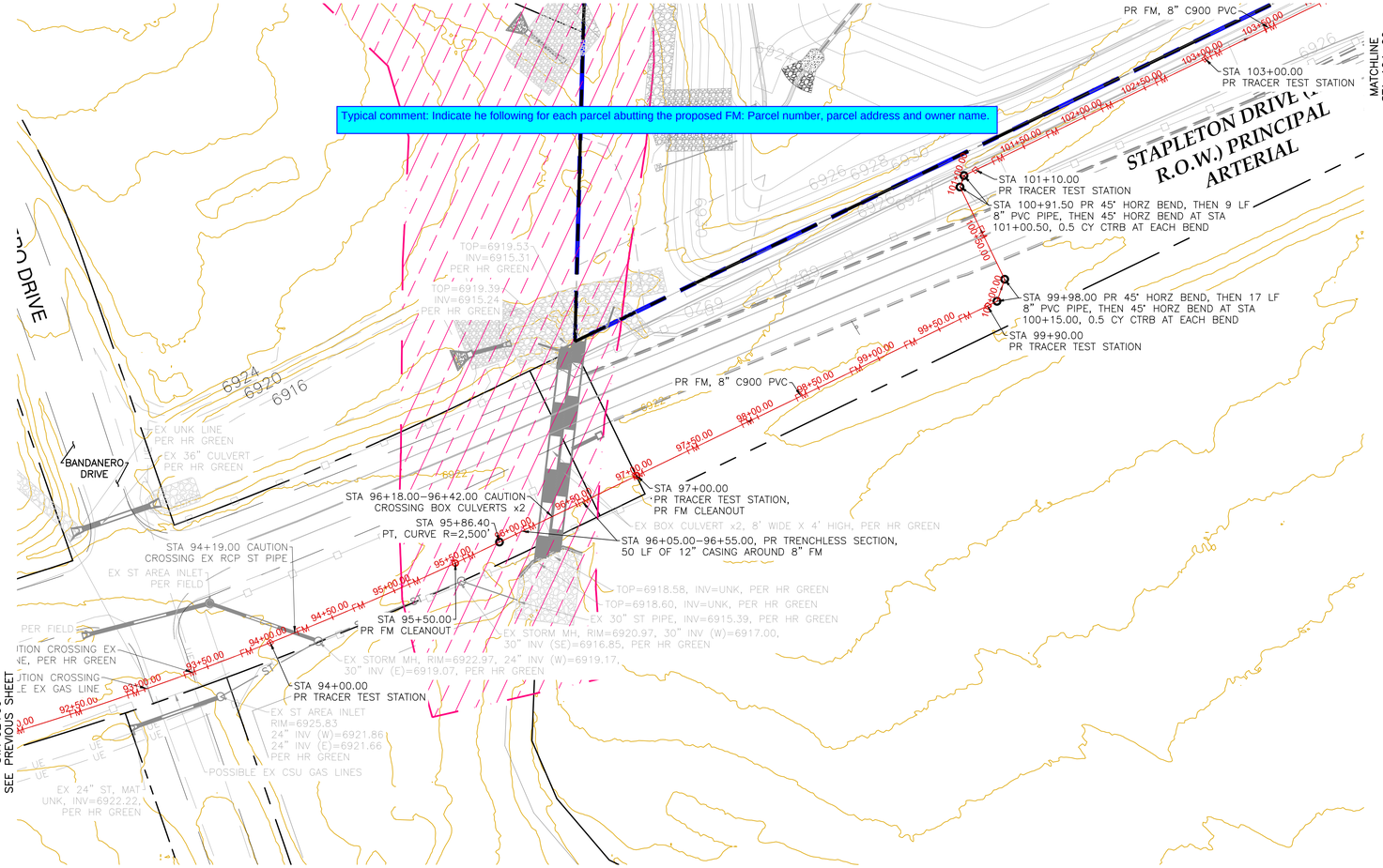

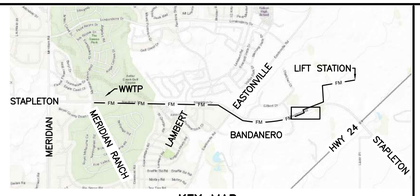

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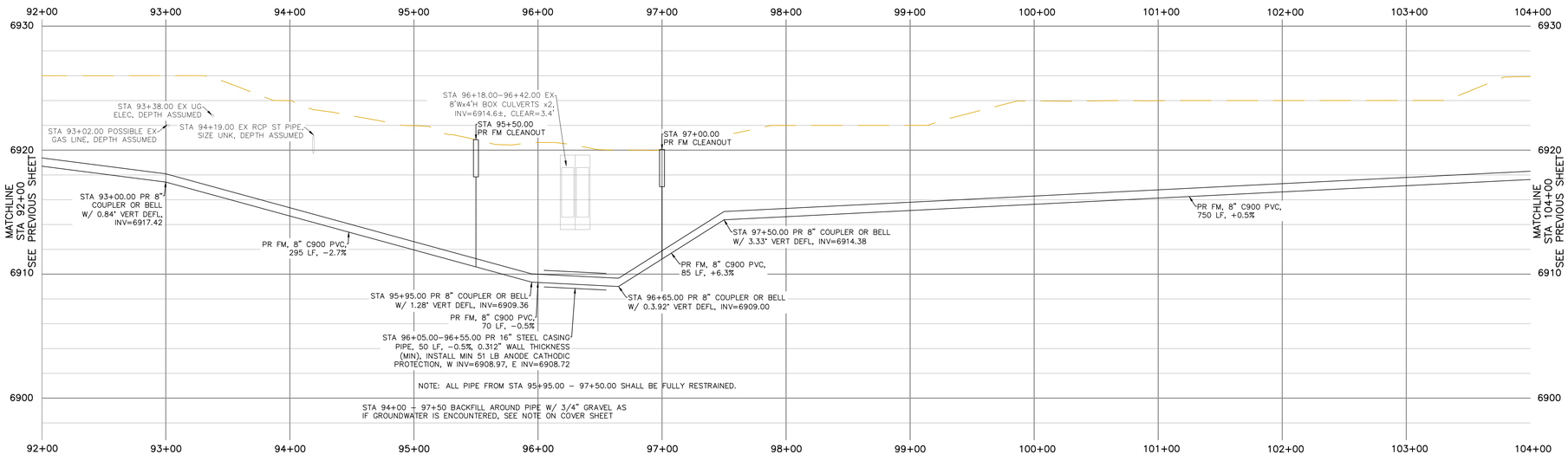

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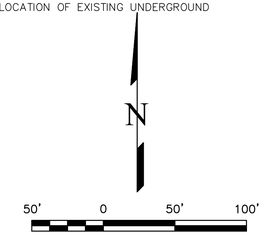

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JOB NO.	2604.00
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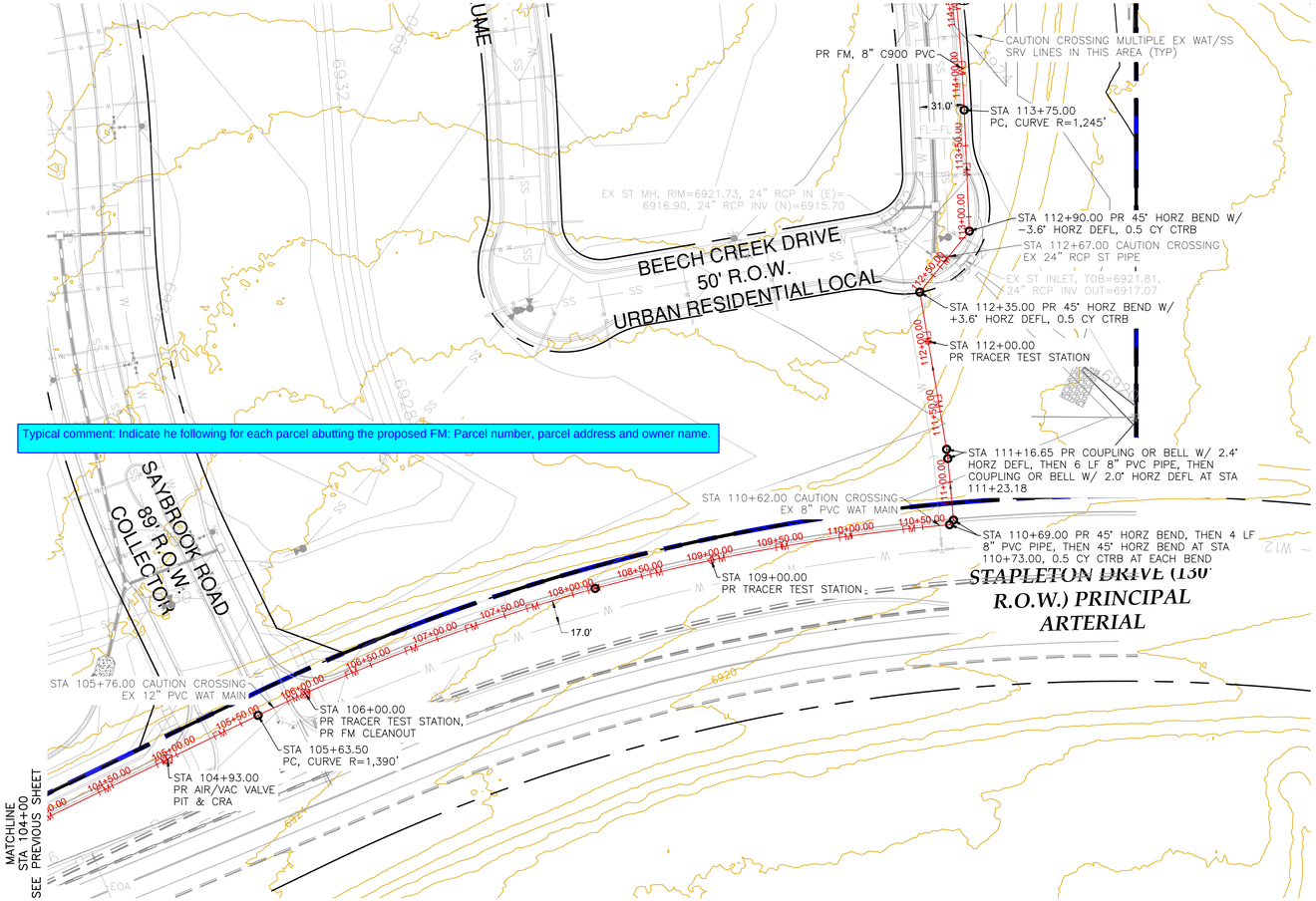

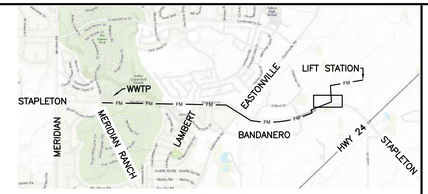

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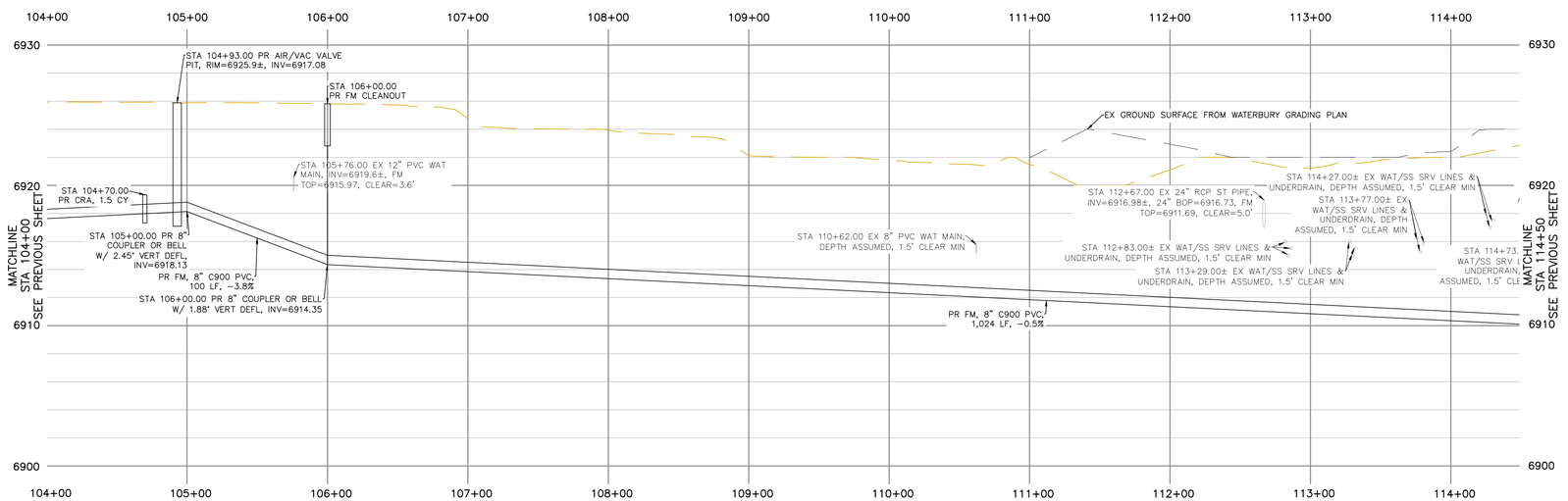

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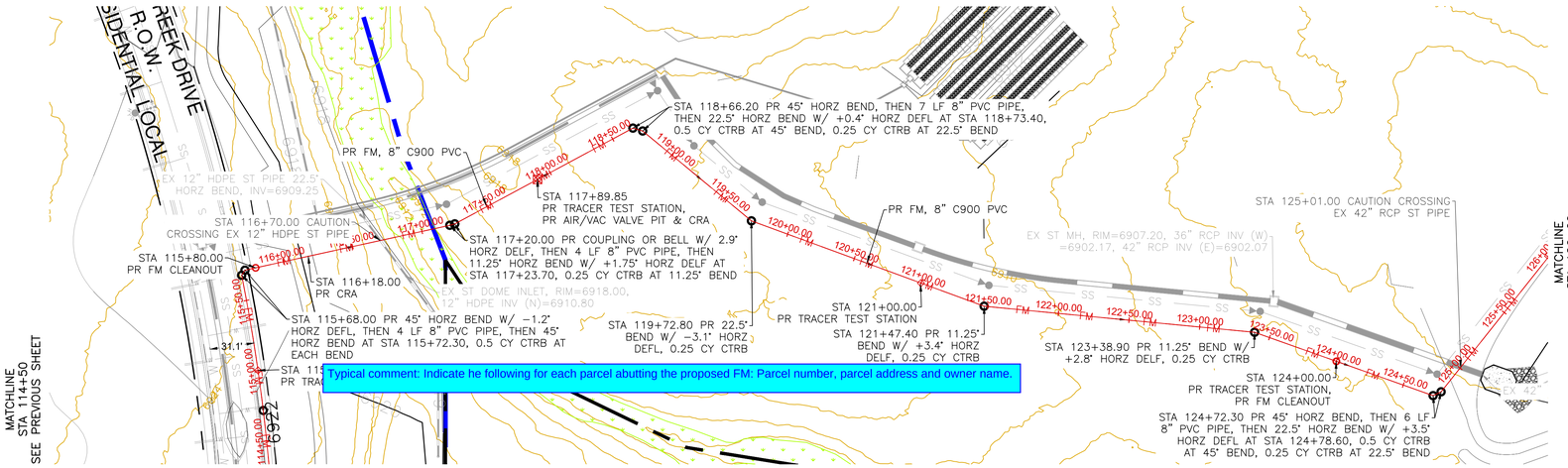

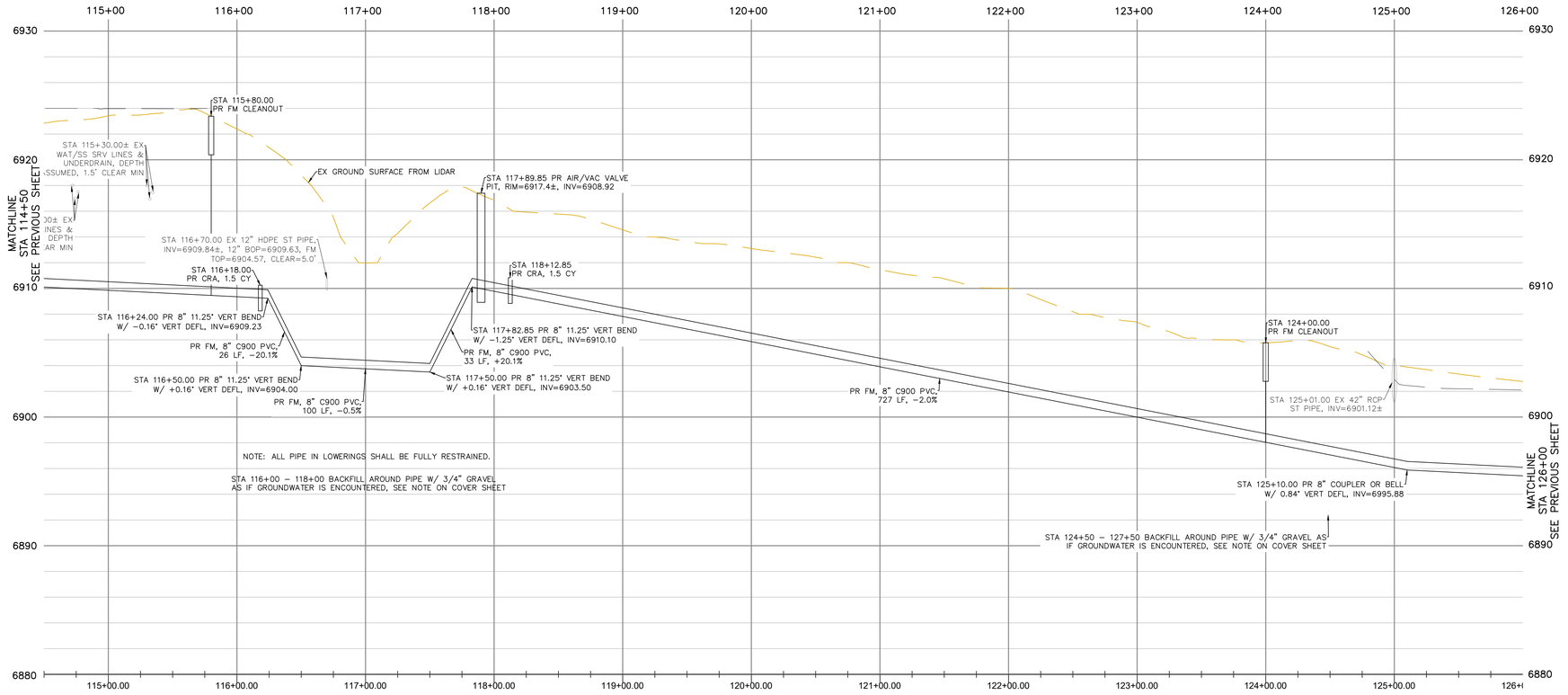

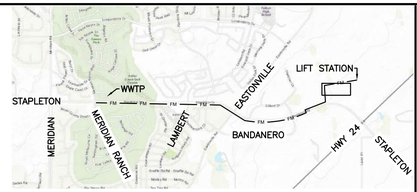

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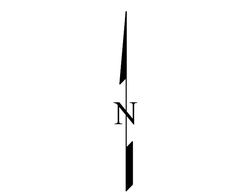

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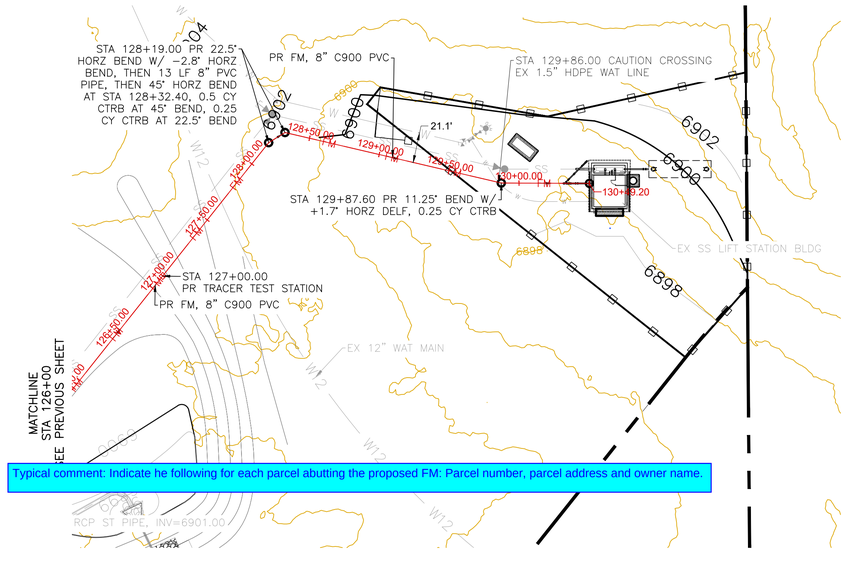

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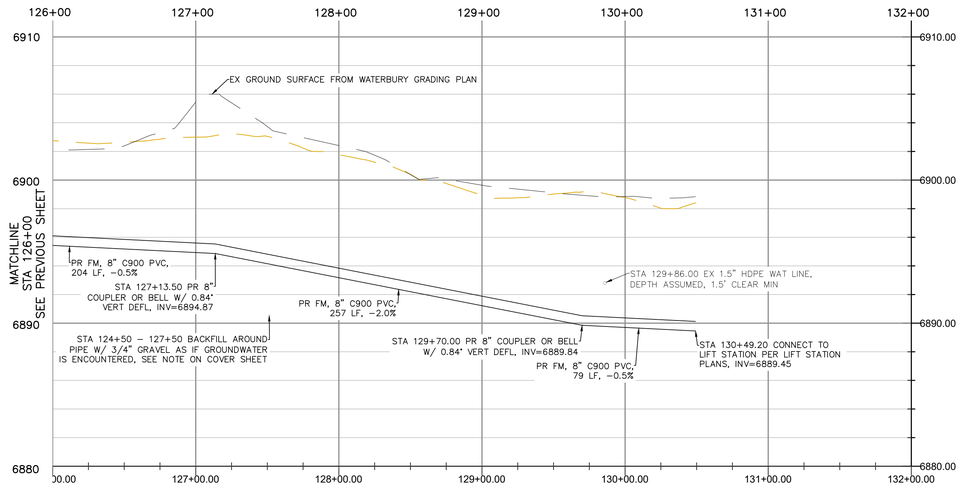

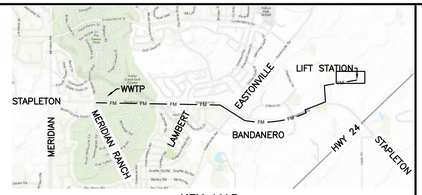

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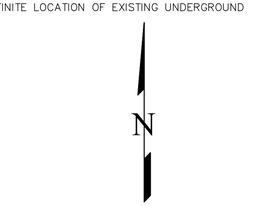

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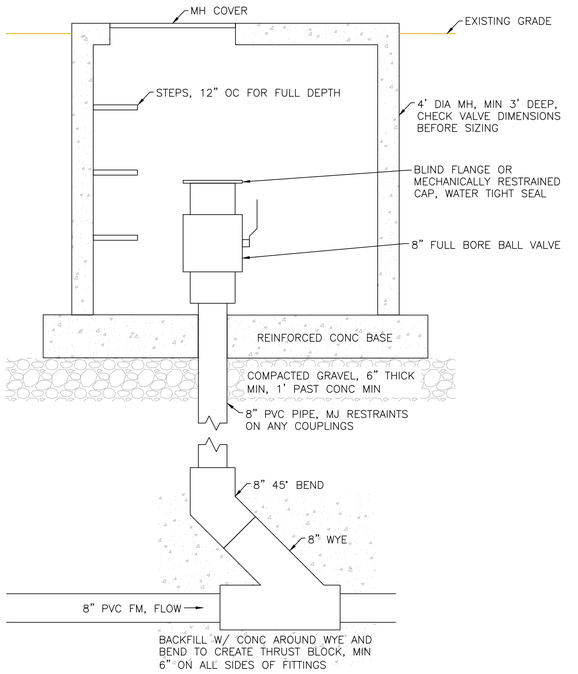
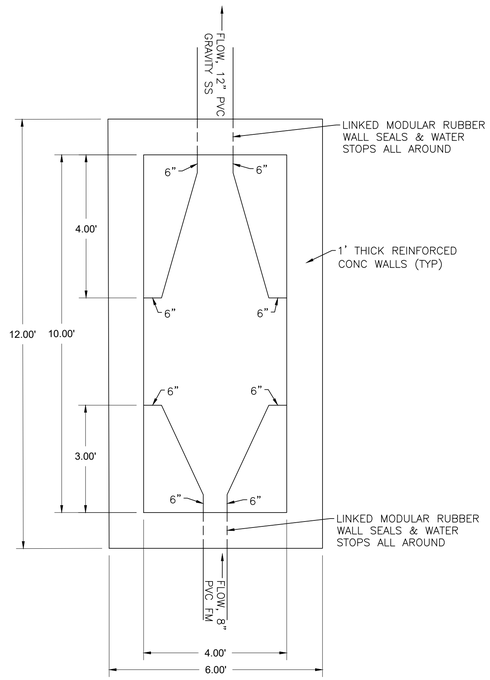


NOTES
1. MANHOLE SHALL BE TRAFFIC RATED FOR HS-20 LOADING.
2. SEE WHMD STANDARD SPECIFICATIONS WW-2 FOR REFERENCE. NOT ALL INFO ON REFERENCE WILL APPLY.
3. INSTALL PIPE SUPPORTS OR RESTRAINTS ON VALVE IF NEEDED.
4. ALL FITTINGS SHALL HAVE MJ RESTRAINTS.
5. ADDITIONAL FITTINGS MAY BE REQUIRED TO GET RISER TO VERTICAL DEPENDING ON FORCE MAIN SLOPE.

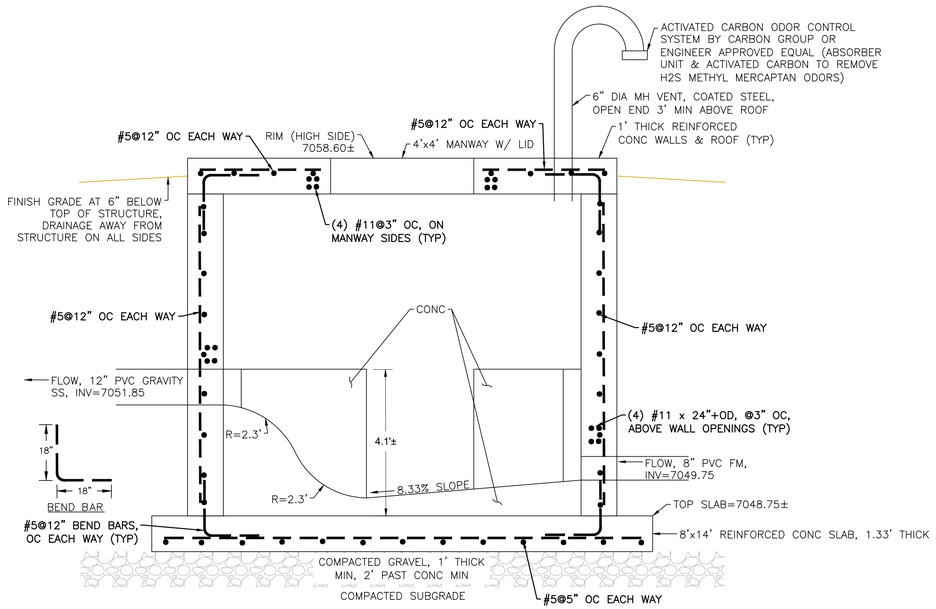
FORCE MAIN CLEANOUT DETAIL

NOT TO SCALE



FORCE MAIN STILLING STRUCTURE PLAN VIEW

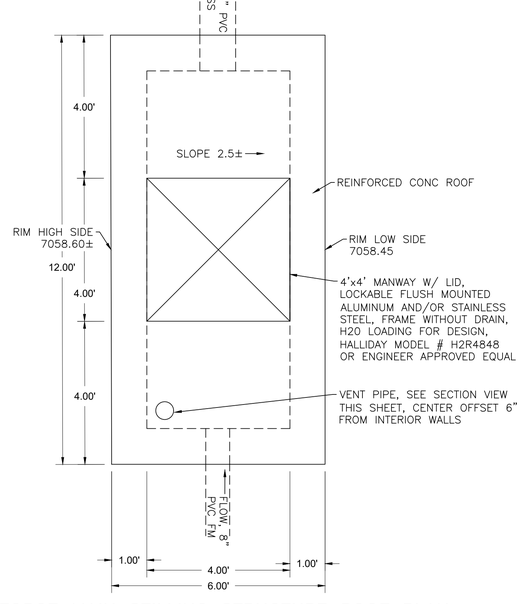
NOT TO SCALE



NOTES
1. MIN CONC COVER OVER REBAR SHALL BE 2.5".

FORCE MAIN STILLING STRUCTURE SECTION VIEW

NOT TO SCALE



FORCE MAIN STILLING STRUCTURE ROOF PLAN

NOT TO SCALE

FORCE MAIN STILLING STRUCTURE NOTES

1. STRUCTURE SHALL BE PRECAST FOR BEST WATERTIGHTNESS. FLOW LINES, BENCHING, AND FILLETS MAY BE CAST IN PLACE.
2. ALL INTERIOR SURFACES SHALL BE LINED, EXCEPT MANWAY LID. SEE CORROSION PROTECTIVE LINING REQUIREMENTS.
3. HS20 LOADING REQUIRED.
4. PRIOR TO BACKFILLING AND INSTALLING ROOF, PERFORM VISUAL ONLY WATERTIGHTNESS TEST TO A MAX WATER LEVEL OF 7057'±. HOLD FOR THREE DAY AND REPAIR ANY LEAKS UNTIL EXTERIOR OF STRUCTURE REMAINS DRY.

CORROSION PROTECTIVE LINING SPECIFICATIONS – EPOXY LINER

A. QUALITY ASSURANCE
- A.A. ALL COATINGS SHALL CONFORM TO OSHA REQUIREMENTS FOR ALLOWABLE EXPOSURE TO LEAD AND OTHER HAZARDOUS SUBSTANCES.
- A.B. MANUFACTURER SHALL BE A COMPANY THAT SPECIALIZES IN PRODUCING HIGH QUALITY INDUSTRIAL COATING MATERIALS.
- A.C. APPLICATOR: COMPANY THAT HAS SUCCESSFULLY COMPLETED COATING SYSTEMS APPLICATIONS SIMILAR IN MATERIAL AND EXTENT TO THOSE INDICATED. APPLICATOR SHALL BE ABLE TO SUPPLY SUITABLE EQUIPMENT TO PREPARE THE SURFACES AND APPLY THE PROTECTIVE COATING SYSTEM SPECIFIED WITHIN THIS ARTICLE.
- A.D. SINGLE SOURCE RESPONSIBILITY: PROVIDE COATING MATERIAL AND THINNERS PRODUCED BY THE SAME MANUFACTURER FOR EACH SYSTEM ON ALL SURFACES OF THE MANHOLE BENCH.
- A.E. FIELD PAINTING PRE-APPLICATION MEETING: HOLD A PRE-APPLICATION MEETING BEFORE THE START OF FIELD SURFACE PREPARATION AND COATINGS APPLICATION. REQUIRE ATTENDANCE OF PARTIES DIRECTLY AFFECTING WORK OF THIS SPECIAL PROVISION, INCLUDING THE ENGINEER, APPLICATOR, INSPECTOR, AND COATING MANUFACTURER'S REPRESENTATIVE. REVIEW THE SPECIFICATIONS TO INSURE EACH PARTY'S RESPONSIBILITIES ARE UNDERSTOOD. SUBJECTS TO BE DISCUSSED ARE: ENVIRONMENTAL REQUIREMENTS, PROTECTION OF SURFACES NOT SCHEDULED TO BE COATED, SURFACE PREPARATION, APPLICATION, REPAIR, FIELD QUALITY CONTROL, CLEANING, PROTECTION OF COATING SYSTEMS, COORDINATION WITH OTHER WORK, AND ANY OTHER AREAS OF CONCERN EXPRESSED AT THE MEETING.
- A.F. DUST AND CONTAMINANTS: SCHEDULE COATING WORK TO AVOID EXCESSIVE DUST AND AIRBORNE CONTAMINANTS. PROTECT WORK AREA FROM EXCESSIVE DUST AND AIRBORNE CONTAMINANTS DURING COATING APPLICATION AND CURING.

B. WARRANTY: FULL WARRANTY AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR TWO YEARS AFTER SUBSTANTIAL COMPLETION, INCLUDING ALL PARTS, LABOR, AND EXPENSES.

C. PRODUCTS
- C.A. MANUFACTURERS: ITW POLYMER COATINGS, MAINSTAY, RAVEN, SAUEREISEN, OR APPROVED EQUAL.
- C.B. GENERAL:
  - C.B.A. APPLICATION METHOD SHALL BE DESIGNED AND INSTALLED USING TECHNIQUE RECOMMENDED BY THE MANUFACTURER.
  - C.B.B. COLORS SHALL BE PER INSPECTOR (WHITE, GRAY, OR TAN EXPECTED).
  - C.B.C. UNLESS OTHERWISE NOTED, ITW POLYMERS COATINGS PRODUCTS ARE IDENTIFIED IN THIS EPOXY LINER SYSTEM TO ESTABLISH QUALITY AND TYPE DESIRED.
  - C.B.D. SYSTEM THICKNESS OR COVERAGE RATE IS RECOMMENDED BY ITW POLYMERS COATINGS. IF OTHER MANUFACTURERS ARE USED, MANUFACTURER REQUIREMENTS SHALL BE FOLLOWED, BUT IN NO CASE SHALL THICKNESS OR COVERAGE RATE BE LESS THAN ITW POLYMERS COATINGS.
- C.C. PROPERTIES – MEET THE FOLLOWING:

PROPERTY	TEST METHOD	PERFORMANCE
COMPRESSIVE STRENGTH	ASTM C579	12,870 PSI
TENSILE STRENGTH	ASTM D637	6,690 PSI
FLEXURAL STRENGTH	ASTM D580	12,443 PSI
BOND STRENGTH	ASTM D4541	450 PSI

- C.C.A. VOLUME OF SOLIDS: 100%
- C.D. SURFACE PREPARATION
  - C.D.A. CONCRETE SURFACES SHALL BE ABRASIVE BLASTED IN ACCORDANCE WITH SSPC-SP13 TO PRODUCE A CLEAN AND ROUGHENED SURFACE FINISH. ALTERNATIVE SURFACE PREPARATION METHODS INCLUDE WET GRIT BLASTING AND HIGH OR ULTRA-HIGH PRESSURE WATER JETTING.
  - C.D.B. ALL LOOSE SURFACE CONTAMINATION SHALL BE COMPLETELY REMOVED BY VACUUMING OR HIGH PRESSURE WATER WASHING. THE SUBSTRATE MUST BE VISIBLY DRY BEFORE PROCEEDING. ANY SPECIFIC AREA THAT IS NOT VISIBLY DRY OR IS EXPERIENCING WATER PENETRATION (I.E. GROUND WATER SEEPAGE) SHALL BE SURFACE DRIED UTILIZING FORCED AIR HEATING OR DEHUMIDIFICATION UNITS. MOISTURE VAPOR TRANSMISSION SHOULD BE THREE POUNDS OR LESS PER 1,000 SQUARE FEET OVER A 24 HOUR PERIOD, AS CONFIRMED THROUGH A CALCIUM CHLORIDE TEST PER ASTM E-1907. QUANTITATIVE RELATIVE HUMIDITY (RH) TESTING, ASTM F-2170, SHOULD CONFIRM CONCRETE RH RESULTS BELOW 75%.
  - C.D.C. PROVIDE A SURFACE PROFILE OF ICRI SCP-3 TO ICRI CSP-5.
- C.E. SYSTEM
  - C.E.A. CONCRETE RESURFACING: ROUGH CONCRETE, SPALLED CONCRETE, OR CONCRETE SURFACES WITH VOIDS AND/OR BUG HOLES MUST BE RESURFACED IN ACCORDANCE WITH MANUFACTURE'S RECOMMENDATION.
  - C.E.B. PRIMER COAT: 1 COAT, 125 TO 175 SQUARE FEET PER GALLON (SFPG) "POLYSPEC MMP PRIMER, TRANSPARENT AMBER" BY ITW POLYMERS COATINGS, OR APPROVED EQUAL.
  - C.E.C. INTERMEDIATE COAT: 1 COAT, 40.0 TO 60.0 DRY FILM THICKNESS (MILS/COAT) "TUFFREZ 240, GRAY" BY ITW POLYMERS COATINGS, OR APPROVED EQUAL.
  - C.E.D. TOP COAT: 1 COAT, 40.0 TO 60.0 DRY FILM THICKNESS (MILS/COAT) "TUFFREZ 240, GRAY" BY ITW POLYMERS COATINGS, OR APPROVED EQUAL.
- C.F. THINNING AND MIXING
  - C.F.A. EPOXY LINER MATERIALS SHALL BE MIXED WIHT A POWER MIXER OF SIFFICIENT SIZE TO ENSURE COMPLETE DISPERSION OF PIGMENTS AND BLENDING OF REACTIVE COMPONENTS.
  - C.F.B. EXPOSY LINER MATERIALS SHALL NOT BE THINNED UNLESS SPECIFICALLY ALLOWED TY THE MANUFACTURER'S RECOMMENDATIONS.
- C.G. EPOXY INSTALLATION
  - C.G.A. EXAMINATION
    - C.G.A.A. EXAMINE AREAS AND CONDITIONS UNDER WHICH THE EPOXY LINER SYSTEM IS TO BE APPLIED. NOTIFY CONTRACTOR AND ENGINEER OF AREAS OR CONDITIONS THAT ARE NOT ACCEPTABLE. NO NOT BEGIN SURFACE PREPARATION OR APPLICATION UNTIL UNACCEPTABLE AREAS OR CONDITIONS HAVE BEEN CORRECTED.
    - C.G.A.B. PROTECT SURROUNDING ARES AND SURFACES NOT SCHEDULED TO BE COATED FROM DAMAGE DURING SURFACE PREPARATION AND APPLICATION OF EPOXY LINER SYSTEM. IMMEDIATELY REMOVED EPOXY LINER SYSTEM THAT FALL ON SURROUNDING AREAS AND SURFACES NOT SCHEDULED TO BE COATED.
    - C.G.A.C. ALL EPOXY LINER MATERIALS SHALL BE MIXED AND APPLIED AT TEMPERATURES IN ACCORDANCE WITH THESE SPECIFICATIONS AND THE MANUFACTURER'S RECOMMENDATIONS.
      - C.G.A.C.A. EPOXY LINER MATERIALS SHALL NOT BE APPLIED IN INCLEMENT WEATHER CONDITIONS.
      - C.G.A.C.B. AMBIENT TEMPERATURES MUST BE BETWEEN 40°F AND 85°F DURING APPLICATION OF EPOXY LINER MATERIALS. RELATIVE HUMIDITY MUST BE BELOW 85%.
      - C.G.A.C.C. THE MINIMUM SUBSTRATE TEMPERATURE AT THE TIME OF APPLICATION SHALL BE 45°F. THE MAXIMUM SUBSTRATE TEMPERATURE AT THE TIME OF APPLICATION SHALL BE 100°F.
      - C.G.A.C.D. AT THE TIME OF APPLICATION, THE SUBSTRATE TEMPERATURE MUST BE AT LEAST 5°F ABOVE THE DEW POINT.
      - C.G.A.C.E. DURING APPLICATION, THE SUBSTRATE TEMPERATURE MUST BE DECLINING.
    - C.G.A.D. ADEQUATE LIGHTING SHALL BE PROVIDED TO SUFFICIENTLY LIGHT UP ALL AREAS TO BE WORKED ON WITHOUT INCLUSION OF SHADOW AREAS. ADEQUATE LIGHTING SHALL BE CONSIDERED A MINIMUM OF 20 FOOT CANDLES IN ALL AREAS IN WHICH WORK OR INSPECTION PROCESSES ARE OCCURRING.
    - C.G.A.E. EPOXY LINER MATERIALS SHALL NOT BE APPLIED IN WINDY CONDITIONS. CONTRACTOR SHALL ENSURE WINDBLOWN MATTER IS PREVENTED FROM CONTAMINATED FRESHLY COATED SURFACES.
    - C.G.A.F. KEEP CONTAINERS CLOSED WHEN NOT IN USE TO AVOID CONTAMINATION.
    - C.G.A.G. DON NOT USE MIXED EPOXY LINER MATERIALS BEYOND POT LIFE LIMITS.
    - C.G.A.H. APPLY MULTIPLE COATS WITHIN MANUFACTURER'S RECOMMENDED RECOAT TIMEFRAME.
    - C.G.A.I. USE APPLICATION EQUIPMENT, TOOLS, PRESSURE SETTINGS, AND TECHNIQUES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
    - C.G.A.J. UNIFORMLY APPLY EPOXY LINER MATERIALS AT SPREADING RATE REQUIRED TO ACHIEVE SPECIFIED DFT.
    - C.G.A.K. APPLY EPOXY LINER MATERIALS TO BE FREE OF FILM DEFECTS THAT WOULD ADVERSELY AFFECT PERFORMANCE OF THE LINE SYSTEM.
  - C.G.B. REPAIRS
    - C.G.B.A. DAMAGED MATERIALS: REPAIR OR REPLACE DAMAGED MATERIALS AND SURFACES NOT SCHEDULED TO BE COATED.
    - C.G.B.B. DAMAGED LINER SYSTEM: REPAIR DAMAGED EPOXY LINER MATERIALS.
      - C.G.B.B.A. REPAIRS SHALL BE MADE WITH THE EPOXY LINER SYSTEM, SURFACE PREPARATION, AND COAT THICKNESS SPECIFIED IN ARTICLE 120141A.02, A.
      - C.G.B.B.B. COMPLETE REPLACEMENT OF THE EPOXY LINER MAY BE REQUIRED BY ENGINEER OR INSPECTOR IF THE DAMAGED OR UNSATISFACTORY AREA EXCEEDS 2% OF THE TOTAL COATED SURFACE AREA.
      - C.G.B.B.C. PRIOR TO ANY REPAIR WORK, THE SURFACE SHALL BE CLEANED IN ACCORDANCE WITH SSPC-SP 1.
      - C.G.B.B.D. INTACT AREAS AROUND THE DAMAGED AREA SHALL BE FEATHERED BY EITHER HAND SANDING, POWER TOOL CLEANING, OR ABRASIVE BLAST CLEANING PRIOR TO THE APPLICATION OF THE EPOXY LINER.
    - C.G.B.C. LINER SYSTEM DEFECTS: COMPLETELY REPLACE THE DEFECTIVE EPOXY LINER WITH THE EPOXY LINER SYSTEM, SURFACE PREPARATION, AND COAT THICKNESS SPECIFIED IN ARTICLE 120141A.01, A.
- C.H. TESTING EQUIPMENT AND PROCEDURES
  - C.H.A. PROVIDE ON THE PROJECT SITE, THE TESTING EQUIPMENT NECESSARY TO TEST THE FOLLOWING. EQUIPMENT SHALL BE IN CALIBRATION AND PROPER WORKING ORDER. EQUIPMENT SHALL BE USED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS OR AS DIRECTED BY THE ENGINEER OR INSPECTOR. THE INSPECTOR SHALL BE NOTIFIED OF THE TIME OF TESTING SO THAT THE MIGHT BE PRESENT TO WITNESS TESTING. KEEP A DAILY LOG OF ENVIRONMENTAL CONDITIONS, WORK SCHEDULE, AND ANY OTHER PERTINENT INFORMATION. THE LOG SHALL BE TURNED OVER TO THE INSPECTOR AT THE END OF THE PROJECT TO BE INCLUDED IN THE PERMANENT RECORD. PROVIDE QUALIFIED PERSONNEL TO PERFORM THE FOLLOWING TESTING:
    - C.H.A.A. MONITORING AMBIENT TEMPERATURE.
    - C.H.A.B. DETECTING OIL OR WATER IN COMPRESSED AIR.
    - C.H.A.C. DETERMINING DEGREE OF CLEANLINESS FOR BLAST CLEANED SURFACES.
    - C.H.A.D. MEASURING NON-VISIBLE CONTAMINANTS ON CONCRETE SURFACES.
    - C.H.A.E. MEASURING CONCRETE SURFACE PROFILE.
    - C.H.A.F. MONITORING THE MIXING AND THINNING OF EPOXY LINER MATERIALS.
    - C.H.A.G. MEASURING WET FILM THICKNESS OF EPOXY LINER MATERIALS.
    - C.H.A.H. MEASURING EPOXY LINER MATERIAL ADHESION USING PORTABLE ADHESION TESTERS (DESTRUCTIVE TEST TO BE PERFORMED ONLY WHEN REQUIRED).
    - C.H.A.I. DISCONTINUITY OR HOLIDAY TESTING OF EPOXY LINER MATERIALS.
    - C.H.A.J. TESTING FOR CURE OF EPOXY LINER MATERIALS.

THIS DESIGN WAS PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF TERRA NOVA ENGINEERING, INC.

QUENTIN ARMIJO
COLORADO P.E. NO. 37170

REVISIONS

NO.	DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

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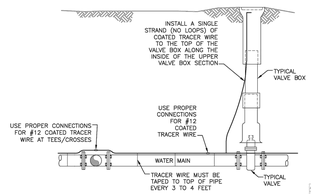
WATERBURY SANITARY FORCE MAIN

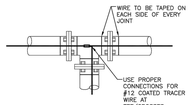
UTILITY CONSTRUCTION SET
UTILITY DETAILS SHEET

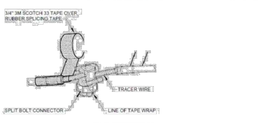
DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY QNA

H-SCALE AS SHOWN
V-SCALE N/A

JOB NO. 2604.00
DATE ISSUED 04/03/26
SHEET NO. 15 OF 36







General: Housing is to protect split bolt wire nut and tracer wire in buried applications.

Specifications: Housing shall be made of high impact polypropylene and be filled with a dielectric silicone gel.

Aqua Housing 69105

Max. Voltage: 50V
Housing: High Impact Polypropylene
Sealant/Dielectric Silicone Gel
Wire Range: #14-10 Solid Copper; #14-10 Steel Core Tracer Wire
Split bolt size not to exceed 1.0" tall by 0.8" wide by 0.2" deep

Ysiltech Housing 9810

Max. Voltage: 600V
Temperature Rating: 0.40° C~300° C (-10-0 F)
Measurements: See specification sheet for complete product measurements
Wire Range:
#8~#10 (.363"~.452" O.D.)E
#12~#14(.305"~.443" O.D.)
Amperage not to exceed maximum temperature of the conductor

1. Wrap all Tracer Wire split bolt connectors or exposed wire using 1" 3M Scotch 130C Linerless Rubber Splicing Tape making sure to seal all ends to prevent moisture penetration.

TRACER WIRE INSTALLATION DETAILS

Drawn: GDM/SKG	Revised: DECEMBER 2021	WOODMEN HILLS METROPOLITAN DISTRICT	WATER & WASTEWATER SYSTEM STANDARD SPECIFICATIONS	W-10
Date: MARCH 2011	Revised:			
Scale: N.T.S.	Revised:			

THRUST BLOCK DIMENSIONS & VOLUMES – PVC & DIP 250 psi

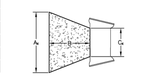
MAIN SIZE (IN.)	TYPE OF FITTING	MINIMUM BEARING SURFACE AREA (ft²)	MINIMUM A_x (ft)	MINIMUM A_y (ft)	MINIMUM C_x (ft)	MINIMUM C_y (ft)	MINIMUM B	APPROXIMATE VOLUME (yd³)
4	11.25° BEND	1.00	1.00	1.00	0.25	0.33	2.00	0.25
4	22.5° BEND	2.00	2.00	1.41	0.21	0.33	22.00	0.25
4	45° BEND	3.50	3.50	1.87	0.42	0.33	2.00	0.25
4	TEE & DEAD END	4.75	4.75	2.18	0.67	0.33	4.75	0.25
6	11.25° BEND	2.00	2.00	1.41	0.25	0.50	2.00	0.25
6	22.5° BEND	3.75	3.75	1.94	0.38	0.50	2.00	0.25
6	45° BEND	7.25	7.25	2.69	0.58	0.50	2.00	0.25
6	TEE & DEAD END	9.50	9.50	3.08	0.83	0.50	2.00	0.50
8	11.25° BEND	3.25	3.25	1.80	0.34	0.67	2.00	0.25
8	22.5° BEND	6.50	6.50	2.55	0.48	0.67	2.00	0.25
8	45° BEND	12.50	12.50	3.57	0.67	0.67	2.00	0.50
8	TEE & DEAD END	16.25	16.25	4.64	1.08	0.67	2.00	0.75

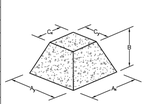
THRUST BLOCK DIMENSIONS & VOLUMES – PVC (Maximum Static Pressure = 170 psi)

MAIN SIZE (IN.)	TYPE OF FITTING	MINIMUM BEARING SURFACE AREA (ft²)	MINIMUM A_x (ft)	MINIMUM A_y (ft)	MINIMUM C_x (ft)	MINIMUM C_y (ft)	MINIMUM B	APPROXIMATE VOLUME (yd³)
12	11.25° BEND	4.75	2.18	2.18	0.43	1.00	2.00	0.25
12	22.5° BEND	9.25	3.04	3.04	0.64	1.00	2.00	0.50
12	45° BEND	18.00	4.92	3.66	1.00	1.00	2.00	0.75
12	TEE & DEAD END	23.50	6.42	3.66	1.46	1.00	2.48	1.00
16	11.25° BEND	8.00	2.83	2.83	0.44	1.33	2.00	0.50
16	22.5° BEND	16.00	4.27	3.75	0.66	1.33	2.00	0.75
16	45° BEND	31.00	8.27	3.75	1.00	1.33	3.64	1.75
16	TEE & DEAD END	40.50	10.80	3.75	1.92	1.33	4.44	3.00

THRUST BLOCK DIMENSIONS & VOLUMES – DIP (Maximum Static Pressure = 250 psi)

MAIN SIZE (IN.)	TYPE OF FITTING	MINIMUM BEARING SURFACE AREA (ft²)	MINIMUM A_x (ft)	MINIMUM A_y (ft)	MINIMUM C_x (ft)	MINIMUM C_y (ft)	MINIMUM B	APPROXIMATE VOLUME (yd³)
12	11.25° BEND	6.75	2.60	2.60	0.43	1.00	2.00	0.50
12	22.5° BEND	13.50	3.69	3.66	0.64	1.00	2.00	0.50
12	45° BEND	26.25	7.17	3.66	1.00	1.00	3.09	1.50
12	TEE & DEAD END	34.25	9.36	3.66	1.46	1.00	3.95	2.25
16	11.25° BEND	11.75	3.43	3.43	0.44	1.33	2.00	0.50
16	22.5° BEND	23.25	6.20	3.75	0.66	1.33	2.77	1.00
16	45° BEND	45.50	12.13	3.75	1.00	1.33	5.57	4.00
16	TEE & DEAD END	59.50	15.87	3.75	1.92	1.33	6.98	6.50

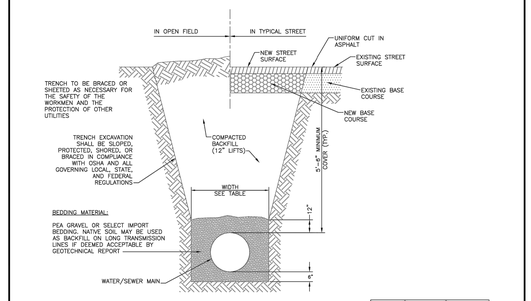




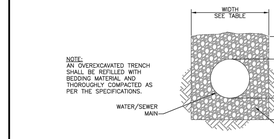
NOTES:
1. THE MINIMUM BEARING SURFACE AREAS SHOWN ARE BASED ON A MAX STATIC PIPE PRESSURE OF 170/250 POUNDS PER SQUARE INCH PLUS A SAFETY FACTOR OF 1.5 AND AN ALLOWABLE SOIL BEARING CAPACITY OF 1,500 POUNDS PER SQUARE FOOT. BEARING SURFACE AREA IS ROUNDED UP TO THE NEAREST 0.25 SQUARE FEET. REFERENCE AWWA M-23 AND M-41.
2. THE DESIGN ENGINEER IS RESPONSIBLE FOR VERIFYING ASSUMPTIONS BASED ON ACTUAL SITE CONDITIONS. IF SITE CONDITIONS VARY FROM THE ASSUMPTIONS, THE DESIGN ENGINEER SHALL PROVIDE A SITE-SPECIFIC DESIGN IN ACCORDANCE WITH AWWA M-23, PVC PIPE – DESIGN AND INSTALLATION AND AWWA M-41, DUCTILE-IRON PIPE AND FITTINGS. SITE-SPECIFIC DESIGNS INCLUDING GEOTECHNICAL INFORMATION SHALL BE SUBMITTED TO THE DISTRICT FOR APPROVAL.
3. THE MINIMUM BEARING SURFACE AREA AND APPROXIMATE VOLUME OF CONCRETE SHALL BE SHOWN ON THE CONSTRUCTION PLANS FOR ALL CONCRETE THRUST BLOCKS. SEE SECTION 9.4 FOR CONCRETE REQUIREMENTS. SEE SECTION 4.8 FOR THRUST BLOCK REQUIREMENTS.
4. THE APPROXIMATE VOLUMES SHOWN ARE BASED ON THE MINIMUM BEARING SURFACE AREA AND THE MINIMUM TRENCH DIMENSIONS. THE APPROXIMATE VOLUME IS ROUNDED UP TO THE NEAREST 0.25 CUBIC YARDS.
5. THESE CHARTS MAY ONLY BE USED IF THE BLOCK HEIGHT (Hy) IS EQUAL TO OR LESS THAN ONE-HALF THE TOTAL DEPTH (H1) FROM THE FINISHED GRADE TO THE BOTTOM OF THE BLOCK. THE MINIMUM DIMENSIONS SHOWN ARE BASED ON A PIPE DEPTH OF 5.5 FEET.
6. A SITE-SPECIFIC DESIGN SHALL BE REQUIRED FOR PIPES LARGER THAN 16 INCHES OR MAX STATIC PIPE PRESSURES GREATER THAN 250 POUNDS PER SQUARE INCH. THE DESIGN ENGINEER HAS THE OPTION OF PROVIDING A SITE-SPECIFIC DESIGN FOR PIPES SMALLER THAN 16 INCHES OR MAX STATIC PRESSURES LESS THAN 250 POUNDS PER SQUARE INCH.
7. ALL CALCULATIONS SHALL BE PROVIDED TO THE DISTRICT FOR REVIEW.

THRUST BLOCK DATA

Drawn: SKG	Revised: DECEMBER 2021	WOODMEN HILLS METROPOLITAN DISTRICT	WATER & WASTEWATER SYSTEM STANDARD SPECIFICATIONS	W-11
Date: MARCH 2011	Revised:			
Scale: N.T.S.	Revised:			



TYPICAL TRENCH SECTION
SCALE: N.T.S.



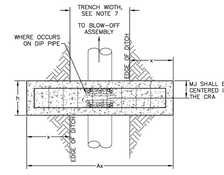
NOTE:
AN OVEREXCAVATED TRENCH SHALL BE REFILLED WITH BEDDING MATERIAL AND THOROUGHLY COMPACTED AS PER THE SPECIFICATIONS.

UNSTABLE TRENCH BEDDING DETAIL
SCALE: N.T.S.

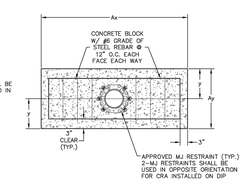
PIPE DIAMETER	MINIMUM WIDTH	MAXIMUM WIDTH
4"	2'-2"	3'-0"
6"	2'-2"	3'-0"
8"	2'-2"	3'-0"
10"	2'-4"	3'-0"
12"	2'-6"	3'-6"
18"	2'-10"	3'-9"
24"	3'-2"	4'-3"

TYPICAL TRENCH CROSS-SECTION

Drawn: GDM/SKG	Revised: DECEMBER 2021	WOODMEN HILLS METROPOLITAN DISTRICT	WATER & WASTEWATER SYSTEM STANDARD SPECIFICATIONS	W-14
Date: MARCH 2011	Revised:			
Scale: N.T.S.	Revised:			



PLAN
DEAD-END OR REVERSE ANCHOR



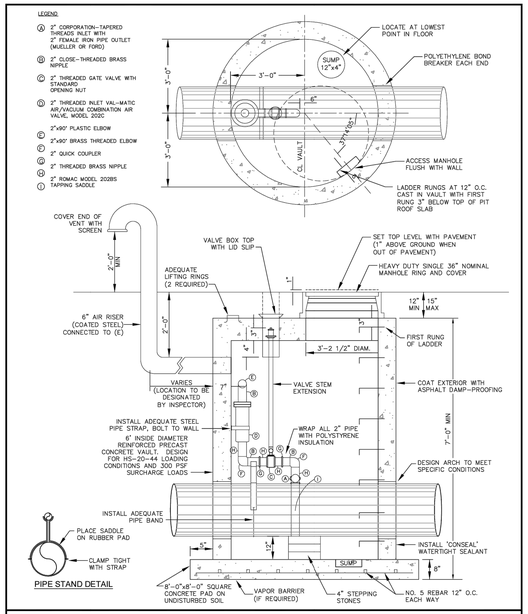
ELEVATION
DEAD-END OR REVERSE ANCHOR

DIAMETER (in)	PRESSURE (psi)	x (in)	Ax (in)	y (in)	Ay (in)	Ab (sf)	h (in)	Vol (cy)
4	250	12	72	12	28.80	6.80	18	1.0
6	250	18	84	12	30.90	9.73	18	1.0
8	250	36	120	12	33.05	18.53	18	1.5
12	170	36	120	15	43.20	24.60	18	2.0
12	250	48	144	18	49.20	36.80	24	3.75
16	170	54	156	18	53.40	44.05	24	4.25
16	250	60	168	24	65.40	60.50	36	8.5

NOTES:
1. THE MINIMUM BEARING SURFACE AREAS SHOWN ARE BASED ON A MAX. STATIC PIPE PRESSURE OF 170/250 POUNDS PER SQUARE INCH PLUS A SAFETY FACTOR OF 1.5, AND AN ALLOWABLE SOIL BEARING CAPACITY OF 1,500 POUNDS PER SQUARE FOOT, FOR HDPE, ADDITIONAL ASSUMPTIONS INCLUDE A MAX 50% DEFLECTION LAG FACTOR, A DEFLECTION CHANCE AND A POISSON RATIO OF 0.45. REFERENCE AWWA M-23, M-41, AND MANUFACTURER'S RECOMMENDATIONS.
2. THE DESIGN ENGINEER IS RESPONSIBLE FOR VERIFYING ASSUMPTIONS BASED ON ACTUAL SITE CONDITIONS. IF SITE CONDITIONS VARY FROM THE ASSUMPTIONS, THE DESIGN ENGINEER SHALL PROVIDE A SITE-SPECIFIC DESIGN IN ACCORDANCE WITH AWWA M-23, PVC PIPE DESIGN AND INSTALLATION, AND AWWA M-41, DUCTILE IRON PIPE, AND FITTINGS. SITE-SPECIFIC DESIGNS USING GEOTECHNICAL INFORMATION, SHALL BE SUBMITTED TO THE DISTRICT FOR APPROVAL.
3. THE MINIMUM LATERAL BEARING SURFACE AREA (Ab) AND APPROXIMATE VOLUME OF CONCRETE (Vol) SHALL BE SHOWN ON THE CONSTRUCTION PLANS FOR ALL CONCRETE REVERSE ANCHORS.
4. THE APPROXIMATE VOLUMES SHOWN ARE BASED ON THE MINIMUM DIMENSIONS IN THE TABLE. THE APPROXIMATE VOLUME IS ROUNDED UP TO THE NEAREST 0.25 CUBIC YARDS.
5. A SITE-SPECIFIC DESIGN SHALL BE REQUIRED FOR PIPES LARGER THAN 16 INCHES OR MAX. STATIC PIPE PRESSURES GREATER THAN 250 POUNDS PER SQUARE INCH. THE DESIGN ENGINEER HAS THE OPTION OF PROVIDING A SITE-SPECIFIC DESIGN FOR PIPES SMALLER THAN 16 INCHES OR MAX. STATIC PRESSURES LESS THAN THE PRESSURE LISTED IN THE TABLE.
6. COAT RODS WITH EPOXY POLYAMIDE COATING, 10 MILS THICK, MIN.
7. A TRENCH WIDTH OF 4 FEET AND 6" BEDDING UNDER THE PIPE ARE ASSUMED FOR BEARING CALCULATIONS, (Ax, Ay, AND y).
8. THE DESIGN ENGINEER SHALL DESIGN THE CONSTRUCTION OF THE CONCRETE REVERSE ANCHOR SHALL NOT CONFLICT WITH OTHER UTILITIES.
9. DUCTILE IRON FITTINGS AND PIPE SHALL BE WRAPPED IN POLYETHYLENE TUBING WHERE ADJACENT TO CONCRETE.

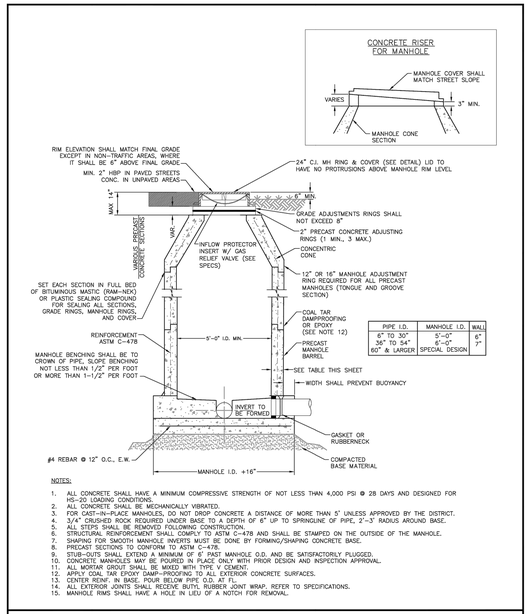
CONCRETE REVERSE ANCHOR FOR MECHANICAL JOINT RESTRAINTS

Drawn: GDM/SKG	Revised: DECEMBER 2021	WOODMEN HILLS METROPOLITAN DISTRICT	WATER & WASTEWATER SYSTEM STANDARD SPECIFICATIONS	W-18
Date: MARCH 2011	Revised:			
Scale: N.T.S.	Revised:			



AIR/VAC PRESSURE VALVE PIT

Drawn: GDM	Revised: DECEMBER 2021	WOODMEN HILLS METROPOLITAN DISTRICT	WATER & WASTEWATER SYSTEM STANDARD SPECIFICATIONS	W-45
Date: MARCH 2011	Revised:			
Scale: N.T.S.	Revised:			

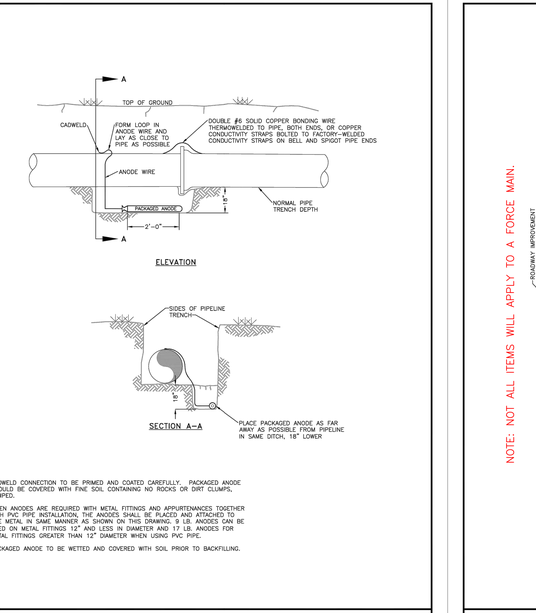


PIPE I.D.	MANHOLE I.D.	WALL
6" TO 30"	5'-0"	6"
36" TO 54"	6'-0"	7"
60" & LARGER	SPECIAL DESIGN	

NOTES:
1. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN 4,000 PSI @ 28 DAYS AND DESIGNED FOR HS-20 LOADING CONDITIONS.
2. ALL CONCRETE SHALL BE MECHANICALLY VIBRATED.
3. FOR CAST-IN-PLACE MANHOLES, DO NOT DROP CONCRETE A DISTANCE OF MORE THAN 5' UNLESS APPROVED BY THE DISTRICT.
4. 3/4" CRUSHED ROCK REQUIRED UNDER BASE TO A DEPTH OF 6" UP TO SPRINGLINE OF PIPE, 2'-3" RADIUS AROUND BASE.
5. ALL STEPS SHALL BE REMOVED FOLLOWING CONSTRUCTION.
6. STRUCTURAL REINFORCEMENT SHALL COMPLY TO ASTM C-478 AND SHALL BE STAMPED ON THE OUTSIDE OF THE MANHOLE.
7. SHAPING FOR SMOOTH MANHOLE INVERTS MUST BE DONE BY FORMING/SHAPING CONCRETE BASE.
8. PRECAST SECTIONS TO CONFORM TO ASTM C-478.
9. STUB-OUTS SHALL EXTEND A MINIMUM OF 6" PAST MANHOLE O.D. AND BE SATISFACTORILY PLUGGED.
10. CONCRETE MANHOLES MAY BE POURED IN PLACE ONLY WITH PRIOR DESIGN AND INSPECTION APPROVAL.
11. ALL MORTAR GROUT SHALL BE MIXED WITH TYPE V CEMENT.
12. APPLY COAL TAR EPOXY DAMP-PROOFING TO ALL EXTERIOR CONCRETE SURFACES.
13. CENTER REINF. IN BASE, POUR BELOW PIPE O.D. AT FL.
14. ALL EXTERIOR JOINTS SHALL RECEIVE BUTYL RUBBER JOINT WRAP, REFER TO SPECIFICATIONS.
15. MANHOLE RIMS SHALL HAVE A HOLE IN LIEU OF A NOTCH FOR REMOVAL.

PRECAST MANHOLE

Drawn: GDM/SKG	Revised: DECEMBER 2021	WOODMEN HILLS METROPOLITAN DISTRICT	WATER & WASTEWATER SYSTEM STANDARD SPECIFICATIONS	WW-2
Date: MARCH 2011	Revised:			
Scale: N.T.S.	Revised:			



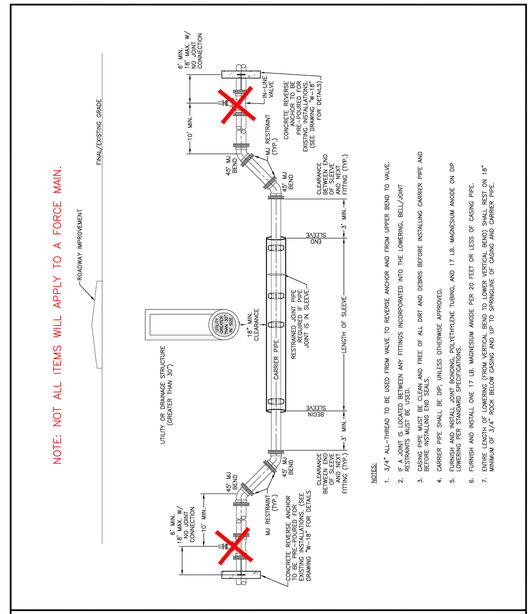
ELEVATION

SECTION A-A

NOTES:
1. CADWELD CONNECTION TO BE PRIMED AND COATED CAREFULLY. PACKAGED ANODE SHOULD BE COVERED WITH FINE SOIL CONTAINING NO ROCKS OR DIRT CLUMPS, TAMPED.
2. WHEN ANODES ARE REQUIRED WITH METAL FITTINGS AND APPURTENANCES TOGETHER WITH PVC PIPE INSTALLATION, THE ANODES SHALL BE PLACED AND ATTACHED TO THE METAL IN SAME MANNER AS SHOWN ON THIS DRAWING. 9 LB. ANODES CAN BE USED ON METAL FITTINGS 12" AND LESS IN DIAMETER AND 17 LB. ANODES FOR METAL FITTINGS GREATER THAN 12" DIAMETER WHEN USING PVC PIPE.
3. PACKAGED ANODE TO BE WETTED AND COVERED WITH SOIL PRIOR TO BACKFILLING.

BONDING JOINT & ANODE INSTALLATION

Drawn: GDM	Revised: DECEMBER 2021	WOODMEN HILLS METROPOLITAN DISTRICT	WATER & WASTEWATER SYSTEM STANDARD SPECIFICATIONS	WW-10
Date: MARCH 2011	Revised:			
Scale: N.T.S.	Revised:			



LOWERING DETAIL W/CASING UTILITY CROSSING GREATER THAN 30"

Drawn: SKG	Revised: DECEMBER 2021	WOODMEN HILLS METROPOLITAN DISTRICT	WATER & WASTEWATER SYSTEM STANDARD SPECIFICATIONS	W-20
Date: MARCH 2011	Revised:			
Scale: N.T.S.	Revised:			

REVISIONS

NO.	DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

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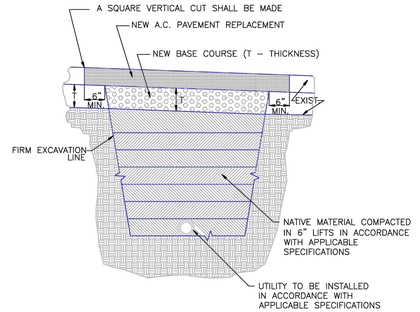
WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
UTILITY DETAILS SHEET

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY QNA
H-SCALE AS SHOWN
V-SCALE N/A
JOB NO. 2604.00
DATE ISSUED 04/03/26
SHEET NO. 16 OF 36



NOTES:

1. THIS DETAIL MAY BE USED FOR PAVEMENT CUTS LESS THAN 200 SQ. FT.

2. EXISTING PAVEMENT MAY BE ROUGH CUT INITIALLY IN CONJUNCTION WITH TRENCHING.

3. A SQUARE VERTICAL CUT SHALL BE MADE IN THE EXISTING A.C. PAVEMENT AFTER PLACEMENT OF BACKFILL PRIOR TO PAVEMENT REPLACEMENT.

4. THICKNESS OF NEW A.C. PAVEMENT REPLACEMENT SHALL MATCH EXISTING (4" MIN.)

5. THICKNESS OF NEW BASE COURSE SHALL BE MINIMUM OF 6" OR EQUAL TO EXISTING, WHICHEVER IS GREATER.

SCALE: NOT TO SCALE

8/11/11 DATE APPROVED: André P. Brackin DEPARTMENT OF TRANSPORTATION	Utility Trench Repair Detail Asphalt Pavement Standard Drawing	EL PASO COUNTY DEPARTMENT OF TRANSPORTATION
	REVISION DATE: 11/10/04	FILE NAME: SD_4–20

REVISIONS

NO.	DESCRIPTION	DATE

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WATERBURY SANITARY FORCE MAIN

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UTILITY DETAILS SHEET

DESIGNED BY DLF
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H–SCALE AS SHOWN
V–SCALE N/A

JOB NO. 2604.00
DATE ISSUED 04/03/26
SHEET NO. 17 OF 36

STANDARD NOTES FOR EL PASO COUNTY GRADING AND EROSION CONTROL PLANS

1. 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 (EPC) STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE (LDC), THE ENGINEERING CRITERIA MANUAL (ECM), THE DRAINAGE CRITERIA MANUAL (DCM) VOLUME 1 AND 2. ANY DEVIATIONS FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.

2. A PRECONSTRUCTION MEETING BETWEEN THE PERMIT HOLDER(S) AND EL PASO COUNTY SHALL BE HELD PRIOR TO ANY CONSTRUCTION ACTIVITIES. IT IS THE RESPONSIBILITY OF THE PERMIT HOLDER(S) TO COORDINATE THE MEETING TIME AND PLACE WITH COUNTY STAFF. NO LAND DISTURBANCE OR CONSTRUCTION ACTIVITIES BEYOND THE INSTALLATION OF THE INITIAL CONSTRUCTION CONTROL MEASURES (CCMS), AS INDICATED ON THE APPROVED GEC PLAN OR CDS WITH GEC PLANS, MAY OCCUR PRIOR TO RECEIVING A NOTICE TO PROCEED (NTP) ISSUED BY THE ECM ADMINISTRATOR. FAILURE TO OBTAIN A NOTICE TO PROCEED PRIOR TO BEGINNING LAND DISTURBING ACTIVITIES MAY RESULT IN AN IMMEDIATE STOP WORK ORDER (SWO).

3. CONSTRUCTION CONTROL MEASURES MUST BE INSTALLED PRIOR TO COMMENCEMENT OF ACTIVITIES THAT COULD CONTRIBUTE POLLUTANTS TO STORMWATER. STORMWATER RUNOFF FROM ALL DISTURBED AREAS AND SOIL STORAGE AREAS MUST UTILIZE OR FLOW TO ONE OR MORE CCM(S) TO MINIMIZE EROSION OR SEDIMENT IN THE DISCHARGE. THE CCM(S) MUST CONTAIN OR FILTER FLOWS IN ORDER TO PREVENT THE BYPASS OF FLOWS WITHOUT TREATMENT AND MUST BE APPROPRIATE FOR STORMWATER RUNOFF FROM DISTURBED AREAS AND FOR THE EXPECTED FLOW RATE, DURATION, AND FLOW CONDITIONS (E.G., SHEET OR CONCENTRATED FLOW).

4. ALL CCMS SHALL BE MAINTAINED AND REMAIN IN EFFECTIVE OPERATING CONDITION UNTIL FINAL STABILIZATION IS ACHIEVED. THE QUALIFIED STORMWATER MANAGER (QSM) SHALL ASSESS THE ADEQUACY OF CCMS AT THE SITE AND IDENTIFY IF CHANGES TO THOSE CCMS ARE NEEDED TO ENSURE THE CONTINUED EFFECTIVE PERFORMANCE OF THE CCMS.

5. PRIOR TO CONSTRUCTION THE PERMIT HOLDER(S) SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.

6. MANAGEMENT OF THE STORMWATER MANAGEMENT PLAN (SWMP) DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE DESIGNATED QSM. THE SWMP SHALL BE LOCATED ON-SITE OR DIGITALLY ACCESSIBLE AT ALL TIMES DURING CONSTRUCTION ACTIVITIES AND MUST BE IMPLEMENTED AS WRITTEN FROM THE START OF CONSTRUCTION ACTIVITY UNTIL FINAL STABILIZATION IS ACHIEVED. THE QSM SHALL AMEND THE SWMP WHEN THERE IS A CHANGE IN DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE OF THE SITE WHICH WOULD REQUIRE THE IMPLEMENTATION OF NEW OR REVISED CCMS OR IF THE SWMP PROVES TO BE INEFFECTIVE IN CONTROLLING POLLUTANTS IN STORMWATER RUNOFF ASSOCIATED WITH CONSTRUCTION ACTIVITY OR WHEN CCMS ARE NO LONGER NECESSARY AND ARE REMOVED. THE QSM SHALL MAINTAIN A RECORD OF AMENDMENTS MADE TO THE SWMP THAT INCLUDES THE DATE AND IDENTIFICATION OF THE CHANGES.

7. 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 RECEIVING WATER UNLESS SHOWN TO BE INFEASIBLE AND SPECIFICALLY REQUESTED AND APPROVED. IN ADDITION TO MAINTAINING 50 HORIZONTAL FEET OF PRE-EXISTING VEGETATION UPGRADIENT OF A RECEIVING WATER (UNLESS INFEASIBLE AND APPROVED), THE PERMIT HOLDER(S) MUST INSTALL CCMS UPGRADIENT OF THE VEGETATIVE BUFFER.

8. TEMPORARY STABILIZATION MEASURES SHALL BE IMPLEMENTED ON DISTURBED AREAS AND STOCKPILES WHERE GROUND DISTURBING CONSTRUCTION ACTIVITY HAS PERMANENTLY CEASED OR TEMPORARILY CEASED FOR LONGER THAN 14 DAYS.

9. EROSION CONTROL BLANKET (ECB) OR OTHER APPROVED CONTROL MEASURE(S) SHALL BE USED ON SLOPES STEEPER THAN 3:1.

10. VEHICLE TRACKING CONTROLS (VTC) MUST BE IMPLEMENTED TO MINIMIZE VEHICLE TRACKING OF SEDIMENT FROM DISTURBED AREAS. VTCS MUST INCLUDE A STRUCTURE CONTROL MEASURE (E.G., TRACKING PAD) AND MAY INCLUDE A NON-STRUCTURAL CONTROL MEASURE (E.G., SWEEPING). MATERIAL TRACKED OFF-SITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.

11. ANY TEMPORARY OR PERMANENT CONTROL MEASURE 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.

12. NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE CURB AND GUTTER, PERMANENT CONTROL MEASURES (PCMS), OR DITCHES EXCEPT WITH APPROVED SEDIMENT CONTROL MEASURES.

13. ALL PCMS SHALL BE INSTALLED AS DESIGNED IN THE APPROVED PLANS. ANY PROPOSED CHANGES THAT AFFECT THE DESIGN OR FUNCTION OF PCMS MUST BE APPROVED BY THE ECM ADMINISTRATOR PRIOR TO IMPLEMENTATION.

14. SOIL COMPACTION MUST BE MINIMIZED IN AREAS WHERE INFILTRATION PCMS WILL BE INSTALLED OR IN AREAS WHERE FINAL STABILIZATION WILL BE ACHIEVED BY VEGETATIVE COVER. AREAS DESIGNATED FOR INFILTRATION PCMS SHALL ALSO BE PROTECTED FROM SEDIMENTATION DURING CONSTRUCTION UNTIL FINAL STABILIZATION IS ACHIEVED. IF SOIL COMPACTION DOES OCCUR IN AREAS WHERE FINAL STABILIZATION WILL BE ACHIEVED BY VEGETATIVE COVER OR IN AREAS WHERE INFILTRATION PCMS WILL BE INSTALLED, DECOMPACTION OF THE SOIL MUST BE COMPLETED PRIOR TO PLANTING OR INSTALLATION OF THE PCM(S). AN INFILTRATION TEST MUST BE CONDUCTED FOR ALL INFILTRATION PCMS AND THE INFILTRATION TEST RESULTS SUBMITTED TO EL PASO COUNTY PRIOR TO PRELIMINARY ACCEPTANCE (PA).

15. FINAL STABILIZATION MUST BE IMPLEMENTED AT ALL APPLICABLE CONSTRUCTION SITES. FINAL STABILIZATION IS ACHIEVED WHEN ALL GROUND DISTURBING ACTIVITIES AT THE SITE HAVE BEEN COMPLETED AND PERMANENT STABILIZATION METHODS ARE COMPLETE. WHEN USING VEGETATIVE COVER AS A PERMANENT STABILIZATION METHOD, THE VEGETATION SHALL BE EVENLY DISTRIBUTED PERENNIAL VEGETATION AND OF THE VARIETY AND SPECIES FOUND IN THE COUNTY-APPROVED SEED MIXES OR IN THE APPROVED GEC PLAN. VEGETATION COVERAGE SHALL BE, AT A MINIMUM, EQUAL TO 70% OF WHAT WOULD HAVE BEEN PROVIDED BY NATIVE VEGETATION IN A LOCAL, UNDISTURBED AREA OR ADEQUATE REFERENCE SITE. ALL TEMPORARY CCMS SHALL BE REMOVED UPON FINAL STABILIZATION AND PRIOR TO STORMWATER PERMIT TERMINATION.

16. 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.

17. CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO BE DISCHARGED OFFSITE OR TO ENTER STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR CONTROL MEASURES. CONCRETE WASHOUT AREAS 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.

18. DURING CONSTRUCTION DEWATERING OPERATIONS, UNCONTAMINATED GROUNDWATER MAY BE DISCHARGED ON-SITE IN ACCORDANCE WITH THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT'S (CDPHE) LOW RISK DISCHARGE GUIDANCE POLICY FOR DISCHARGES OF UNCONTAMINATED GROUNDWATER TO LAND. IF CONSTRUCTION DEWATERING OPERATIONS ARE UNABLE TO MEET ALL CRITERIA, CONDITIONS, AND CONTROL MEASURE REQUIREMENTS OF THE LOW RISK DISCHARGE GUIDANCE POLICY, A COLORADO DISCHARGE PERMIT SYSTEM (CDPS) GENERAL PERMIT COG080000 WILL BE REQUIRED.

19. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL WASTE 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.

20. THE PERMIT HOLDER(S) 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.

21. 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.

22. 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. APPROPRIATE CMS SHALL BE UTILIZED BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.

23. BULK STORAGE (I.E., INDIVIDUAL CONTAINERS OF 55 GALLONS OR GREATER) OF ALLOWED PETROLEUM PRODUCTS OR OTHER ALLOWED LIQUID SHALL REQUIRE ADEQUATE SECONDARY CONTAINMENT, OR EQUIVALENT PROTECTION, TO CONTAIN ALL SPILLS ON-SITE AND TO PREVENT ANY SPILLED MATERIALS FROM ENTERING STATE WATERS, ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM, OR OTHER FACILITIES.

24. 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.

25. ON AREAS OF EXPOSED SOIL, MINIMIZE DUST THROUGH THE APPROPRIATE APPLICATION OF WATER OR OTHER DUST SUPPRESSION TECHNIQUES. WATER APPLICATION MUST BE CONDUCTED IN A MANNER TO PREVENT DISCHARGE OFFSITE UNLESS AUTHORIZED BY A CDPS OR NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT.

26. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE ONLY AT APPROVED CONSTRUCTION ACCESS POINTS.

27. FOR SITES WHERE A SOILS REPORT IS REQUIRED, THE APPROVED SOILS REPORT FOR THIS SITE SHALL BE CONSIDERED A PART OF THESE PLANS.

28. PERMIT HOLDER(S) 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, DRAINAGE CRITERIA MANUAL VOLUME 2, AND ENGINEERING CRITERIA MANUAL. ALL APPLICABLE LOCAL, STATE, AND FEDERAL PERMITS MUST BE OBTAINED PRIOR TO CONSTRUCTION. 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.

29. AT LEAST TEN (10) DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB ONE (1) ACRE OR MORE OR LESS THAN 1 ACRE AND PART OF A LARGER COMMON PLAN OF DEVELOPMENT OR SALE THAT WOULD DISTURB 1 OR MORE ACRES, THE PERMIT HOLDER(S) SHALL SUBMIT A PERMIT APPLICATION FOR STORMWATER DISCHARGE (COR400000 PERMIT) TO THE CDPHE WATER QUALITY DIVISION. THE APPLICATION CONTAINS CERTIFICATION OF COMPLETION OF A SWMP, OF WHICH THIS GEC 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

GENERAL NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES ALONG THE SITE. THE OMISSION FROM OR THE 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.

2. THE CONTRACTOR WILL 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.

3. NO STOCKPILE MANAGEMENT AREA HAS BEEN SHOW DUE TO THIS BEING A UTILITY INSTALLATION OPERATION. SOILS WILL BE STORED ON THE SIDE OF THE TRENCH UNTIL THE TRENCH IS BACKFILLED.

4. CONCRETE WASHOUT, STAGING AREA, AND PORTA-POTTY LOCATIONS HAVE NOT BEEN SHOWN DUE TO THEM BEING EXPECTED TO MOVE REPEATEDLY DURING THE PROJECT. THE CONTRACTOR SHALL DOCUMENT THEIR LOCATIONS DURING CONSTRUCTION.

5. EXISTING VEGETATION: THE STUDY AREA CONSISTS OF UNDEVELOPED PRAIRIE LAND THAT HAS EXISTING VEGETATION CONSISTING OF NATIVE GRASSES & SHRUBS WITH GOOD TO EXCELLENT COVERAGE OF 75% TO 90%, AND ROAD RIGHT OF WAY THAT HAS ESSENTIALLY ZERO VEGETATION IN MOST AREAS.

SCOPE OF WORK

INSTALL SANITARY FORCE MAIN FROM WATERBURY LIFT STATION TO WOODMEN HILLS METRO DISTRICT WASTEWATER TREATMENT PLANT, NO GRADING IS PROPOSED

CONSTRUCTION SCHEDULE

BEGIN: FALL 2026, END: WINTER 2027

SOIL TYPES

ONSITE SOILS ARE HALF COLUMBINE GRAVELLY SANDY LOAM AND HALF STAPLETON SANDY LOAM, PER NRCS WEB SOIL SURVEY MAP

BENCH MARK

1. THE TOP OF A 1-1-/2' ALUMINUM SURVEYORS CAP STAMPED JR LD PLS 31161, AT THE MOST EASTERLY CORNER OF LOT 36 AS PLATED IN 4-WAY RANCH FILING NO. 1 RECORDED UNDER RECEPTION NO. 206712416 RECORDS OF EL PASO COUNTY, COLORADO ELEV= 6931.92

2. THE TOP OF A 1-1-/2' ALUMINUM SURVEYORS CAP STAMPED JR LD PLS 82820, ATTHE MOST NORHERLY CORNER OF LOT 42 AS PLATED IN 4-WAY RANCH FILING NO. 1 RECORDED UNDER RECEPTION NO. 206712416 RECORDS OF EL PASO COUNTY, COLORADO ELEV= 6973.99

BASIS OF BEARING: THE NORH LINE OF SECTION 28, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE SIXTH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO BEINGMONUMNETED AT EACH END BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PSINC LS 30087 AND ASSUMED TO BEAR S89°47'04"E A DISTANCE OF 5,285.07 FEET

EARTHWORK VOLUMES

ESTIMATED CUT = 0 CY, ESTIMATED FILL = 0 CY, NET = 0 CY

EROSION CONTROL COST OPINION:

1. 1 EA - CONCRETE WASHOUT
2. 15 EA - INLET PROTECTION
3. 855 LF - SILT FENCE
4. 9 EA - VEHICLE TRAFFIC CONTROL
5. 18 AC - PERM SEED AND MULCH
6. 35% MAINTENANCE AND REPLACEMENT

THIS DESIGN WAS PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF TERRA NOVA ENGINEERING, INC.

QUENTIN ARMIJO
COLORADO P.E. NO. 37170

REVISIONS		
NO.	DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR:
ACM ALF VIII JV SUB II LLC
ATTN: JASON POCK
8350 E CRESCENT PKWY, #200
GREENWOOD, CO 80111
303-984-9800

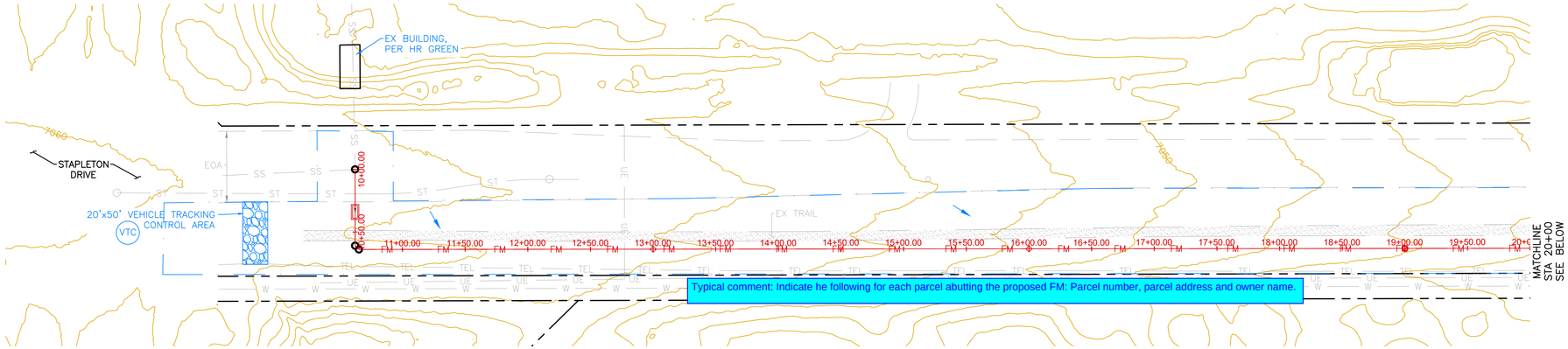
Terra Nova Engineering, Inc.
Creative Civil Engineering Solutions
721 S. 23RD STREET
COLORADO SPRINGS, CO 80904
OFFICE: 719-635-6422
FAX: 719-635-6426
www.tneinc.com

WATERBURY SANITARY FORCE MAIN

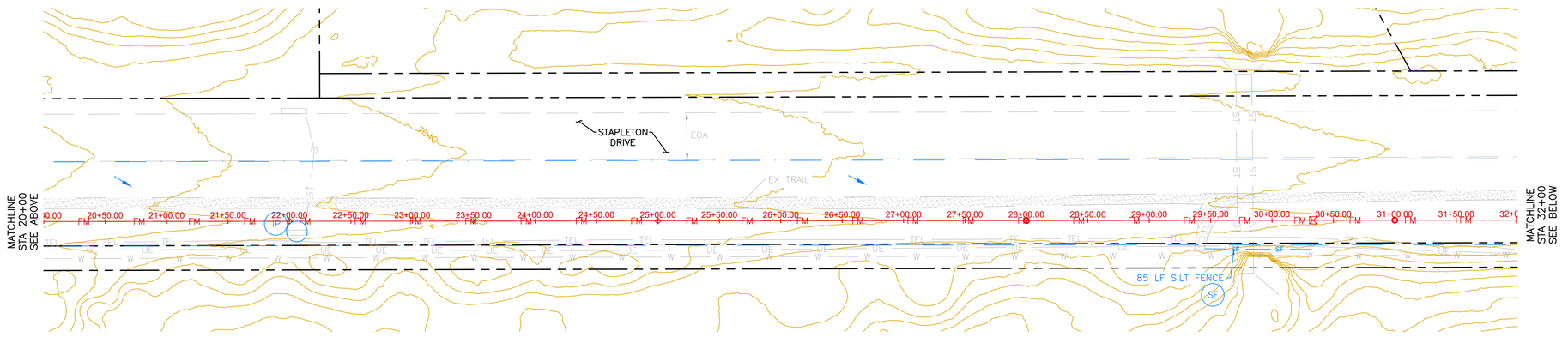
UTILITY CONSTRUCTION SET
EROSION CONTROLS NOTES SHEET

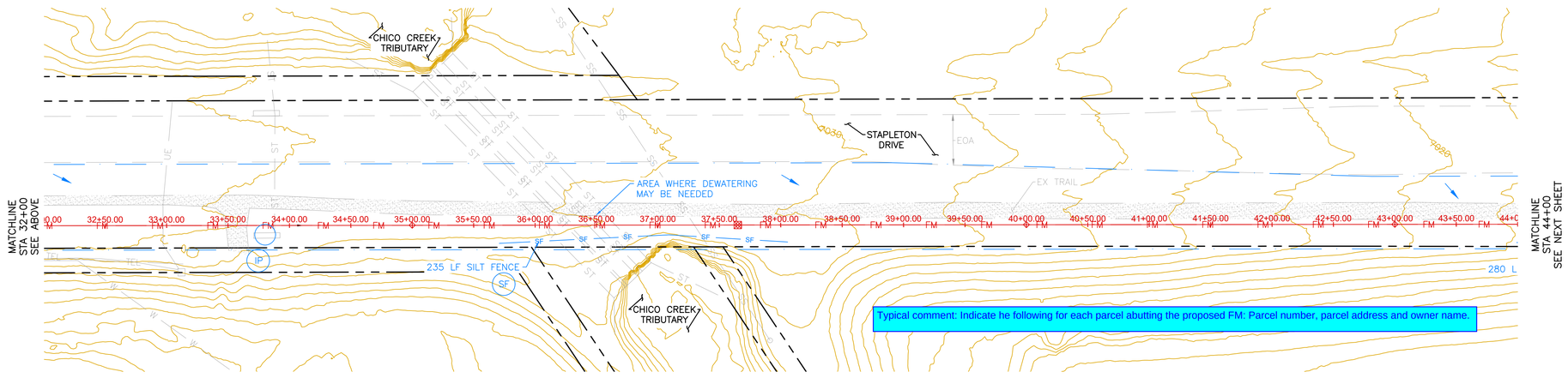
DESIGNED BY	DLF
DRAWN BY	DLF
CHECKED BY	QNA
H-SCALE	AS SHOWN
V-SCALE	N/A
JOB NO.	2604.00
DATE ISSUED	04/03/26
SHEET NO.	18 OF 36

Add the following note "the open cut shall not exceed 250 LF per day, the developer can not open ground if he/she can not back fill it at the end of the same day and make it safe to the public (No open cut to remain open after working hours).".



Typical comment: Indicate he following for each parcel abutting the proposed FM: Parcel number, parcel address and owner name.





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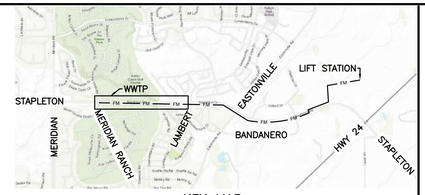
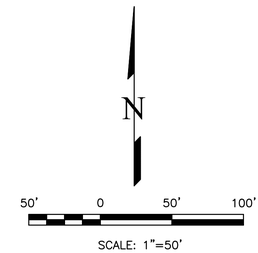


KEY MAP
1" = 3000' ±



SCALE: 1"=50'

REVISIONS		
NO.	DESCRIPTION	DATE

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303-984-9800

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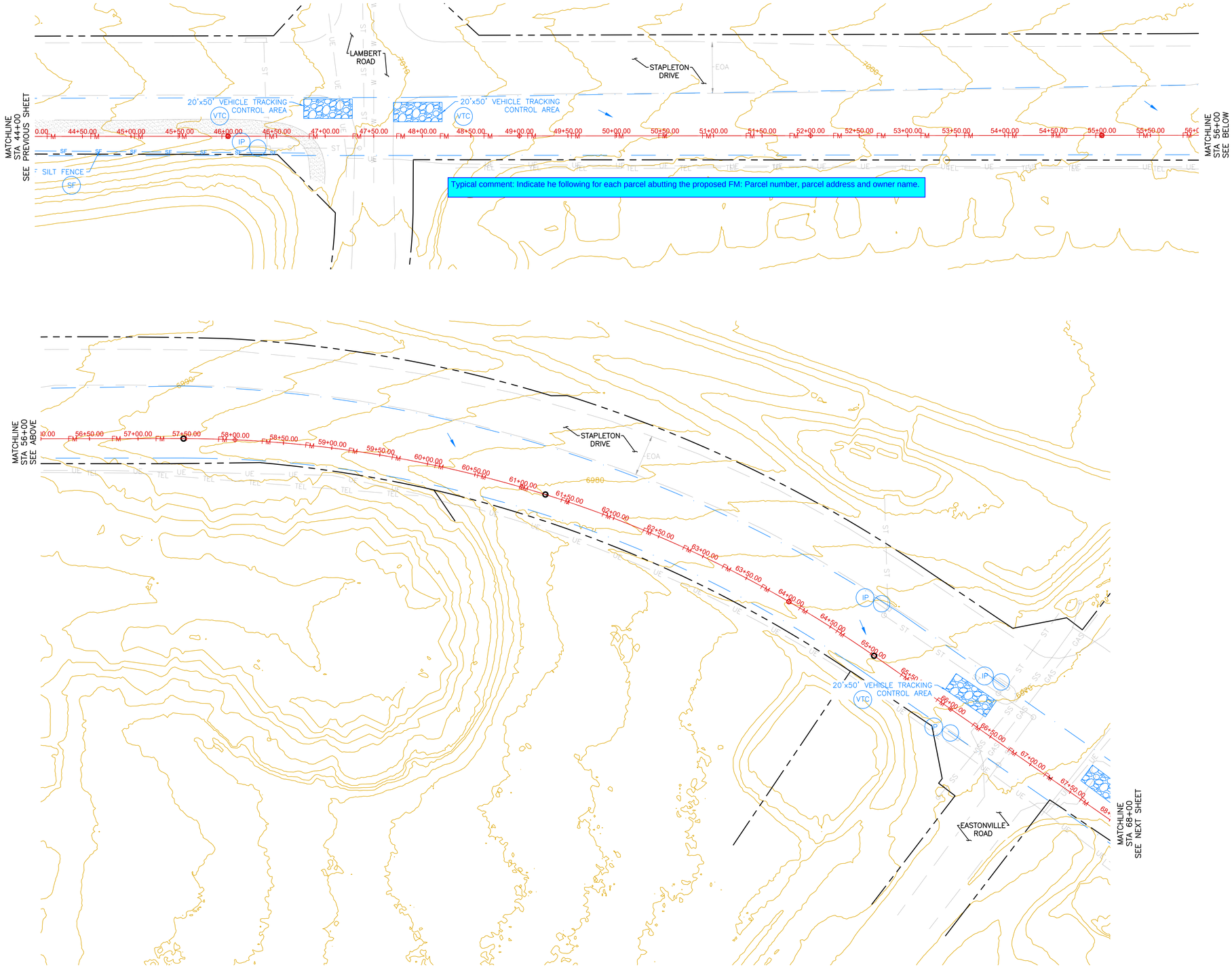
WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
EROSION CONTROL PLAN - INITIAL/INTERIM

THIS DESIGN WAS PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF TERRA NOVA ENGINEERING, INC.

QUENTIN ARMIJO
COLORADO P.E. NO. 37170

DESIGNED BY	DLF
DRAWN BY	DLF
CHECKED BY	QNA
H-SCALE	AS SHOWN
V-SCALE	N/A
JOB NO.	2604.00
DATE ISSUED	04/03/26
SHEET NO.	19 OF 36



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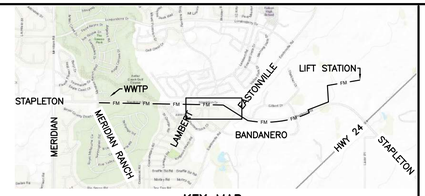

KEY MAP
1" = 3000' ±

N

50' 0 50' 100'

SCALE: 1"=50'

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QUENTIN ARMIJO
COLORADO P.E. NO. 37170

REVISIONS

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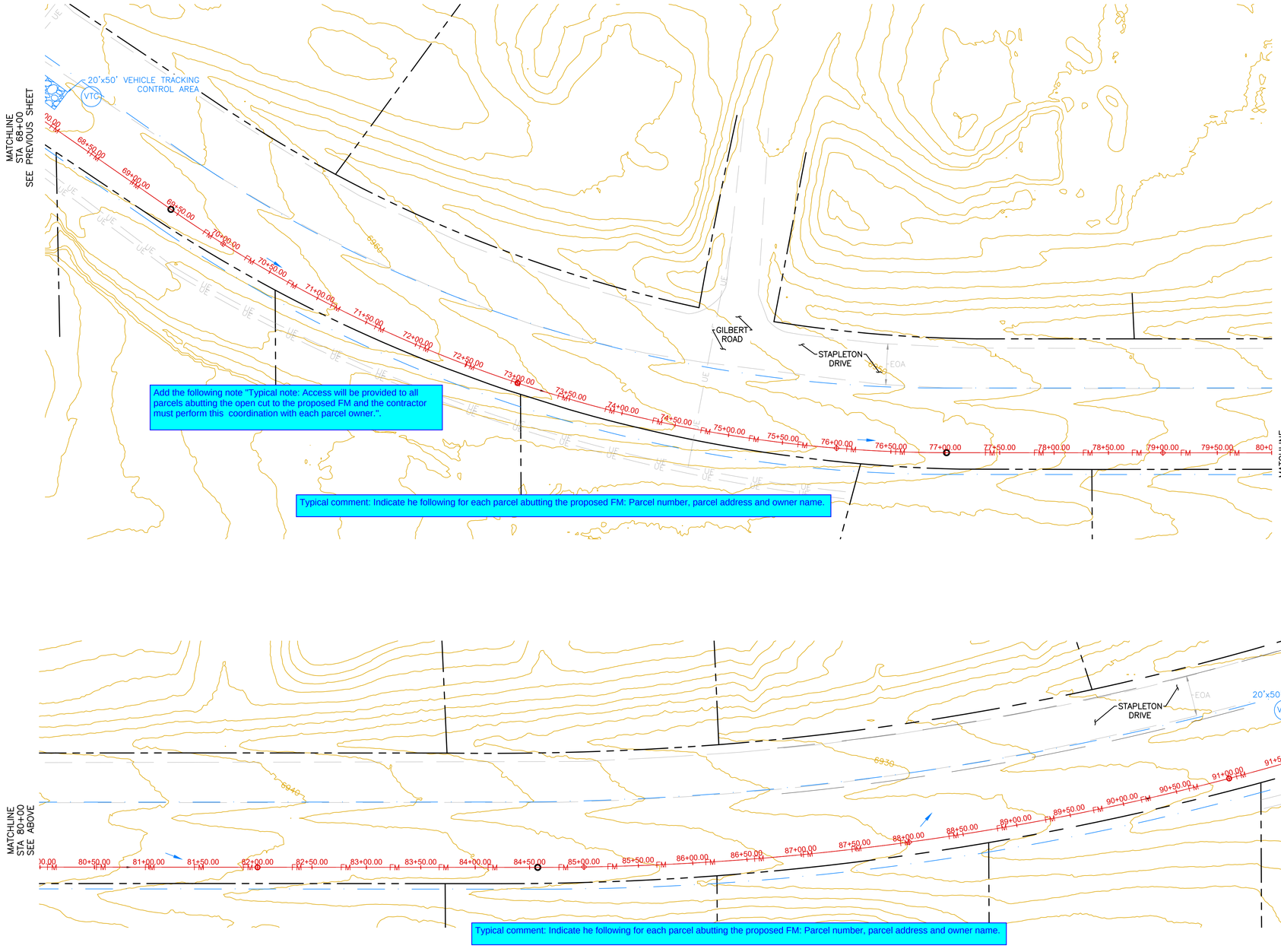
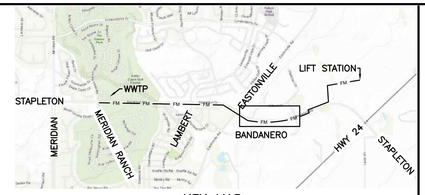
WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
EROSION CONTROL PLAN – INITIAL/INTERIM

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY QNA
H-SCALE AS SHOWN
V-SCALE N/A
JOB NO. 2604.00
DATE ISSUED 04/03/26
SHEET NO. 20 OF 36





KEY MAP
1" = 3000' ±

N

50' 0 50' 100'

SCALE: 1"=50'

REVISIONS

NO.	DESCRIPTION	DATE

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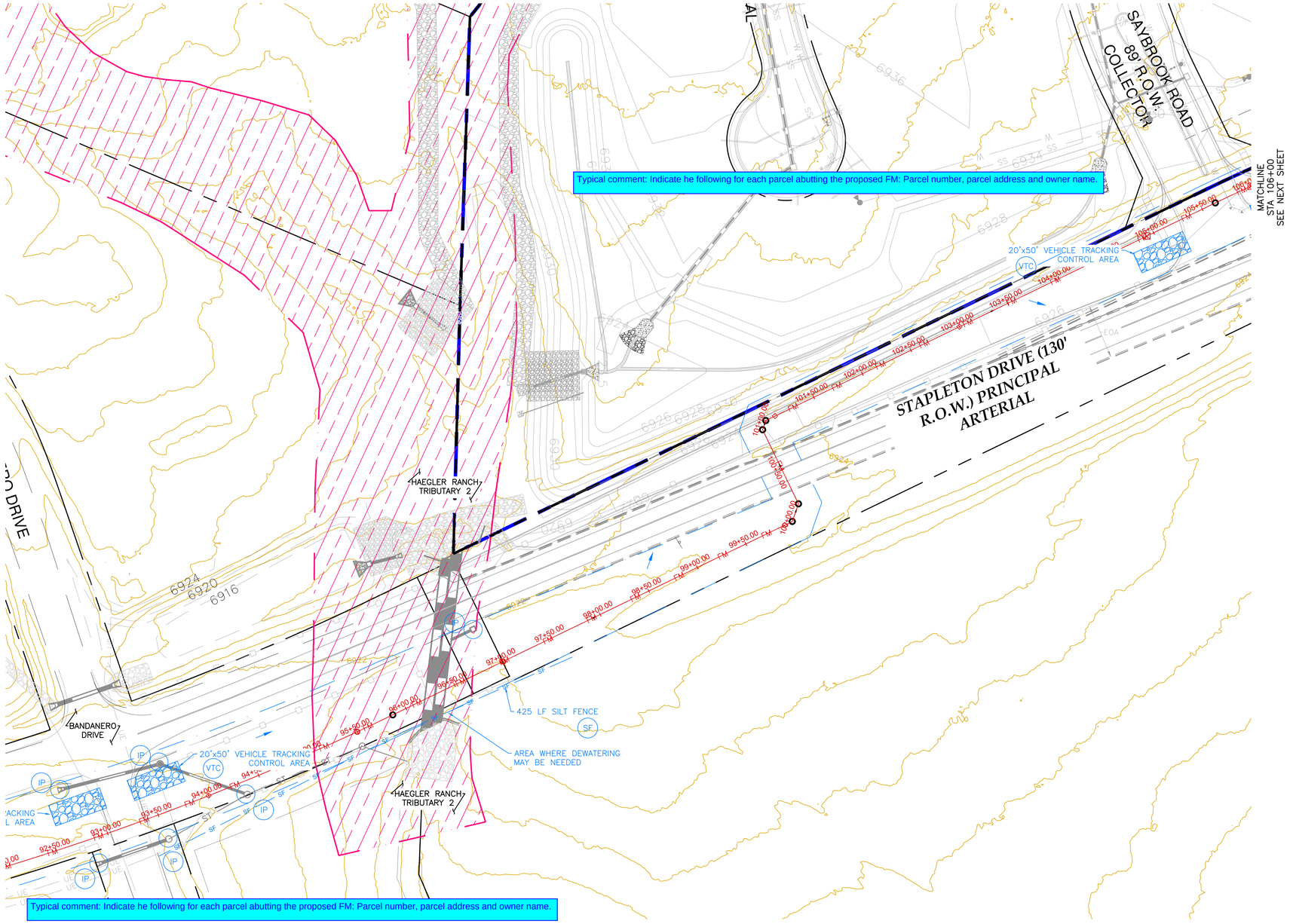
WATERBURY SANITARY FORCE MAIN

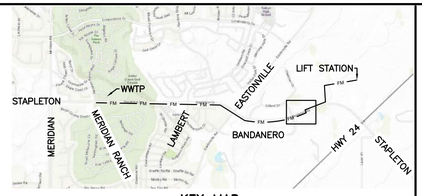
UTILITY CONSTRUCTION SET
EROSION CONTROL PLAN – INITIAL/INTERIM

THIS DESIGN WAS PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF TERRA NOVA ENGINEERING, INC.

QUENTIN ARMIJO
COLORADO P.E. NO. 37170

DESIGNED BY	DLF
DRAWN BY	DLF
CHECKED BY	QNA
H-SCALE	AS SHOWN
V-SCALE	N/A
JOB NO.	2604.00
DATE ISSUED	04/03/26
SHEET NO.	21 OF 36





KEY MAP
1" = 3000' ±

N

50' 0 50' 100'

SCALE: 1"=50'

REVISIONS

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303-984-9800

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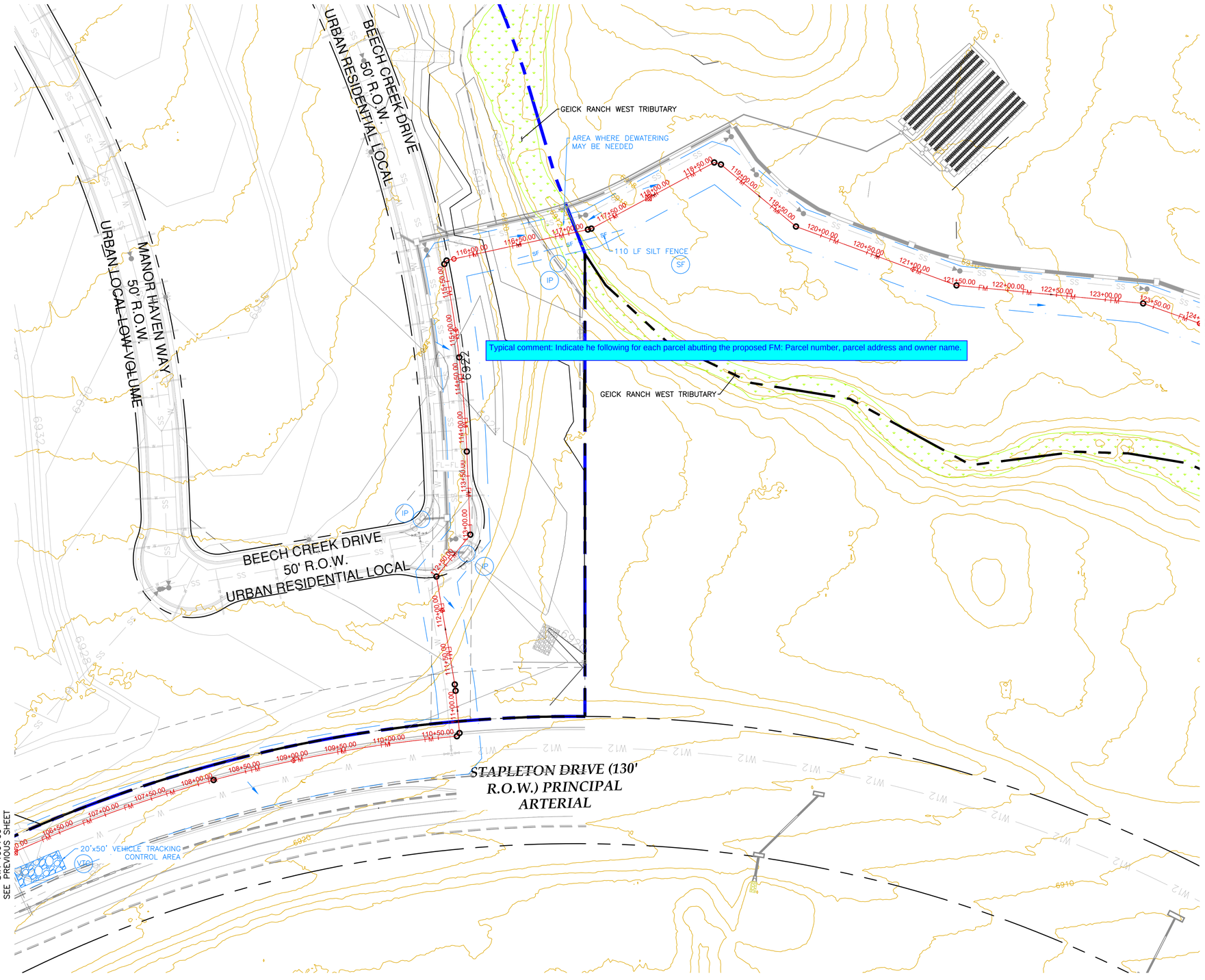
WATERBURY SANITARY FORCE MAIN

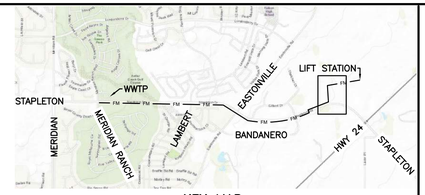
UTILITY CONSTRUCTION SET
EROSION CONTROL PLAN – INITIAL/INTERIM

THIS DESIGN WAS PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF TERRA NOVA ENGINEERING, INC.

QUENTIN ARMIJO
COLORADO P.E. NO. 37170

DESIGNED BY	DLF
DRAWN BY	DLF
CHECKED BY	QNA
H-SCALE	AS SHOWN
V-SCALE	N/A
JOB NO.	2604.00
DATE ISSUED	04/03/26
SHEET NO.	22 OF 36





KEY MAP
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N

50' 0 50' 100'

SCALE: 1"=50'

REVISIONS		
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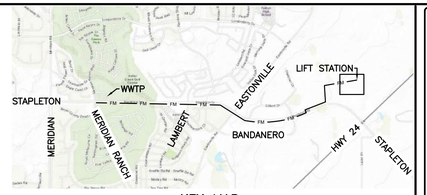
WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
EROSION CONTROL PLAN – INITIAL/INTERIM

THIS DESIGN WAS PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF TERRA NOVA ENGINEERING, INC.

QUENTIN ARMIJO
COLORADO P.E. NO. 37170

DESIGNED BY	DLF
DRAWN BY	DLF
CHECKED BY	QNA
H-SCALE	AS SHOWN
V-SCALE	N/A
JOB NO.	2604.00
DATE ISSUED	04/03/26
SHEET NO.	23 OF 36



KEY MAP
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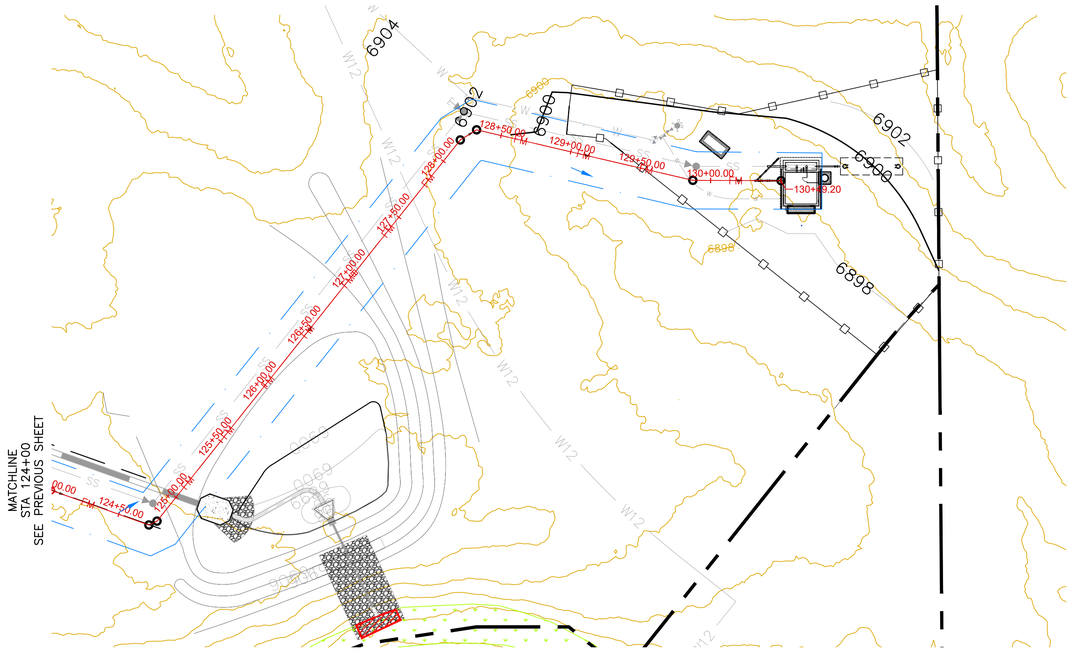

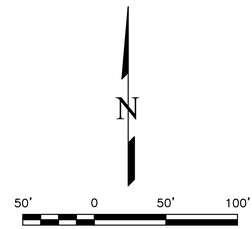

SCALE: 1"=50'

REVISIONS		
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WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
EROSION CONTROL PLAN – INITIAL/INTERIM

THIS DESIGN WAS PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF TERRA NOVA ENGINEERING, INC.

QUENTIN ARMIJO
COLORADO P.E. NO. 37170

DESIGNED BY	DLF
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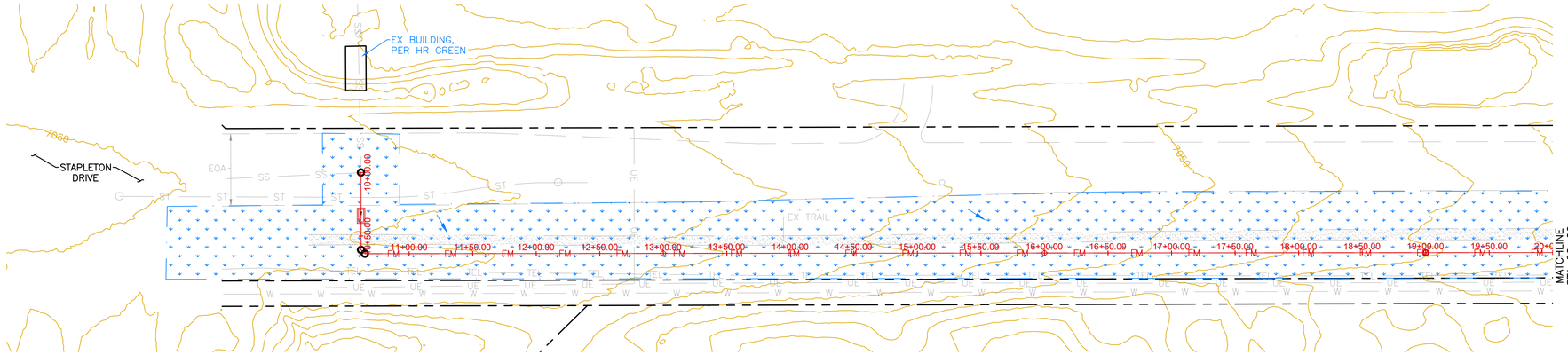
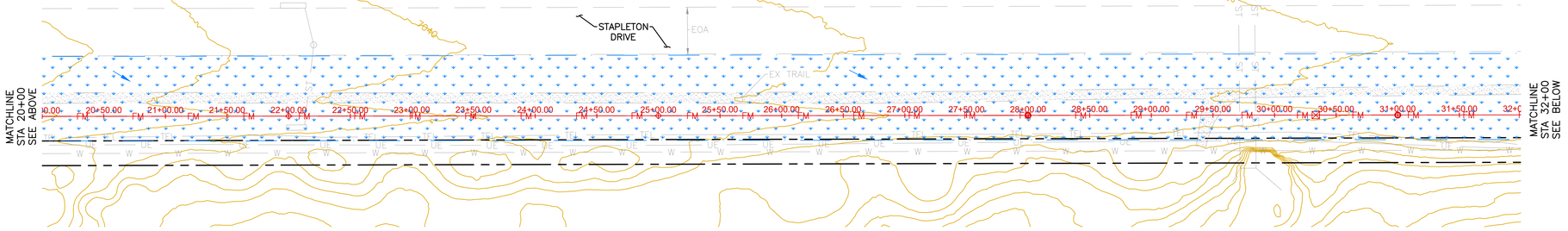
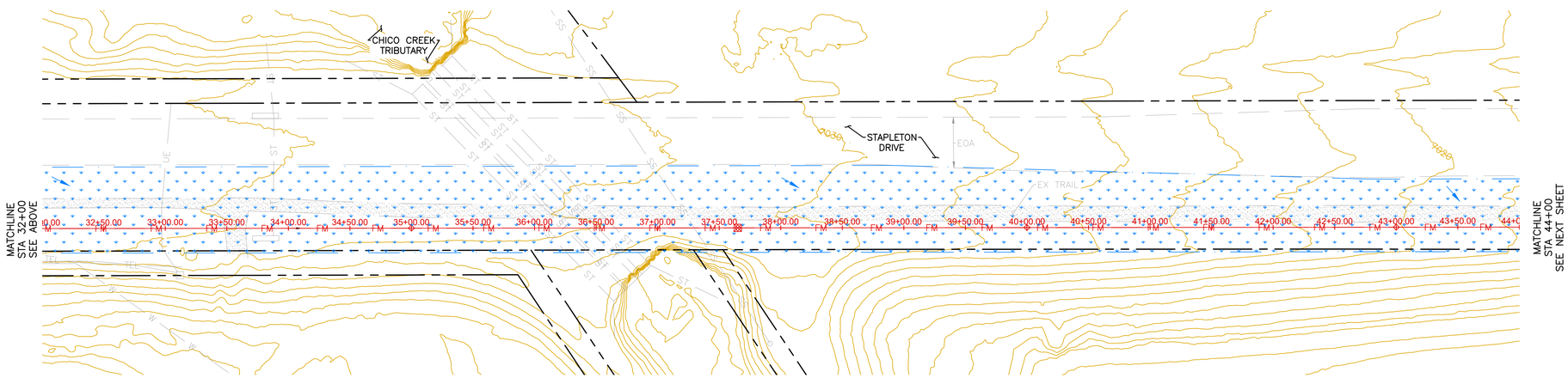
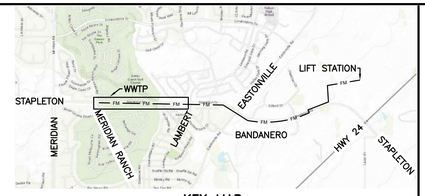
CHECKED BY	QNA
H-SCALE	AS SHOWN
V-SCALE	N/A
JOB NO.	2604.00
DATE ISSUED	04/03/26
SHEET NO.	24 OF 36









KEY MAP
1" = 3000' ±

N

50' 0 50' 100'

SCALE: 1"=50'

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QUENTIN ARMIJO
COLORADO P.E. NO. 37170

REVISIONS		
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8350 E CRESCENT PKWY, #200
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303-984-9800

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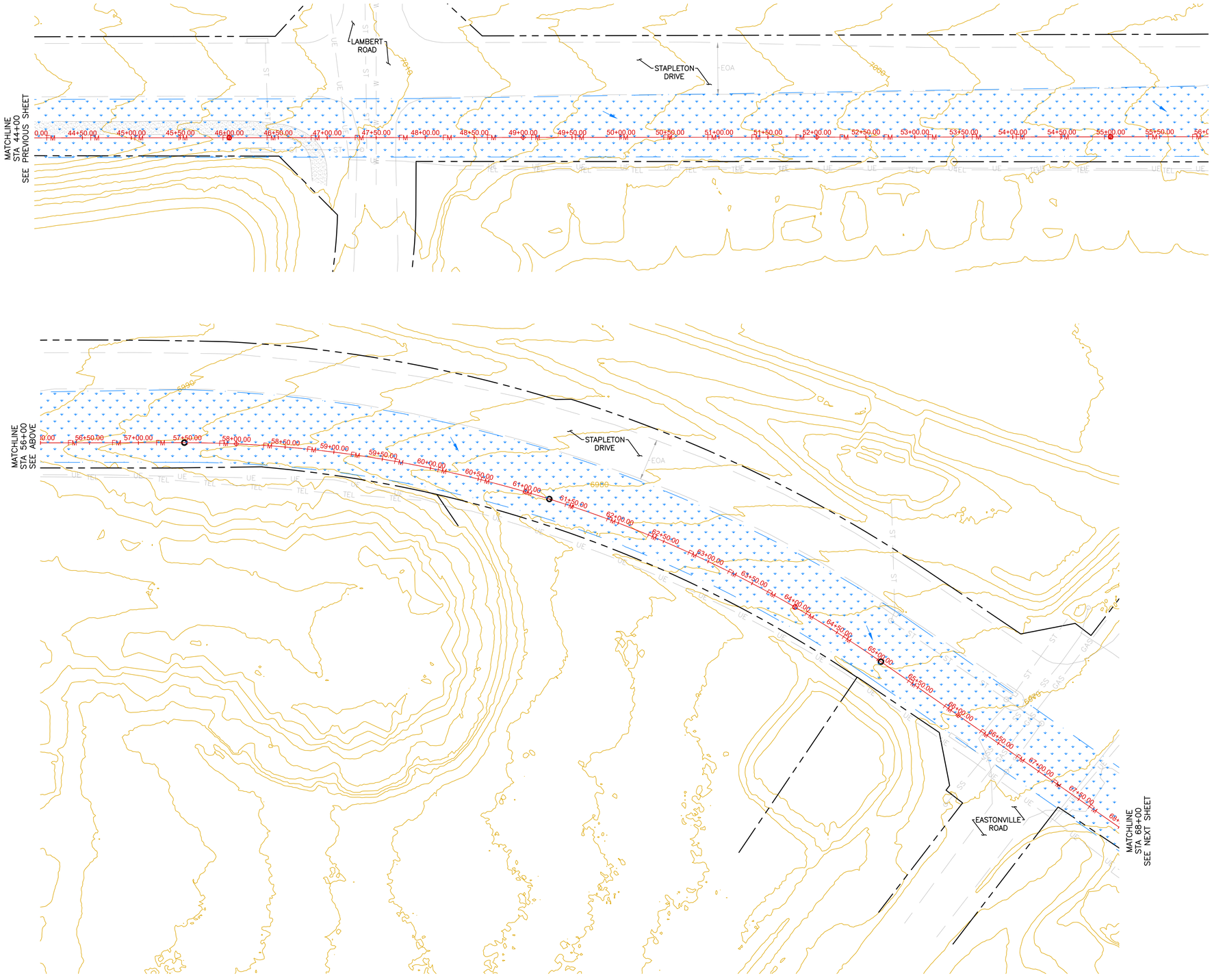
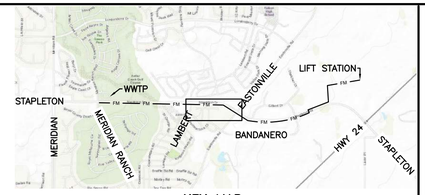
WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
EROSION CONTROL PLAN – FINAL

DESIGNED BY	DLF
DRAWN BY	DLF
CHECKED BY	QNA
H-SCALE	AS SHOWN
V-SCALE	N/A
JOB NO.	2604.00
DATE ISSUED	04/03/26
SHEET NO.	25 OF 36





KEY MAP
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COLORADO P.E. NO. 37170

REVISIONS		
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PREPARED FOR:
ACM ALF VIII JV SUB II LLC
ATTN: JASON POCK
8350 E CRESCENT PKWY, #200
GREENWOOD, CO 80111
303-984-9800

Terra Nova Engineering, Inc.
Creative Civil Engineering Solutions
721 S. 23RD STREET
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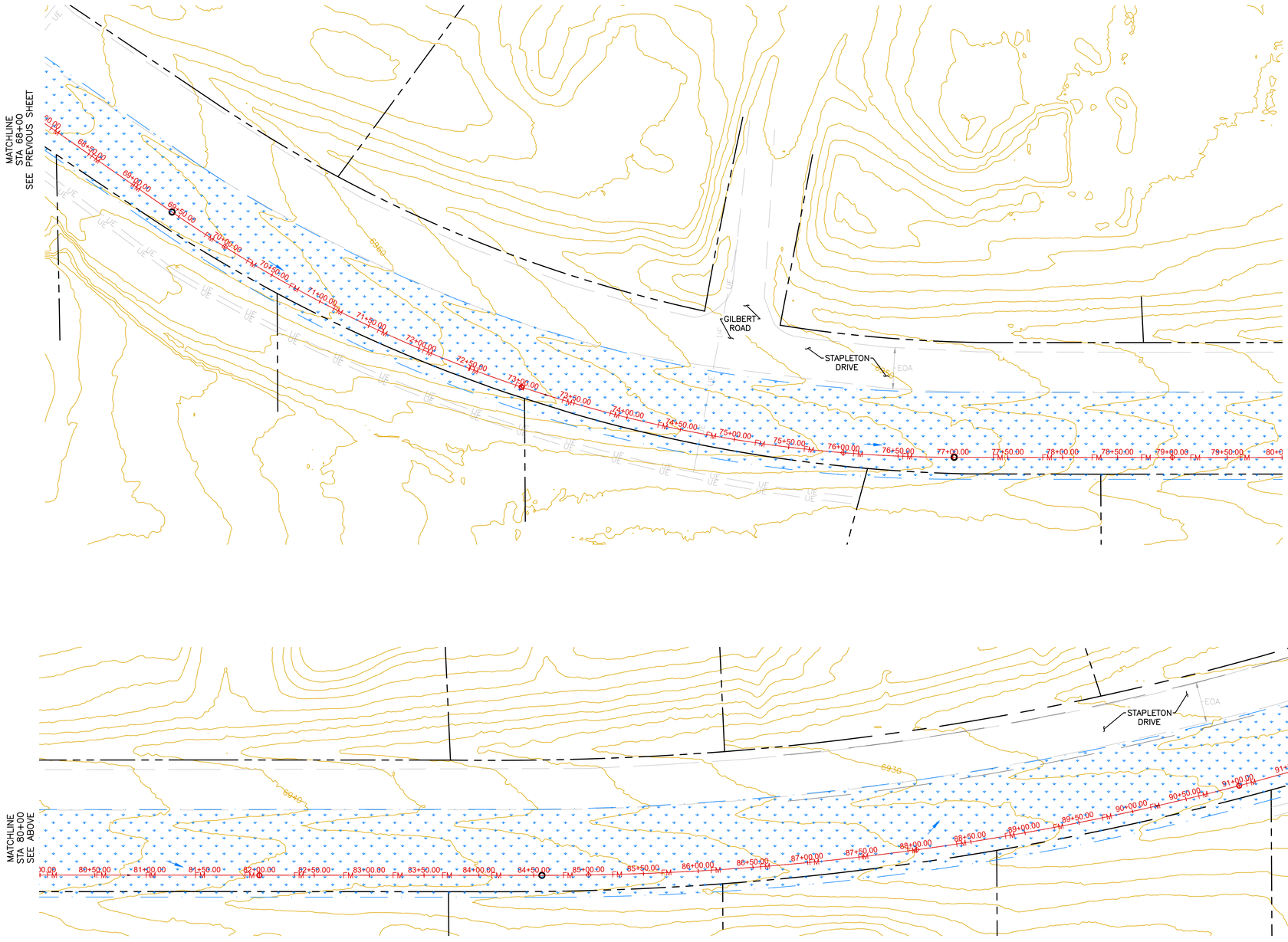
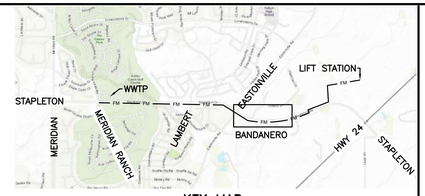
WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
EROSION CONTROL PLAN – FINAL

DESIGNED BY	DLF
DRAWN BY	DLF
CHECKED BY	QNA
H-SCALE	AS SHOWN
V-SCALE	N/A
JOB NO.	2604.00
DATE ISSUED	04/03/26
SHEET NO.	26 OF 36





KEY MAP
1" = 3000' ±

N

50' 0 50' 100'

SCALE: 1"=50'

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QUENTIN ARMIJO
COLORADO P.E. NO. 37170

REVISIONS		
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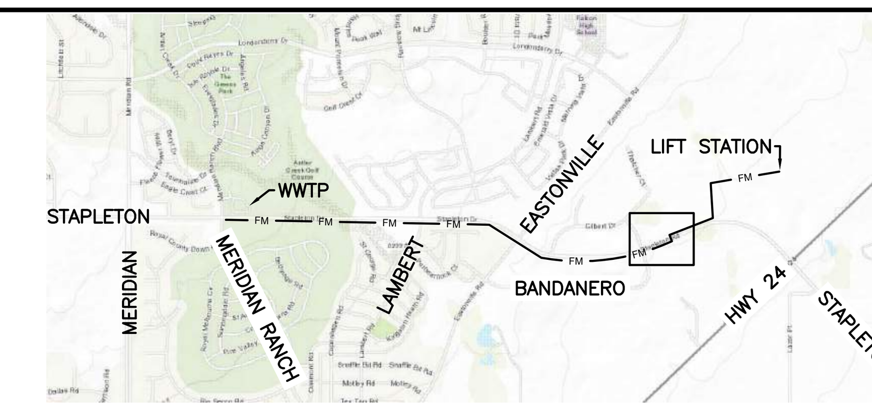

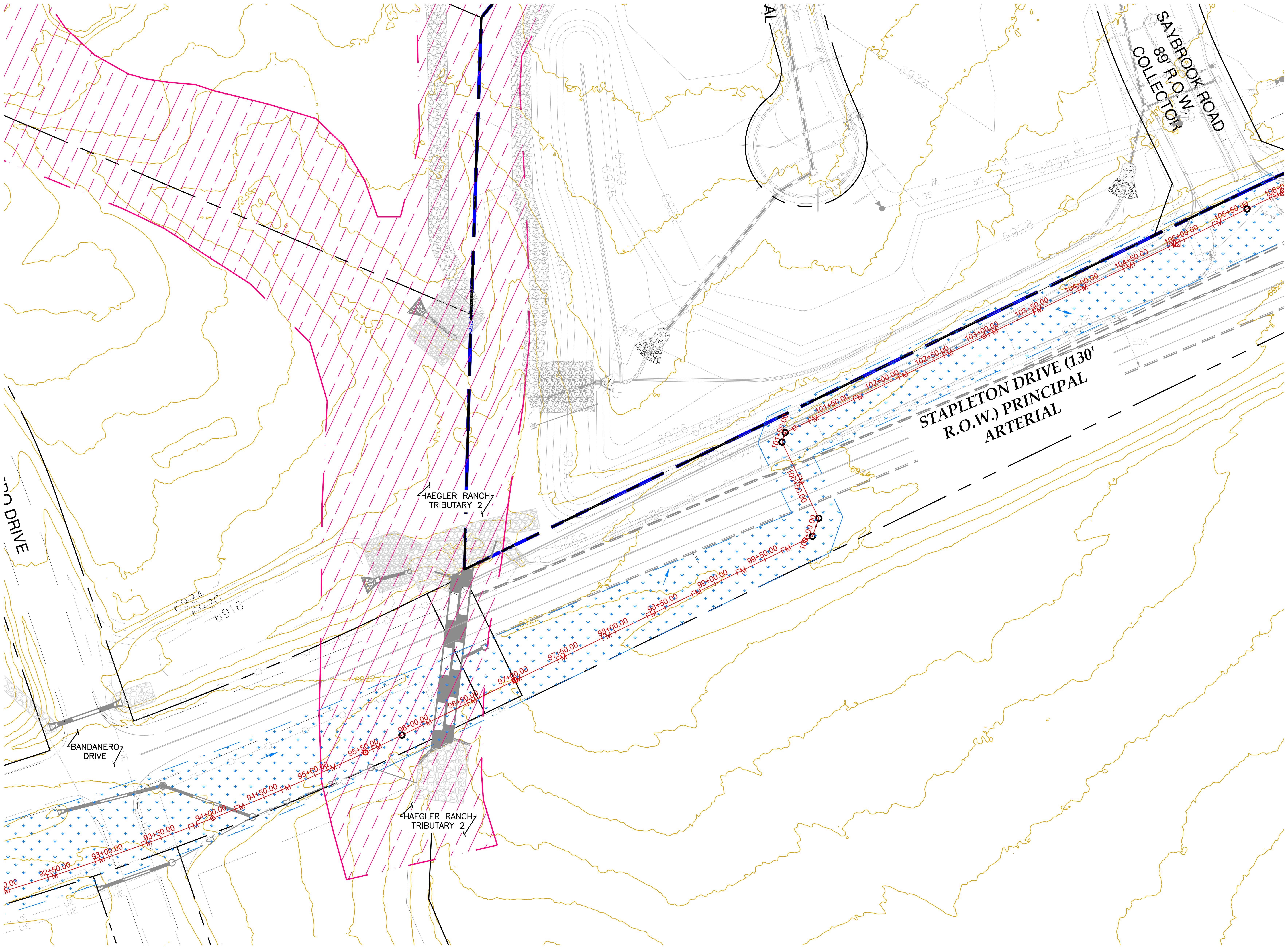

MATCHLINE
STA 92+00
SEE PREVIOUS SHEET

MATCHLINE
STA 106+00
SEE NEXT SHEET

50' 0 50' 100'

SCALE: 1"=50'

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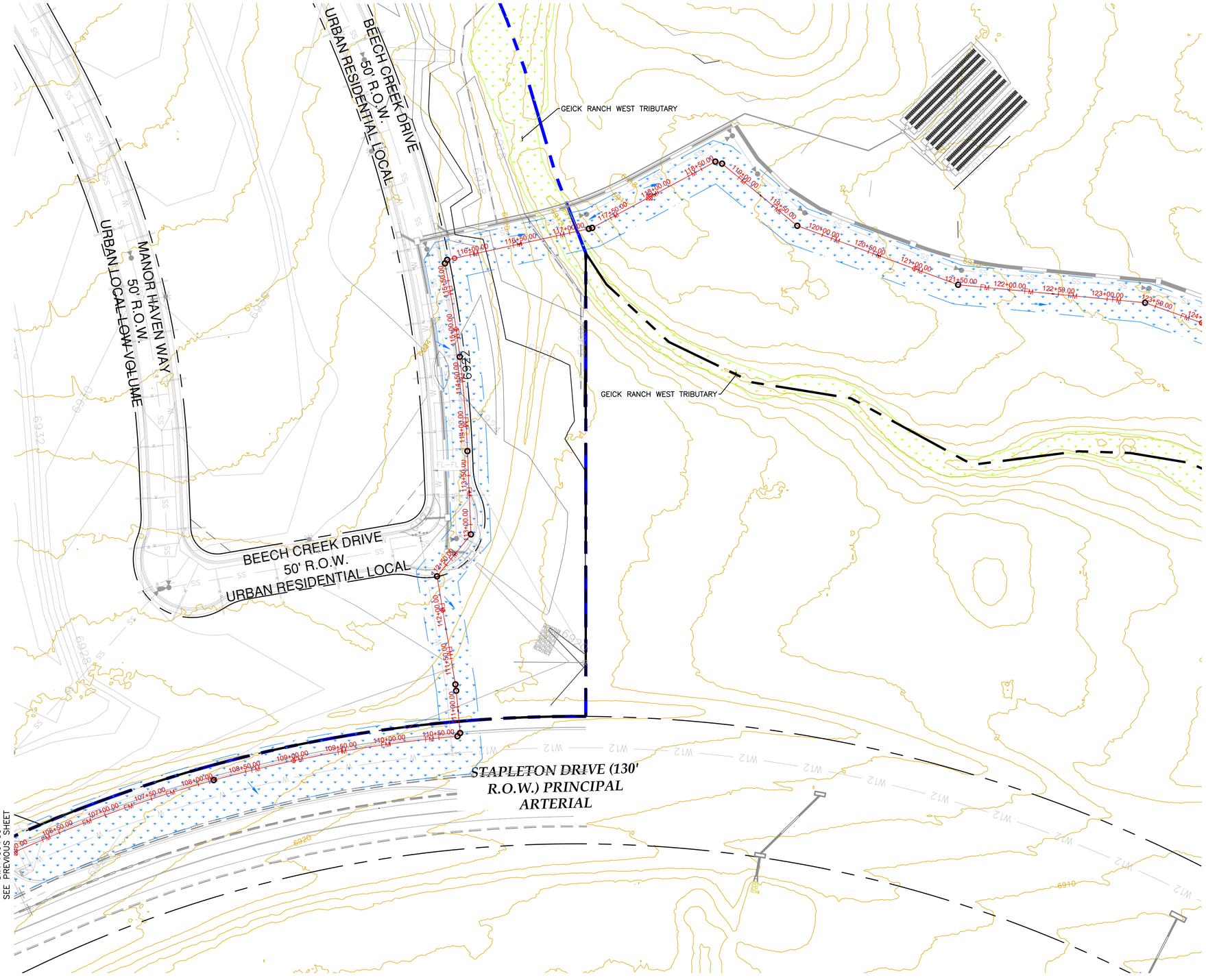

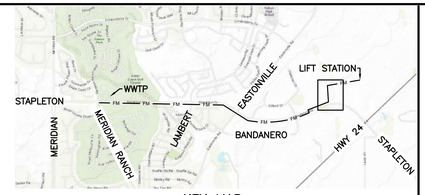

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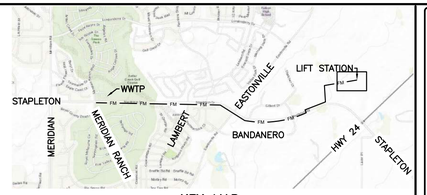

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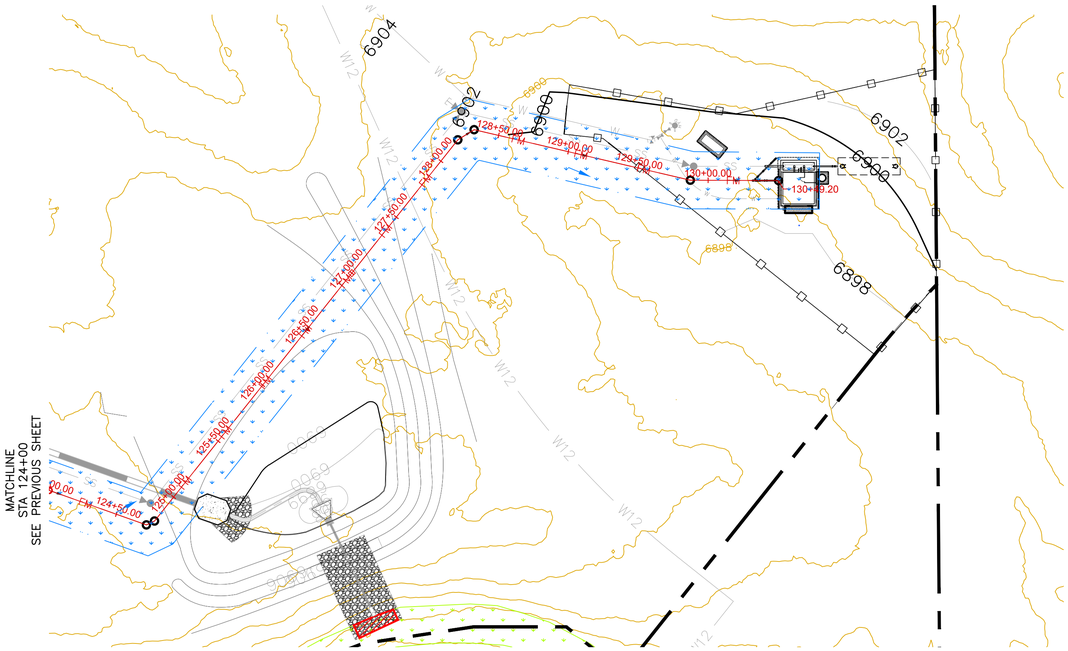

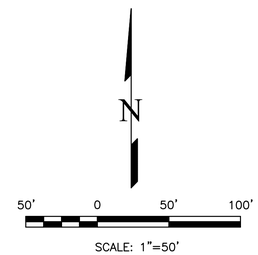

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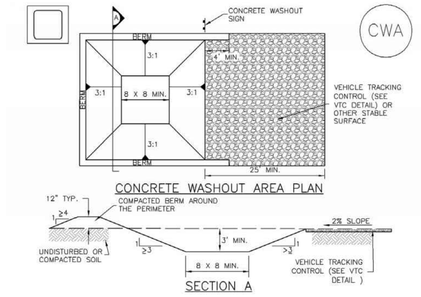
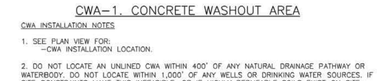
Concrete Washout Area (CWA) MM-1



CONCRETE WASHOUT AREA PLAN



SECTION A

CWA-1. CONCRETE WASHOUT AREA

CWA INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -CWA INSTALLATION LOCATION.

2. DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (16 MIL MIN. THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED.

3. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.

4. CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8' BY 8' SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3' DEEP.

5. BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.

6. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.

7. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.

8. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

MM-1 Concrete Washout Area (CWA)

CWA 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. THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS, ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.

5. CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.

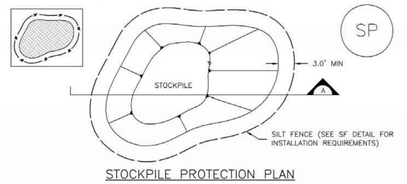
6. THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.

7. WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

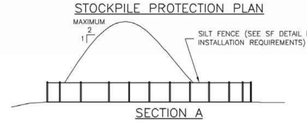
(DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND THE CITY OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD).

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.

Stockpile Management (SP) MM-2



STOCKPILE PROTECTION PLAN



SECTION A

SP-1. STOCKPILE PROTECTION

STOCKPILE PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -LOCATION OF STOCKPILES.
   -TYPE OF STOCKPILE PROTECTION.

2. INSTALL PERIMETER CONTROLS IN ACCORDANCE WITH THEIR RESPECTIVE DESIGN DETAILS. SILT FENCE IS SHOWN IN THE STOCKPILE PROTECTION DETAILS; HOWEVER, OTHER TYPES OF PERIMETER CONTROLS INCLUDING SEDIMENT CONTROL LOGS OR ROCK SOCKS MAY BE SUITABLE IN SOME CIRCUMSTANCES. CONSIDERATIONS FOR DETERMINING THE APPROPRIATE TYPE OF PERIMETER CONTROL FOR A STOCKPILE INCLUDE WHETHER THE STOCKPILE IS LOCATED ON A PERVIOUS OR IMPERVIOUS SURFACE, THE RELATIVE HEIGHTS OF THE PERIMETER CONTROL AND STOCKPILE, THE ABILITY OF THE PERIMETER CONTROL TO CONTAIN THE STOCKPILE WITHOUT FAILING IN THE EVENT THAT MATERIAL FROM THE STOCKPILE SHIFTS OR SLUMPS AGAINST THE PERIMETER, AND OTHER FACTORS.

3. STABILIZE THE STOCKPILE SURFACE WITH SURFACE ROUGHENING, TEMPORARY SEEDING AND MULCHING, EROSION CONTROL BLANKETS, OR SOIL BINDERS. SOILS STOCKPILED FOR AN EXTENDED PERIOD (TYPICALLY FOR MORE THAN 60 DAYS) SHOULD BE SEEDED AND MULCHED WITH A TEMPORARY GRASS COVER ONCE THE STOCKPILE IS PLACED (TYPICALLY WITHIN 14 DAYS). USE OF MULCH ONLY OR A SOIL BINDER IS ACCEPTABLE IF THE STOCKPILE WILL BE IN PLACE FOR A MORE LIMITED TIME PERIOD (TYPICALLY 30-60 DAYS).

4. FOR TEMPORARY 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.

MM-2 Stockpile Management (SM)

STOCKPILE PROTECTION 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.

STOCKPILE PROTECTION MAINTENANCE NOTES

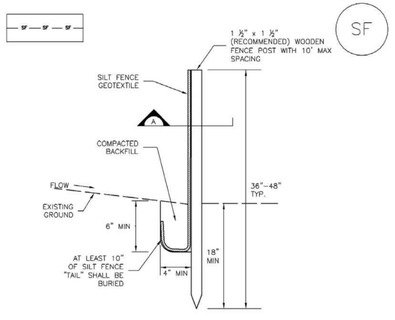
4. IF PERIMETER PROTECTION MUST BE MOVED TO ACCESS SOIL STOCKPILE, REPLACE PERIMETER CONTROLS BY THE END OF THE WORKDAY.

5. STOCKPILE PERIMETER CONTROLS CAN BE REMOVED ONCE ALL THE MATERIAL FROM THE STOCKPILE HAS BEEN USED.

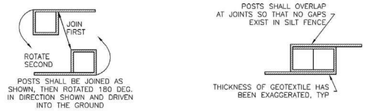
(DETAILS ADAPTED FROM PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

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.

Silt Fence (SF) SC-1



SILT FENCE



SECTION A

SF-1. SILT FENCE

SC-1 Silt Fence (SF)

SILT FENCE INSTALLATION NOTES

1. SILT FENCE MUST BE PLACED AWAY FROM THE TOE OF THE SLOPE TO ALLOW FOR WATER PONDING. SILT FENCE AT THE TOE OF A SLOPE SHOULD BE INSTALLED IN A FLAT LOCATION AT LEAST SEVERAL FEET (2-5 FT) FROM THE TOE OF THE SLOPE TO ALLOW ROOM FOR PONDING AND DEPOSITION.

2. A UNIFORM 6" X 4" ANCHOR TRENCH SHALL BE EXCAVATED USING TRENCHER OR SILT FENCE INSTALLATION DEVICE. NO ROAD GRADERS, BACKHOES, OR SIMILAR EQUIPMENT SHALL BE USED.

3. COMPACT ANCHOR TRENCH BY HAND WITH A "JUMPING JACK" OR BY WHEEL ROLLING. COMPACTION SHALL BE SUCH THAT SILT FENCE RESISTS BEING PULLED OUT OF ANCHOR TRENCH BY HAND.

4. SILT FENCE SHALL BE PULLED TIGHT AS IT IS ANCHORED TO THE STAKES. THERE SHOULD BE NO NOTICEABLE SAG BETWEEN STAKES AFTER IT HAS BEEN ANCHORED TO THE STAKES.

5. SILT FENCE FABRIC SHALL BE ANCHORED TO THE STAKES USING 1" HEAVY DUTY STAPLES OR NAILS WITH 1" HEADS. STAPLES AND NAILS SHOULD BE PLACED 3" ALONG THE FABRIC DOWN THE STAKE.

6. AT THE END OF A RUN OF SILT FENCE ALONG A CONTOUR, THE SILT FENCE SHOULD BE TURNED PERPENDICULAR TO THE CONTOUR TO CREATE A "J-HOOK." THE "J-HOOK" EXTENDING PERPENDICULAR TO THE CONTOUR SHOULD BE OF SUFFICIENT LENGTH TO KEEP RUNOFF FROM FLOWING AROUND THE END OF THE SILT FENCE (TYPICALLY 10' - 20').

7. SILT FENCE SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

SILT 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. SEDIMENT ACCUMULATED UPSTREAM OF THE SILT FENCE SHALL BE REMOVED AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 6".

5. REPAIR OR REPLACE SILT FENCE WHEN THERE ARE SIGNS OF WEAR, SUCH AS SAGGING, TEARING, OR COLLAPSE.

6. SILT FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION, OR IS REPLACED BY AN EQUIVALENT PERIMETER SEDIMENT CONTROL BMP.

7. WHEN SILT FENCE IS REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, NOT AVAILABLE IN AUTOCAD)

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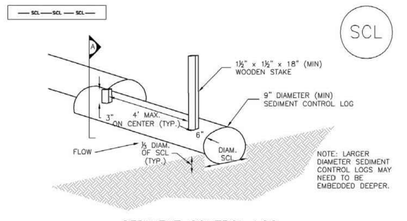
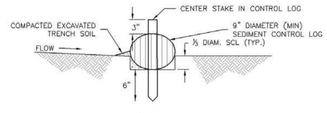
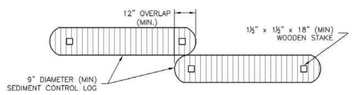
Sediment Control Log (SCL) SC-2



SEDIMENT CONTROL LOG



SECTION A



SEDIMENT CONTROL LOG JOINTS

SCL-1. SEDIMENT CONTROL LOG

Sediment Control Log (SCL) SC-2

SEDIMENT CONTROL LOG INSTALLATION NOTES

1. SEE PLAN VIEW FOR LOCATION AND LENGTH OF SEDIMENT CONTROL LOGS.

2. SEDIMENT CONTROL LOGS THAT ACT AS A PERIMETER CONTROL SHALL BE INSTALLED PRIOR TO ANY UPGRADIENT LAND-DISTURBING ACTIVITIES.

3. SEDIMENT CONTROL LOGS SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR OR COCONUT FIBER, AND SHALL BE FREE OF ANY NOXIOUS WEED SEEDS OR DEFECTS INCLUDING RIPS, HOLES AND OBVIOUS WEAR.

4. SEDIMENT CONTROL LOGS MAY BE USED AS SMALL CHECK DAMS IN DITCHES AND SWALES. HOWEVER, THEY SHOULD NOT BE USED IN PERENNIAL STREAMS OR HIGH VELOCITY DRAINAGE WAYS.

5. IT IS RECOMMENDED THAT SEDIMENT CONTROL LOGS BE TRENCHED INTO THE GROUND TO A DEPTH OF APPROXIMATELY ⅓ OF THE DIAMETER OF THE LOG. IF TRENCHING TO THIS DEPTH IS NOT FEASIBLE AND/OR DESIRABLE (SHORT TERM INSTALLATION WITH DESIRE NOT TO DAMAGE LANDSCAPE) A LESSER TRENCHING DEPTH MAY BE ACCEPTABLE WITH MORE ROBUST STAKING

6. THE UPHILL SIDE OF THE SEDIMENT CONTROL LOG SHALL BE BACKFILLED WITH SOIL THAT IS FREE OF ROCKS AND DEBRIS. THE SOIL SHALL BE TIGHTLY COMPACTED INTO THE SHAPE OF A RIGHT TRIANGLE USING A SHOVEL OR WEIGHTED LAWN ROLLER.

7. FOLLOW MANUFACTURERS' GUIDANCE FOR STAKING. IF MANUFACTURERS' INSTRUCTIONS DO NOT SPECIFY SPACING, STAKES SHALL BE PLACED ON 4' CENTERS AND EMBEDDED A MINIMUM OF 6" INTO THE GROUND. 3" OF THE STAKE SHALL PROTRUDE FROM THE TOP OF THE LOG. STAKES THAT ARE BROKEN PRIOR TO INSTALLATION SHALL BE REPLACED.

SEDIMENT CONTROL LOG 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. SEDIMENT ACCUMULATED UPSTREAM OF SEDIMENT CONTROL LOG SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY ½ OF THE HEIGHT OF THE SEDIMENT CONTROL LOG.

5. SEDIMENT CONTROL LOG SHALL BE REMOVED AT THE END OF CONSTRUCTION. IF DISTURBED AREAS EXIST AFTER REMOVAL, THEY SHALL BE COVERED WITH TOP SOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAILS ADAPTED FROM TOWN OF PARKER, COLORADO, JEFFERSON COUNTY, COLORADO, DOUGLAS COUNTY, COLORADO, AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

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.

REVISIONS

NO.	DESCRIPTION	DATE

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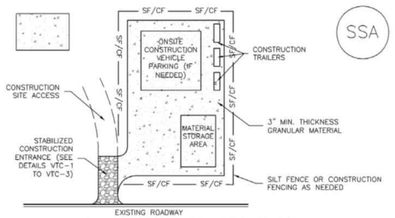
WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
EROSION CONTROL DETAILS SHEET

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY QNA
H-SCALE AS SHOWN
V-SCALE N/A
JOB NO. 2604.00
DATE ISSUED 04/03/26
SHEET NO. 31 OF 36



SSA-1, STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   -LOCATION OF STAGING AREA(S).
   -CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.

2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.

3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.

4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.

5. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.

6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA 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. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

STABILIZED STAGING AREA MAINTENANCE NOTES

5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.

6. 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)

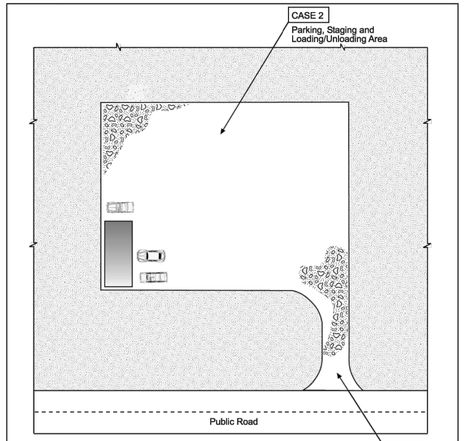


Table VT-1

	Case 1	Case 2
Gravel Thickness	9"	3"
Filter Fabric	YES	NO

City of Colorado Springs Storm Water Quality

Figure VT-1
Vehicle Tracking
Application Examples

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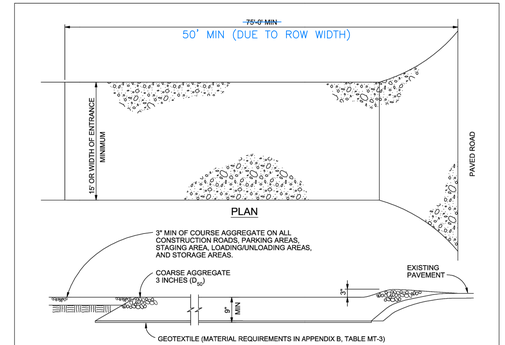

VEHICLE TRACKING

NTS

VEHICLE TRACKING NOTES

INSTALLATION REQUIREMENTS

1. ALL ENTRANCES TO THE CONSTRUCTION SITE ARE TO BE STABILIZED PRIOR TO CONSTRUCTION BEGINNING.

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 PRIOR TO LAYING DOWN GEOTEXTILE AND STONE.

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. STORM SEWER INLET PROTECTION IS TO BE IN PLACE, INSPECTED, AND CLEANED IF NECESSARY.

5. 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

Description

Photograph TS/PS -1. Equipment used to drill seed. Photo courtesy of Douglas County.

Temporary seeding can be used to stabilize disturbed areas that will be inactive for an extended period. Permanent seeding should be used to stabilize areas at final grade that will not be otherwise stabilized. Effective seeding includes preparation of a seedbed, selection of an appropriate seed mixture, proper planting techniques, and protection of the seeded area with mulch, geotextiles, or other appropriate measures.

Appropriate Uses

When the soil surface is disturbed and will remain inactive for an extended period (typically 30 days or longer), proactive stabilization measures should be implemented. If the inactive period is short-lived (on the order of two weeks), techniques such as surface roughening may be appropriate. For longer periods of inactivity, temporary seeding and mulching can provide effective erosion control. Permanent seeding should be used on finished areas that have not been otherwise stabilized.

Typically, local governments have their own seed mixes and timelines for seeding. Check jurisdictional requirements for seeding and temporary stabilization.

Design and Installation

Effective seeding requires proper seedbed preparation, selection of an appropriate seed mixture, use of appropriate seeding equipment to ensure proper coverage and density, and protection with mulch or fabric until plants are established.

The USDCM Volume 2 *Revegetation* Chapter contains detailed seed mix, soil preparations, and seeding and mulching recommendations that may be referenced to supplement this Fact Sheet.

Drill seeding is the preferred seeding method. Hydroseeding is not recommended except in areas where steep slopes prevent use of drill seeding equipment, and even in these instances it is preferable to hand seed and mulch. Some jurisdictions do not allow hydroseeding or hydromulching.

Seedbed Preparation

Prior to seeding, ensure that areas to be revegetated have soil conditions capable of supporting vegetation. Overlot grading can result in loss of topsoil, resulting in poor quality subsoils at the ground surface that have low nutrient value, little organic matter content, few soil microorganisms, rooting restrictions, and conditions less conducive to infiltration of precipitation. As a result, it is typically necessary to provide stockpiled topsoil, compost, or other

Temporary and Permanent Seeding	
Functions	
Erosion Control	Yes
Sediment Control	No
Site/Material Management	No

soil amendments and rototill them into the soil to a depth of 6 inches or more.

Topsoil should be salvaged during grading operations for use and spread on areas to be revegetated later. Topsoil should be viewed as an important resource to be utilized for vegetation establishment, due to its water-holding capacity, structure, texture, organic matter content, biological activity, and nutrient content. The rooting depth of most native grasses in the semi-arid Denver metropolitan area is 6 to 18 inches. At a minimum, the upper 6 inches of topsoil should be stripped, stockpiled, and ultimately respread across areas that will be revegetated.

Where topsoil is not available, subsoils should be amended to provide an appropriate plant-growth medium. Organic matter, such as well digested compost, can be added to improve soil characteristics conducive to plant growth. Other treatments can be used to adjust soil pH conditions when needed. Soil testing, which is typically inexpensive, should be completed to determine and optimize the types and amounts of amendments that are required.

If the disturbed ground surface is compacted, rip or rototill the surface prior to placing topsoil. If adding compost to the existing soil surface, rototilling is necessary. Surface roughening will assist in placement of a stable topsoil layer on steeper slopes, and allow infiltration and root penetration to greater depth.

Prior to seeding, the soil surface should be rough and the seedbed should be firm, but neither too loose nor compacted. The upper layer of soil should be in a condition suitable for seeding at the proper depth and conducive to plant growth. Seed-to-soil contact is the key to good germination.

Seed Mix for Temporary Vegetation

To provide temporary vegetative cover on disturbed areas which will not be paved, built upon, or fully landscaped or worked for an extended period (typically 30 days or more), plant an annual grass appropriate for the time of planting and mulch the planted areas. Annual grasses suitable for the Denver metropolitan area are listed in Table TS/PS-1. These are to be considered only as general recommendations when specific design guidance for a particular site is not available. Local governments typically specify seed mixes appropriate for their jurisdiction.

Seed Mix for Permanent Revegetation

To provide vegetative cover on disturbed areas that have reached final grade, a perennial grass mix should be established. Permanent seeding should be performed promptly (typically within 14 days) after reaching final grade. Each site will have different characteristics and a landscape professional or the local jurisdiction should be contacted to determine the most suitable seed mix for a specific site. In lieu of a specific recommendation, one of the perennial grass mixes appropriate for site conditions and growth season listed in Table TS/PS-2 can be used. The pure live seed (PLS) rates of application recommended in these tables are considered to be absolute minimum rates for seed applied using proper drill-seeding equipment.

If desired for wildlife habitat or landscape diversity, shrubs such as rubber rabbitbrush (*Chrysothamnus nauseosus*), fourwing saltbush (*Atriplex canescens*) and skunkbrush sumac (*Rhus trilobata*) could be added to the upland seedmixes at 0.25, 0.5 and 1 pound PLS/acre, respectively. In riparian zones, planting root stock of such species as American plum (*Prunus americana*), woods rose (*Rosa woodsii*), plains cottonwood (*Populus sargentii*), and willow (*Populus spp.*) may be considered. On non-topsoiled upland sites, a legume such as Ladak alfalfa at 1 pound PLS/acre can be included as a source of nitrogen for perennial grasses.

Description

Photograph MU-1. An area that was recently seeded, mulched, and crimped.

Mulching consists of evenly applying straw, hay, shredded wood mulch, rock, bark or compost to disturbed soils and securing the mulch by crimping, tackifiers, netting or other measures. Mulching helps reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff. Although often applied in conjunction with temporary or permanent seeding, it can also be used for temporary stabilization of areas that cannot be reseeded due to seasonal constraints.

Mulch can be applied either using standard mechanical dry application methods or using hydromulching equipment that hydraulically applies a slurry of water, wood fiber mulch, and often a tackifier.

Appropriate Uses

Use mulch in conjunction with seeding to help protect the seedbed and stabilize the soil. Mulch can also be used as a temporary cover on low to mild slopes to help temporarily stabilize disturbed areas where growing season constraints prevent effective reseeding. Disturbed areas should be properly mulched and tacked, or seeded, mulched and tacked promptly after final grade is reached (typically within no longer than 14 days) on portions of the site not otherwise permanently stabilized.

Standard dry mulching is encouraged in most jurisdictions; however, hydromulching may not be allowed in certain jurisdictions or may not be allowed near waterways.

Do not apply mulch during windy conditions.

Design and Installation

Prior to mulching, surface-roughen areas by rolling with a crimping or punching type roller or by track walking. Track walking should only be used where other methods are impractical because track walking with heavy equipment typically compacts the soil.

A variety of mulches can be used effectively at construction sites. Consider the following:

Mulch	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material Management	No

- Clean, weed-free and seed-free cereal grain straw should be applied evenly at a rate of 2 tons per acre and must be tacked or fastened by a method suitable for the condition of the site. Straw mulch must be anchored (and not merely placed) on the surface. This can be accomplished mechanically by crimping or with the aid of tackifiers or nets. Anchoring with a crimping implement is preferred, and is the recommended method for areas flatter than 3:1. Mechanical crimpers must be capable of tucking the long mulch fibers into the soil to a depth of 3 inches without cutting them. An agricultural disk, while not an ideal substitute, may work if the disk blades are dull or blunted and set vertically; however, the frame may have to be weighted to afford proper soil penetration.
- Grass hay may be used in place of straw; however, because hay is comprised of the entire plant including seed, mulching with hay may seed the site with non-native grass species which might in turn out-compete the native seed. Alternatively, native species of grass hay may be purchased, but can be difficult to find and are more expensive than straw. Purchasing and utilizing a certified weed-free straw is an easier and less costly mulching method. When using grass hay, follow the same guidelines as for straw (provided above).
- On small areas sheltered from the wind and heavy runoff, spraying a tackifier on the mulch is satisfactory for holding it in place. For steep slopes and special situations where greater control is needed, erosion control blankets anchored with stakes should be used instead of mulch.
- Hydraulic mulching consists of wood cellulose fibers mixed with water and a tackifying agent and should be applied at a rate of no less than 1,500 pounds per acre (1,425 lbs of fibers mixed with at least 75 lbs of tackifier) with a hydraulic mulcher. For steeper slopes, up to 2000 pounds per acre may be required for effective hydroseeding. Hydromulch typically requires up to 24 hours to dry; therefore, it should not be applied immediately prior to inclement weather. Application to roads, waterways and existing vegetation should be avoided.
- Erosion control mats, blankets, or nets are recommended to help stabilize steep slopes (generally 3:1 and steeper) and waterways. Depending on the product, these may be used alone or in conjunction with grass or straw mulch. Normally, use of these products will be restricted to relatively small areas. Biodegradable mats made of straw and jute, straw-coconut, coconut fiber, or excelsior can be used instead of mulch. (See the ECM/TRM BMP for more information.)
- Some tackifiers or binders may be used to anchor mulch. Check with the local jurisdiction for allowed tackifiers. Manufacturer's recommendations should be followed at all times. (See the Soil Binder BMP for more information on general types of tackifiers.)
- Rock can also be used as mulch. It provides protection of exposed soils to wind and water erosion and allows infiltration of precipitation. An aggregate base course can be spread on disturbed areas for temporary or permanent stabilization. The rock mulch layer should be thick enough to provide full coverage of exposed soil on the area it is applied.

Maintenance and Removal

After mulching, the bare ground surface should not be more than 10 percent exposed. Reapply mulch, as needed, to cover bare areas.

REVISIONS

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UTILITY CONSTRUCTION SET
EROSION CONTROL DETAILS SHEET

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H-SCALE AS SHOWN
V-SCALE N/A
JOB NO. 2604.00
DATE ISSUED 04/03/26
SHEET NO. 32 OF 36

Description

Surface roughening is an erosion control practice that involves tracking, scarifying, imprinting, or tilling a disturbed area to provide temporary stabilization of disturbed areas. Surface roughening creates variations in the soil surface that help to minimize wind and water erosion. Depending on the technique used, surface roughening may also help establish conditions favorable to establishment of vegetation.

Photograph SR-1. Surface roughening via imprinting for temporary stabilization.

Appropriate Uses

Surface roughening can be used to provide temporary stabilization of disturbed areas, such as when revegetation cannot be immediately established due to seasonal planting limitations. Surface roughening is not a stand-alone BMP, and should be used in conjunction with other erosion and sediment controls.

Surface roughening is often implemented in conjunction with grading and is typically performed using heavy construction equipment to track the surface. Be aware that tracking with heavy equipment will also compact soils, which is not desirable in areas that will be revegetated. Scarifying, tilling, or ripping are better surface roughening techniques in locations where revegetation is planned. Roughening is not effective in very sandy soils and cannot be effectively performed in rocky soil.

Design and Installation

Typical design details for surfacing roughening on steep and mild slopes are provided in Details SR-1 and SR-2, respectively.

Surface roughening should be performed either after final grading or to temporarily stabilize an area during active construction that may be inactive for a short time period. Surface roughening should create depressions 2 to 6 inches deep and approximately 6 inches apart. The surface of exposed soil can be roughened by a number of techniques and equipment. Horizontal grooves (running parallel to the contours of the land) can be made using tracks from equipment treads, stair-step grading, ripping, or tilling.

Fill slopes can be constructed with a roughened surface. Cut slopes that have been smooth graded can be roughened as a subsequent operation. Roughening should follow along the contours of the slope. The tracks left by truck mounted equipment working perpendicular to the contour can leave acceptable horizontal depressions; however, the equipment will also compact the soil.

Surface Roughening	
Functions	
Erosion Control	Yes
Sediment Control	No
Site/Material Management	No

Maintenance and Removal

Care should be taken not to drive vehicles or equipment over areas that have been surface roughened. Tire tracks will smooth the roughened surface and may cause runoff to collect into rills and gullies.

Because surface roughening is only a temporary control, additional treatments may be necessary to maintain the soil surface in a roughened condition.

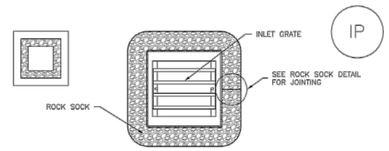
Areas should be inspected for signs of erosion. Surface roughening is a temporary measure, and will not provide long-term erosion control.

Table 5-1. El Paso County Conservation District All-Purpose Mix for Upland, Transition and Permanent Control Measure Areas

Common Name	Scientific Name	Growth Season / Form	% of Mix	Pounds PLS		
				• Irrigated broadcast • Irrigated hydroseeded	• Non-irrigated broadcast • Non-irrigated hydroseeded • Irrigated drilled	• Non-irrigated drilled
				80 seeds/sq ft	40 seeds/sq ft	20 seeds/sq ft
Bluestem, big	*Andropogon gerardii*	Warm, sod	20	4.4	2.2	1.1
Grama, blue	*Bouteloua gracilis*	Warm, bunch	10	0.5	0.25	0.13
Green needlegrass[2]	*Nassella viridula*	Cool, bunch	10	2	1	0.5
Wheatgrass, western[2]	*Pascopyrum smithii*	Cool, sod	20	6.4	3.2	1.6
Grama, sideoats	*Bouteloua curtipendula*	Warm, bunch	10	2	1	0.5
Switchgrass[2]	*Panicum virgatum*	Warm, bunch/sod	10	0.8	0.4	0.2
Prairie sandreed	*Calimovilfa longifolia*	Warm, sod	10	1.2	0.6	0.3
Yellow indiangrass[2]	*Sorghastrum nutans*	Warm, sod	10	2	1	0.5
			Seed rate (lbs PLS/acre)	19.3	9.7	4.8

[1]For portions of facilities located near or on the bottom or where wet soil conditions occur. Planting of potted nursery stock wetland plants 2-foot on-center is recommended for sites with wetland hydrology.

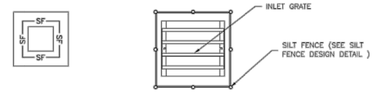
[2]Species that will do well in the bottom of pond areas.



IP-3, ROCK SOCK SUMP/AREA INLET PROTECTION

ROCK SOCK SUMP/AREA INLET PROTECTION INSTALLATION NOTES
1. SEE ROCK SOCK DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.

2. STRAW WATTLES/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF ROCK SOCKS FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.



IP-4, SILT FENCE FOR SUMP INLET PROTECTION

SILT FENCE INLET PROTECTION INSTALLATION NOTES

1. SEE SILT FENCE DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.

2. POSTS SHALL BE PLACED AT EACH CORNER OF THE INLET AND AROUND THE EDGES AT A MAXIMUM SPACING OF 3 FEET.

3. STRAW WATTLES/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF SILT FENCE FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.

Surface Roughening (SR) EC-1

Description

Surface roughening is an erosion control practice that involves tracking, scarifying, imprinting, or tilling a disturbed area to provide temporary stabilization of disturbed areas. Surface roughening creates variations in the soil surface that help to minimize wind and water erosion. Depending on the technique used, surface roughening may also help establish conditions favorable to establishment of vegetation.

Photograph SR-1. Surface roughening via imprinting for temporary stabilization.

Appropriate Uses

Surface roughening can be used to provide temporary stabilization of disturbed areas, such as when revegetation cannot be immediately established due to seasonal planting limitations. Surface roughening is not a stand-alone BMP, and should be used in conjunction with other erosion and sediment controls.

Surface roughening is often implemented in conjunction with grading and is typically performed using heavy construction equipment to track the surface. Be aware that tracking with heavy equipment will also compact soils, which is not desirable in areas that will be revegetated. Scarifying, tilling, or ripping are better surface roughening techniques in locations where revegetation is planned. Roughening is not effective in very sandy soils and cannot be effectively performed in rocky soil.

Design and Installation

Typical design details for surfacing roughening on steep and mild slopes are provided in Details SR-1 and SR-2, respectively.

Surface roughening should be performed either after final grading or to temporarily stabilize an area during active construction that may be inactive for a short time period. Surface roughening should create depressions 2 to 6 inches deep and approximately 6 inches apart. The surface of exposed soil can be roughened by a number of techniques and equipment. Horizontal grooves (running parallel to the contours of the land) can be made using tracks from equipment treads, stair-step grading, ripping, or tilling.

Fill slopes can be constructed with a roughened surface. Cut slopes that have been smooth graded can be roughened as a subsequent operation. Roughening should follow along the contours of the slope. The tracks left by truck mounted equipment working perpendicular to the contour can leave acceptable horizontal depressions; however, the equipment will also compact the soil.

Surface Roughening	
Functions	
Erosion Control	Yes
Sediment Control	No
Site/Material Management	No

November 2010 Urban Drainage and Flood Control District SR-1
Urban Storm Drainage Criteria Manual Volume 3

Surface Roughening (SR) EC-1

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Appropriate Uses

Surface roughening can be used to provide temporary stabilization of disturbed areas, such as when revegetation cannot be immediately established due to seasonal planting limitations. Surface roughening is not a stand-alone BMP, and should be used in conjunction with other erosion and sediment controls.

Surface roughening is often implemented in conjunction with grading and is typically performed using heavy construction equipment to track the surface. Be aware that tracking with heavy equipment will also compact soils, which is not desirable in areas that will be revegetated. Scarifying, tilling, or ripping are better surface roughening techniques in locations where revegetation is planned. Roughening is not effective in very sandy soils and cannot be effectively performed in rocky soil.

Design and Installation

Typical design details for surfacing roughening on steep and mild slopes are provided in Details SR-1 and SR-2, respectively.

Surface roughening should be performed either after final grading or to temporarily stabilize an area during active construction that may be inactive for a short time period. Surface roughening should create depressions 2 to 6 inches deep and approximately 6 inches apart. The surface of exposed soil can be roughened by a number of techniques and equipment. Horizontal grooves (running parallel to the contours of the land) can be made using tracks from equipment treads, stair-step grading, ripping, or tilling.

Fill slopes can be constructed with a roughened surface. Cut slopes that have been smooth graded can be roughened as a subsequent operation. Roughening should follow along the contours of the slope. The tracks left by truck mounted equipment working perpendicular to the contour can leave acceptable horizontal depressions; however, the equipment will also compact the soil.

Surface Roughening	
Functions	
Erosion Control	Yes
Sediment Control	No
Site/Material Management	No

November 2010 Urban Drainage and Flood Control District SR-1
Urban Storm Drainage Criteria Manual Volume 3

Table 5-2. El Paso County All-Purpose Low Grow Mix for Upland and Transition Areas

Common Name	Scientific Name	Growth Season / Form	% of Mix	Pounds PLS		
				• Irrigated broadcast • Irrigated hydroseeded	• Non-irrigated broadcast • Non-irrigated hydroseeded • Irrigated drilled	• Non-irrigated drilled
				80 seeds/sq ft	40 seeds/sq ft	20 seeds/sq ft
Buffalograss	*Buchloe dactyloides*	Warm, sod	25	9.6	4.8	2.4
Grama, blue	*Bouteloua gracilis*	Warm, bunch	20	10.8	5.4	2.7
Grama, sideoats	*Bouteloua curtipendula*	Warm, bunch	29	5.6	2.8	1.4
Green needlegrass	*Nassella viridula*	Cool, bunch	5	3.2	1.6	0.8
Wheatgrass, western	*Pascopyrum smithii*	Cool, sod	20	12	6	3
Dropseed, sand	*Sporobolus cryptandrus*	Warm, bunch	1	0.8	0.4	0.2
			Seed rate (lbs PLS/acre)	42	21	10.3

GENERAL INLET PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATION OF INLET PROTECTION.
   –TYPE OF INLET PROTECTION (IP.1, IP.2, IP.3, IP.4, IP.5, IP.6)

2. INLET PROTECTION SHALL BE INSTALLED PROMPTLY AFTER INLET CONSTRUCTION OR PAVING IS COMPLETE (TYPICALLY WITHIN 48 HOURS). IF A RAINFALL/RUNOFF EVENT IS FORECAST, INSTALL INLET PROTECTION PRIOR TO ONSET OF EVENT.

3. 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.

INLET PROTECTION 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. SEDIMENT ACCUMULATED UPSTREAM OF INLET PROTECTION SHALL BE REMOVED AS NECESSARY TO MAINTAIN BMP EFFECTIVENESS, TYPICALLY WHEN STORAGE VOLUME REACHES 50% OF CAPACITY, A DEPTH OF 6" WHEN SILT FENCE IS USED, OR ¼ OF THE HEIGHT FOR STRAW BALES.

5. INLET PROTECTION IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS PERMANENTLY STABILIZED, UNLESS THE LOCAL JURISDICTION APPROVES EARLIER REMOVAL OF INLET PROTECTION IN STREETS.

6. WHEN INLET PROTECTION AT AREA INLETS IS REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOP SOIL, SEEDED AND MULCHED, OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

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.

NOTE: THE DETAILS INCLUDED WITH THIS FACT SHEET SHOW COMMONLY USED, CONVENTIONAL METHODS OF INLET PROTECTION IN THE DENVER METROPOLITAN AREA. THERE ARE MANY PROPRIETARY INLET PROTECTION METHODS ON THE MARKET. UDFCD NEITHER ENDORSES NOR DISCOURAGES USE OF PROPRIETARY INLET PROTECTION; HOWEVER, IN THE EVENT PROPRIETARY METHODS ARE USED, THE APPROPRIATE DETAIL FROM THE MANUFACTURER MUST BE INCLUDED IN THE SWMP AND THE BMP MUST BE INSTALLED AND MAINTAINED AS SHOWN IN THE MANUFACTURER'S DETAILS.

NOTE: SOME MUNICIPALITIES DISCOURAGE OR PROHIBIT THE USE OF STRAW BALES FOR INLET PROTECTION. CHECK WITH LOCAL JURISDICTION TO DETERMINE IF STRAW BALE INLET PROTECTION IS ACCEPTABLE.

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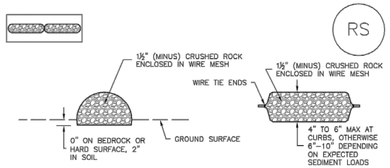
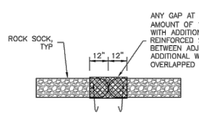




ANY GAP AT JOINT SHALL BE FILLED WITH AN ADEQUATE AMOUNT OF ½" (MINUS) CRUSHED ROCK AND WRAPPED WITH ADDITIONAL WIRE MESH SECURED TO ENDS OF ROCK REINFORCED SOCK. AS AN ALTERNATIVE TO FILLING JOINTS BETWEEN ADJOINING ROCK SOCKS WITH CRUSHED ROCK AND ADDITIONAL WIRE WRAPPING, ROCK SOCKS CAN BE OVERLAPPED (TYPICALLY 12–INCH OVERLAP) TO AVOID GAPS.

GRADATION TABLE	
SIEVE SIZE	MASS PERCENT PASSING SQUARE MESH SIEVES
	NO. 4
2"	100
1½"	90 – 100
1"	20 – 55
¾"	0 – 15
⅜"	0 – 5
MATCHES SPECIFICATIONS FOR NO. 4 COARSE AGGREGATE FOR CONCRETE PER AASHTO M43. ALL ROCK SHALL BE FRACTURED FACE, ALL SIDES.	

ROCK SOCK INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATION(S) OF ROCK SOCKS.

2. CRUSHED ROCK SHALL BE 1½" (MINUS) IN SIZE WITH A FRACTURED FACE (ALL SIDES) AND SHALL COMPLY WITH GRADATION SHOWN ON THIS SHEET (1½" MINUS).

3. WIRE MESH SHALL BE FABRICATED OF 10 GAGE POULTRY MESH, OR EQUIVALENT, WITH A MAXIMUM OPENING OF ½", RECOMMENDED MINIMUM ROLL WIDTH OF 48"

4. WIRE MESH SHALL BE SECURED USING "HOG RINGS" OR WIRE TIES AT 6" CENTERS ALONG ALL JOINTS AND AT 2" CENTERS ON ENDS OF SOCKS.

5. SOME MUNICIPALITIES MAY ALLOW THE USE OF FILTER FABRIC AS AN ALTERNATIVE TO WIRE MESH FOR THE ROCK ENCLOSURE.

RS–1. ROCK SOCK PERIMETER CONTROL

ROCK SOCK 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. ROCK SOCKS SHALL BE REPLACED IF THEY BECOME HEAVILY SOILED, OR DAMAGED BEYOND REPAIR.

5. SEDIMENT ACCUMULATED UPSTREAM OF ROCK SOCKS SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY ½ OF THE HEIGHT OF THE ROCK SOCK.

6. ROCK SOCKS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

7. WHEN ROCK SOCKS ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

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.

NOTE: THE DETAILS INCLUDED WITH THIS FACT SHEET SHOW COMMONLY USED, CONVENTIONAL METHODS OF ROCK SOCK INSTALLATION IN THE DENVER METROPOLITAN AREA. THERE ARE MANY OTHER SIMILAR PROPRIETARY PRODUCTS ON THE MARKET. UDFCD NEITHER NDORSES NOR DISCOURAGES USE OF PROPRIETARY PROTECTION PRODUCTS; HOWEVER, IN THE EVENT PROPRIETARY METHODS ARE USED, THE APPROPRIATE DETAIL FROM THE MANUFACTURER MUST BE INCLUDED IN THE SWMP AND THE BMP MUST BE INSTALLED AND MAINTAINED AS SHOWN IN THE MANUFACTURER'S DETAILS.

Description

Check dams are temporary grade control structures placed in drainage channels to limit the erosivity of stormwater by reducing flow velocity. Check dams are typically constructed from rock, gravel bags, sand bags, or sometimes, proprietary devices. Reinforced check dams are typically constructed from rock and wire gabion. Although the primary function of check dams is to reduce the velocity of concentrated flows, a secondary benefit is sediment trapping upstream of the structure.

Photograph CD-1. Rock check dams in a roadside ditch. Photo courtesy of WWE.

Appropriate Uses

Use as a grade control for temporary drainage ditches or swales until final soil stabilization measures are established upstream and downstream. Check dams can be used on mild or moderately steep slopes. Check dams may be used under the following conditions:

- As temporary grade control facilities along waterways until final stabilization is established.
- Along permanent swales that need protection prior to installation of a non-erodible lining.
- Along temporary channels, ditches or swales that need protection where construction of a non-erodible lining is not practicable.
- Reinforced check dams should be used in areas subject to high flow velocities.

Design and Installation

Place check dams at regularly spaced intervals along the drainage swale or ditch. Check dams heights should allow for pools to develop upstream of each check dam, extending to the downstream toe of the check dam immediately upstream.

When rock is used for the check dam, place rock mechanically or by hand. Do not dump rocks into the drainage channel. Where multiple check dams are used, the top of the lower dam should be at the same elevation as the toe of the upper dam.

When reinforced check dams are used, install erosion control fabric under and around the check dam to prevent erosion on the upstream and downstream sides. Each section of the dam should be keyed in to reduce the potential for washout or undermining. A rock apron upstream and downstream of the dam may be necessary to further control erosion.

Check Dams	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material Management	No

Design details with notes are provided for the following types of check dams:

- Rock Check Dams (CD-1)
- Reinforced Check Dams (CD-2)

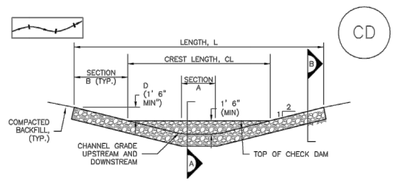
Sediment control logs may also be used as check dams; however, silt fence is not appropriate for use as a check dam. Many jurisdictions also prohibit or discourage use of straw bales for this purpose.

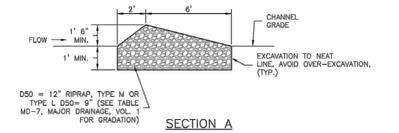
Maintenance and Removal

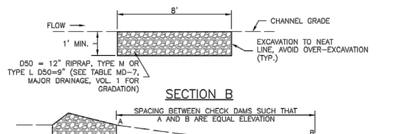
Replace missing rocks causing voids in the check dam. If gravel bags or sandbags are used, replace or repair torn or displaced bags.

Remove accumulated sediment, as needed to maintain BMP effectiveness, typically before the sediment depth upstream of the check dam is within ½ of the crest height. Remove accumulated sediment prior to mulching, seeding, or chemical soil stabilization. Removed sediment can be incorporated into the earthwork with approval from the Project Engineer, or disposed of at an alternate location in accordance with the standard specifications.

Check dams constructed in permanent swales should be removed when perennial grasses have become established, or immediately prior to installation of a non-erodible lining. All of the rock and accumulated sediment should be removed, and the area seeded and mulched, or otherwise stabilized.







CD–1. CHECK DAM

CHECK DAM INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATION OF CHECK DAMS.
   –CHECK DAM TYPE (CHECK DAM OR REINFORCED CHECK DAM).
   –LENGTH (L), CREST LENGTH (CL), AND DEPTH (D).

2. CHECK DAMS INDICATED ON INITIAL SWMP SHALL BE INSTALLED AFTER CONSTRUCTION FENCE, BUT PRIOR TO ANY UPSTREAM LAND DISTURBING ACTIVITIES.

3. RIPRAP UTILIZED FOR CHECK DAMS SHOULD BE OF APPROPRIATE SIZE FOR THE APPLICATION. TYPICAL TYPES OF RIPRAP USED FOR CHECK DAMS ARE TYPE M (D50 12") OR TYPE L (D50 9").

4. RIPRAP PAD SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 1'.

5. THE ENDS OF THE CHECK DAM SHALL BE A MINIMUM OF 1' 6" HIGHER THAN THE CENTER OF THE CHECK DAM.

CHECK DAM 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. SEDIMENT ACCUMULATED UPSTREAM OF THE CHECK DAMS SHALL BE REMOVED WHEN THE SEDIMENT DEPTH IS WITHIN ½ OF THE HEIGHT OF THE CREST.

5. CHECK DAMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

6. WHEN CHECK DAMS ARE REMOVED, EXCAVATIONS SHALL BE FILLED WITH SUITABLE COMPACTED BACKFILL. DISTURBED AREA SHALL BE SEEDED AND MULCHED AND COVERED WITH GEOTEXTILE OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

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Description

A construction fence restricts site access to designated entrances and exits, delineates construction site boundaries, and keeps construction out of sensitive areas such as natural areas to be preserved as open space, wetlands and riparian areas.

Photograph CF-1. A construction fence helps delineate areas where existing vegetation is being protected. Photo courtesy of Douglas County.

Appropriate Uses

A construction fence can be used to delineate the site perimeter and locations within the site where access is restricted to protect natural resources such as wetlands, waterbodies, trees, and other natural areas of the site that should not be disturbed.

If natural resource protection is an objective, then the construction fencing should be used in combination with other perimeter control BMPs such as silt fence, sediment control logs or similar measures.

Design and Installation

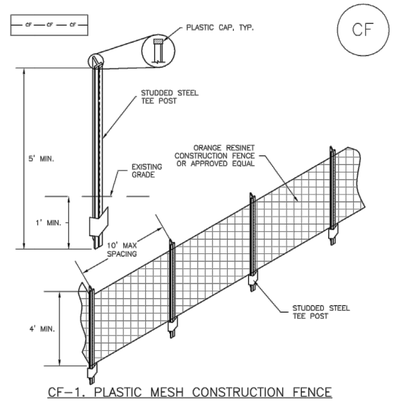
Construction fencing may be chain link or plastic mesh and should be installed following manufacturer's recommendations. See Detail CF-1 for typical installations.

Do not place construction fencing in areas within work limits of machinery.

Maintenance and Removal

- Inspect fences for damage; repair or replace as necessary.
- Fencing should be tight and any areas with slumping or fallen posts should be reinstalled.
- Fencing should be removed once construction is complete.

Construction Fence	
Functions	
Erosion Control	No
Sediment Control	No
Site/Material Management	Yes



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.

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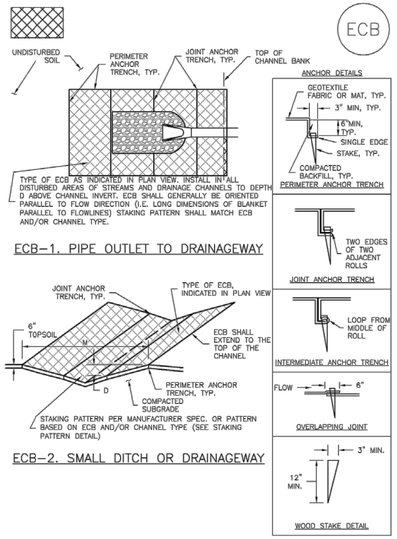


EROSION CONTROL BLANKET INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATION OF ECB.
   –TYPE OF ECB (STRAW, STRAW–COCONUT, COCONUT, OR EXCELSIOR).
   –AREA, A, IN SQUARE YARDS OF EACH TYPE OF ECB.

2. 100% NATURAL AND BIODEGRADABLE MATERIALS ARE PREFERRED FOR RECPs, ALTHOUGH SOME JURISDICTIONS MAY ALLOW OTHER MATERIALS IN SOME APPLICATIONS.

3. IN AREAS WHERE ECBs ARE SHOWN ON THE PLANS, THE PERMITTEE SHALL PLACE TOPSOIL AND PERFORM FINAL GRADING, SURFACE PREPARATION, AND SEEDING AND MULCHING. SUBGRADE SHALL BE SMOOTH AND MOIST PRIOR TO ECB INSTALLATION AND THE ECB SHALL BE IN FULL CONTACT WITH SUBGRADE. NO GAPS OR VOIDS SHALL EXIST UNDER THE BLANKET.

4. PERIMETER ANCHOR TRENCH SHALL BE USED ALONG THE OUTSIDE PERIMETER OF ALL BLANKET AREAS.

5. JOINT ANCHOR TRENCH SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER (LONGITUDINALLY AND TRANSVERSELY) FOR ALL ECBs EXCEPT STRAW WHICH MAY USE AN OVERLAPPING JOINT.

6. INTERMEDIATE ANCHOR TRENCH SHALL BE USED AT SPACING OF ONE–HALF ROLL LENGTH FOR COCONUT AND EXCELSIOR ECBs.

7. OVERLAPPING JOINT DETAIL SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER FOR ECBs ON SLOPES.

8. MATERIAL SPECIFICATIONS OF ECBs SHALL CONFORM TO TABLE ECB–1.

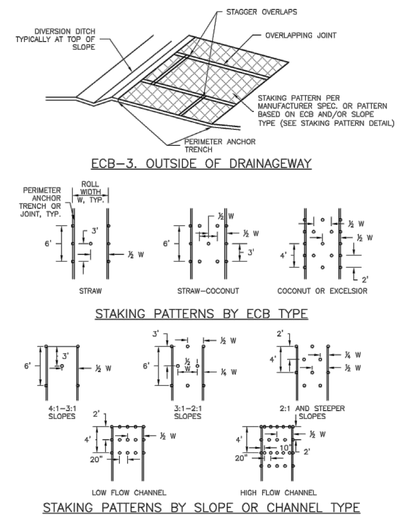
9. ANY AREAS OF SEEDING AND MULCHING DISTURBED IN THE PROCESS OF INSTALLING ECBS SHALL BE RESEEDED AND MULCHED.

10. DETAILS ON DESIGN PLANS FOR MAJOR DRAINAGEWAY STABILIZATION WILL GOVERN IF DIFFERENT FROM THOSE SHOWN HERE.

TABLE ECB–1. ECB MATERIAL SPECIFICATIONS

TYPE	COCONUT CONTENT	STRAW CONTENT	EXCELSIOR CONTENT	RECOMMENDED NETTING**
STRAW*	–	100%	–	DOUBLE/ NATURAL
STRAW–COCONUT	30% MIN	70% MAX	–	DOUBLE/ NATURAL
COCONUT	100%	–	–	DOUBLE/ NATURAL
EXCELSIOR	–	–	100%	DOUBLE/ NATURAL

*STRAW ECBs MAY ONLY BE USED OUTSIDE OF STREAMS AND DRAINAGE CHANNEL.
**ALTERNATE NETTING MAY BE ACCEPTABLE IN SOME JURISDICTIONS



EROSION CONTROL BLANKET MAINTENANCE NOTES

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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. ECBs SHALL BE LEFT IN PLACE TO EVENTUALLY BIODEGRADE, UNLESS REQUESTED TO BE REMOVED BY THE LOCAL JURISDICTION.

5. ANY ECB PULLED OUT, TORN, OR OTHERWISE DAMAGED SHALL BE REPAIRED OR REINSTALLED. ANY SUBGRADE AREAS BELOW THE GEOTEXTILE THAT HAVE ERODED TO CREATED A VOID UNDER THE BLANKET, OR THAT REMAIN DEVOID OF GRASS SHALL BE REPAIRED, RESEEDED AND MULCHED AND THE ECB REINSTALLED.

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.

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H–SCALE AS SHOWN
V–SCALE N/A

JOB NO. 2604.00
DATE ISSUED 04/03/26
SHEET NO. 35 OF 36

Description

The BMPs selected for construction dewatering vary depending on site-specific features such as soils, topography, anticipated discharge quantities, and discharge location. Dewatering typically involves pumping water from an inundated area to a BMP, and then downstream to a receiving waterway, sediment basin, or well-vegetated area. Dewatering typically involves use of several BMPs in sequence.

Photograph DW-1. A relatively small dewatering operation using straw bales and a dewatering bag.

Appropriate Uses

Dewatering operations are used when an area of the construction site needs to be dewatered as the result of a large storm event, groundwater, or existing ponding conditions. This can occur during deep excavation, utility trenching, and wetland or pond excavation.

Photograph DW-2. Dewatering bags used for a relatively large dewatering operation.

Design and Installation

Dewatering techniques will vary depending on site conditions. However, all dewatering discharges must be treated to remove sediment before discharging from the construction site. Discharging water into a sediment trap or basin is an acceptable treatment option. Water may also be treated using a dewatering filter bag, and a series of straw bales or sediment logs. If these previous options are not feasible due to space or the ability to passively treat the discharge to remove sediment, then a settling tank or an active treatment system may need to be utilized. Settling tanks are manufactured tanks with a series of baffles to promote settling. Flocculants can also be added to the tank to induce more rapid settling. This is an approach sometimes used on highly urbanized construction sites. Contact the state agency for special requirements prior to using flocculents and land application techniques.

Some commonly used methods to handle the pumped water without surface discharge include land application to vegetated areas through a perforated discharge hose (i.e., the "sprinkler method") or dispersal from a water truck for dust control.

Dewatering Operations	
Functions	
Erosion Control	Moderate
Sediment Control	Yes
Site/Material Management	Yes

Dewatering discharges to non-paved areas must minimize the potential for scour at the discharge point either using a velocity dissipation device or dewatering filter bag.

Design Details are provided for these types of dewatering situations:

DW-1. Dewatering for Pond Already Filled with Water

DW-2 Dewatering Sump for Submersed Pump

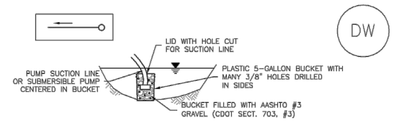
DW-3 Sump Discharge Settling Basin

DW-4 Dewatering Filter Bag

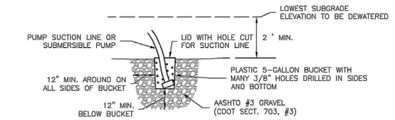
Maintenance and Removal

When a sediment basin or trap is used to enable settling of sediment from construction dewatering discharges, inspect the basin for sediment accumulation. Remove sediment prior to the basin or trap reaching half full. Inspect treatment facilities prior to any dewatering activity. If using a sediment control practice such as a sediment trap or basin, complete all maintenance requirements as described in the fact sheets prior to dewatering.

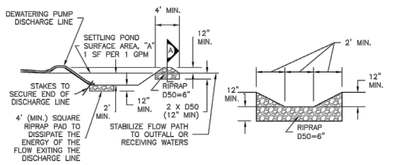
Properly dispose of used dewatering bags, as well as sediment removed from the dewatering BMPs. Depending on the size of the dewatering operation, it may also be necessary to revegetate or otherwise stabilize the area where the dewatering operation was occurring.



DW-1. DEWATERING POND ALREADY FILLED WITH WATER

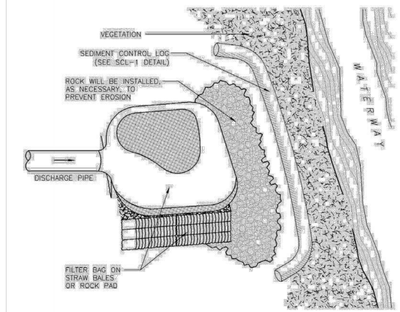


DW-2. DEWATERING SUMP FOR SUBMERSED PUMP



DW-3. SUMP DISCHARGE SETTLING BASIN

SETTLING BASIN SECTION A



DW-4. DEWATERING FILTER BAG

DEWATERING INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -LOCATION OF DEWATERING EQUIPMENT.
   -TYPE OF DEWATERING OPERATION (DW-1 TO DW-4).

2. THE OWNER OR CONTRACTOR SHALL OBTAIN A CONSTRUCTION DISCHARGE (DEWATERING) PERMIT FROM THE STATE PRIOR TO ANY DEWATERING OPERATIONS DISCHARGING FROM THE SITE. ALL DEWATERING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE PERMIT.

3. THE OWNER OR OPERATOR SHALL PROVIDE, OPERATE, AND MAINTAIN DEWATERING SYSTEMS OF SUFFICIENT SIZE AND CAPACITY TO PERMIT EXCAVATION AND SUBSEQUENT CONSTRUCTION IN DRY CONDITIONS AND TO LOWER AND MAINTAIN THE GROUNDWATER LEVEL A MINIMUM OF 2-FEET BELOW THE LOWEST POINT OF EXCAVATION AND CONTINUOUSLY MAINTAIN EXCAVATIONS FREE OF WATER UNTIL BACK-FILLED TO FINAL GRADE.

DEWATERING INSTALLATION NOTES

4. DEWATERING OPERATIONS SHALL USE ONE OR MORE OF THE DEWATERING SUMPS SHOWN ABOVE, WELL POINTS, OR OTHER MEANS APPROVED BY THE LOCAL JURISDICTION TO REDUCE THE PUMPING OF SEDIMENT, AND SHALL PROVIDE A TEMPORARY SEDIMENT BASIN OR FILTRATION BMP TO REDUCE SEDIMENT TO ALLOWABLE LEVELS PRIOR TO RELEASE OFF SITE OR TO A RECEIVING WATER. A SEDIMENT BASIN MAY BE USED IN LIEU OF SUMP DISCHARGE SETTLING BASIN SHOWN ABOVE IF A 4-FOOT-SQUARE RIPRAP PAD IS PLACED AT THE DISCHARGE POINT AND THE DISCHARGE END OF THE LINE IS STAKED IN PLACE TO PREVENT MOVEMENT OF THE LINE.

DEWATERING 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. DEWATERING BMPs ARE REQUIRED IN ADDITION TO ALL OTHER PERMIT REQUIREMENTS.

5. TEMPORARY SETTLING BASINS SHALL BE REMOVED WHEN NO LONGER NEEDED FOR DEWATERING OPERATIONS. ANY DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE 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.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

REVISIONS

NO.	DESCRIPTION	DATE

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WATERBURY SANITARY FORCE MAIN

UTILITY CONSTRUCTION SET
EROSION CONTROL DETAILS SHEET

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