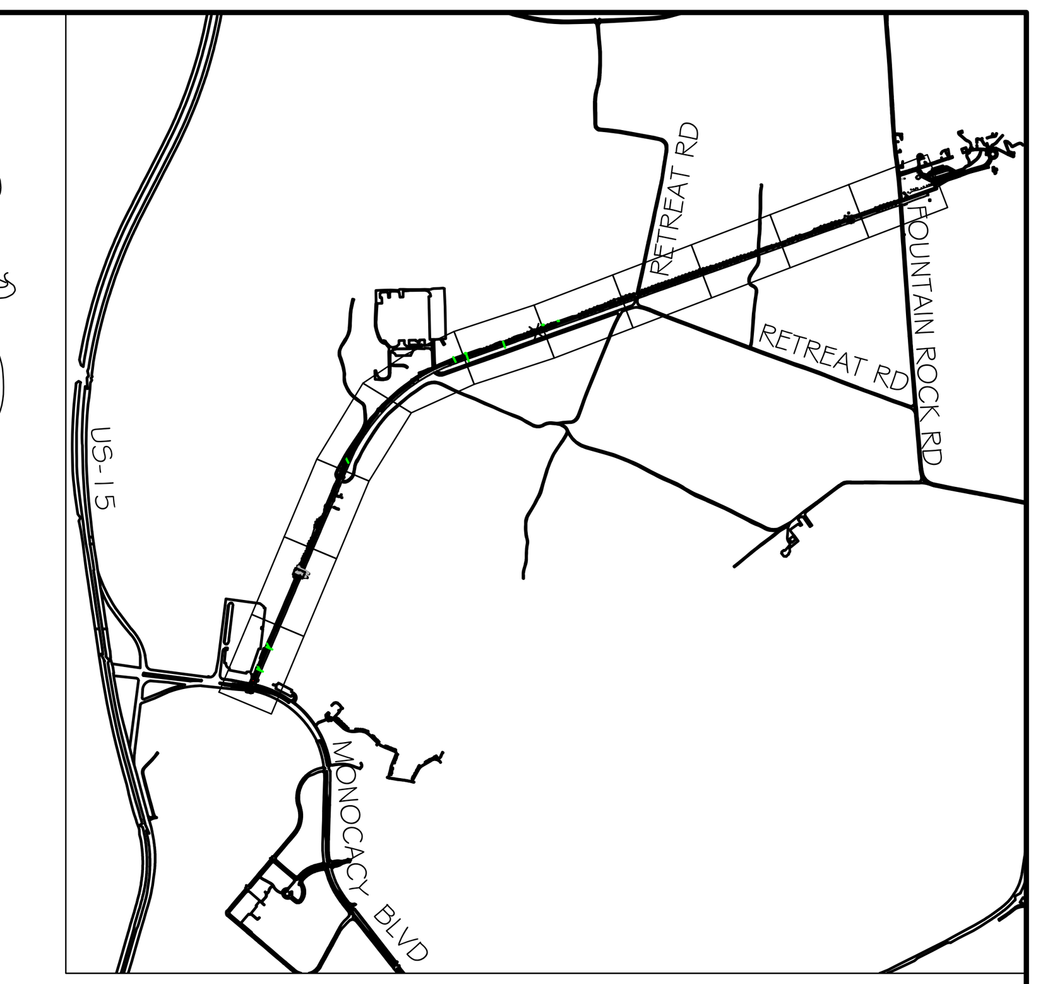
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

FREDERICK, MARYLAND



VICINITY MAP

SCALE: 1"=2000'

PROJECT NARRATIVE:

1. BACKGROUND:

A. THE CONSULTANT WILL FURNISH DESIGN AND ENGINEERING SERVICES FOR THE DEVELOPMENT OF THE FIRST PHASE OF CONSTRUCTION OF A 10 FOOT WIDE ASPHALT TRAIL PROJECT FROM MONOCACY BOULEVARD IN FREDERICK, TO FOUNTAIN ROCK PARK IN WALKERSVILLE. THE STARTING POINT FOR THE TRAIL IS WHERE THE CITY OF FREDERICK EAST STREET RAILS WITH TRAIL PROJECT ENDS AND ACCESS THE 350 SPACE MDOT SHA PARK AND RIDE LOT WITH BIKE PARKING AND LOCAL MTA COMMUTER BUS TRANSIT. THE TRAIL WILL BE LOCATED WITHIN THE RAILROAD RIGHT-OF-WAY OWNED BY MTA AND LEASED TO WALKERSVILLE SOUTHERN RAILROAD FOR AN EXCURSION TRAIN. THE TRAIL WILL CROSS OVER THE TUSCARORA CREEK AND THE MONOCACY RIVER.

2. STATEMENT OF WORK:

A. OVERVIEW:

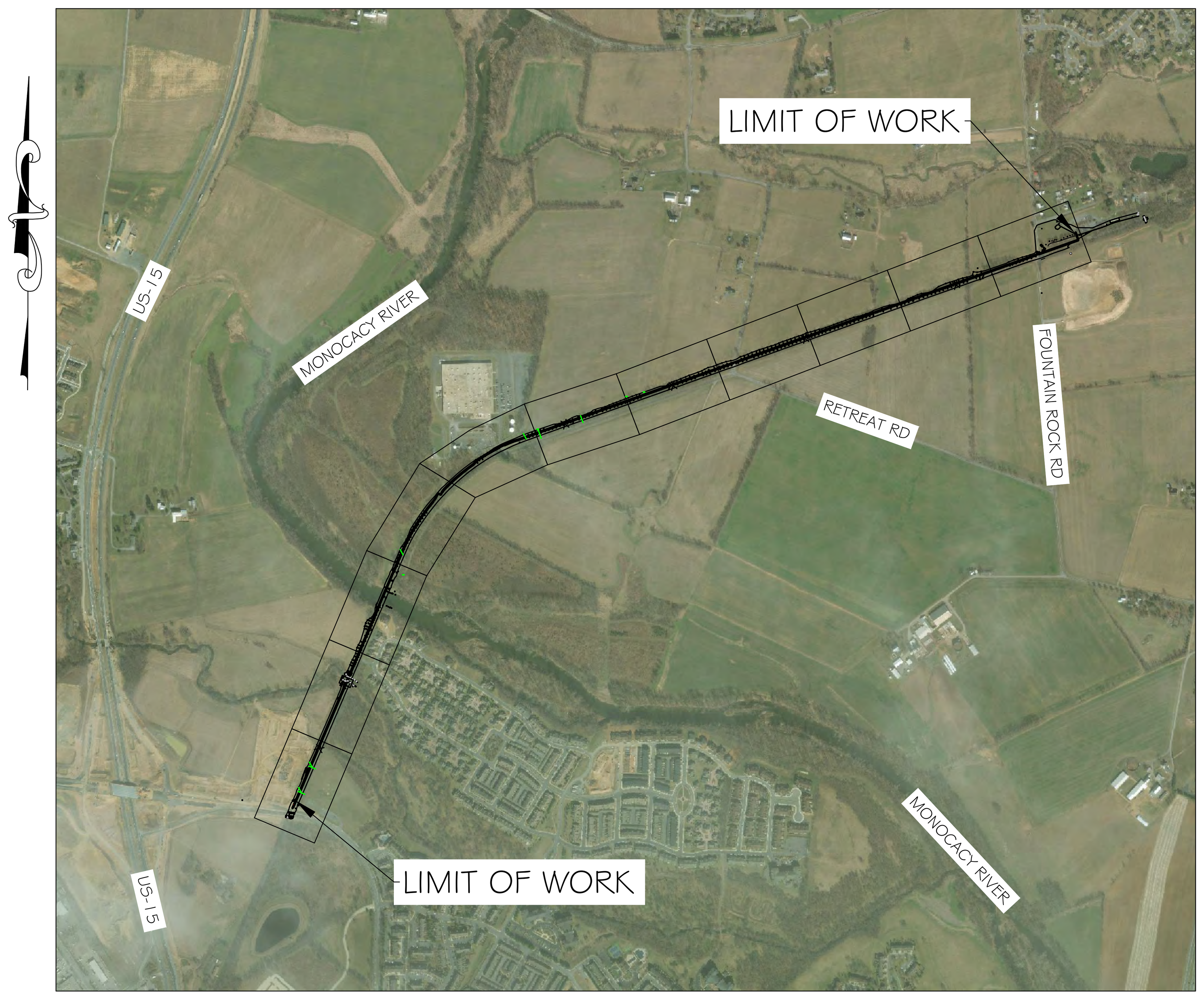
- THE PROPOSED ALIGNMENT OF THE PENNSYLVANIA RAILROAD TRAIL (PA RR TRAIL) BEGINS AT THE INTERSECTION WITH MONOCACY BOULEVARD, JUST SOUTH OF THE TUSCARORA CREEK, AND ENDS AT HERITAGE FARM PARK IN WALKERSVILLE. THE PROPOSED ALIGNMENT FOLLOWS ALONG THE EXISTING RAILROAD TRACKS THAT ARE STILL IN USE. THE SHARED-USE TRAIL SHALL BE A MINIMUM WIDTH OF 10 FEET, AND WILL BE COMPROMISED OF ASPHALT UNLESS THE COST, ENVIRONMENTAL SURROUNDINGS, OR LOCAL RESIDENTS DICTATE OTHERWISE.
- II. MULTIPLE CONFLICTS WERE ENCOUNTERED DURING THE INITIAL STUDY OF THIS PROPOSED ALIGNMENT. TWO WATERWAY CROSSING, ONE AT THE MONOCACY RIVER AND A SECOND AT TUSCARORA CREEK, ALONG WITH FLOODPLAIN IMPACTS WILL BE ENCOUNTERED. ADDITIONAL CONFLICTS INCLUDE RAILROAD CROSSING, RIGHT-OF-WAY IMPACTS TO AVOID THE MTA PROPERTY, AND RIGHT-OF-WAY IMPACTS DUE TO RESTRICTED SPACE ALONG THE HCI PROPERTY. MDOT CAN ASSIST WITH MTA COORDINATION TO AVOID PROPERTY IMPACTS.

B.DEVELOPMENT PROGRAM SERVICES: DEVELOPMENT PROGRAM SERVICES SHALL BE PROVIDED FOR THE FOLLOWING:

- PAVED TRAILS. PHASE I DESIGN AND CONSTRUCTION SHALL INCLUDE A MINIMUM 10 FOOT WIDE ASPHALT PAVED TRAIL. THIS TRAIL WILL PARALLEL THE WALKERSVILLE SOUTHERN RAILROAD, LINKING THE MDOT SHA PARK AND RIDE LOT LOCATED AT MONOCACY BOULEVARD, AND FOUNTAIN ROCK PARK. SPECIAL CONSIDERATIONS MUST BE GIVEN TO RIGHT-OF-WAY IMPLICATIONS, STREAM/RIVER CROSSINGS, AND FLOODPLAINS.
- II. WATER CROSSINGS. PHASE I DESIGN AND CONSTRUCTION SHALL INCLUDE WATER CROSSING AS BOTH THE TUSCARORA CREEK AND MONOCACY RIVER. ADDITIONAL CROSSINGS MAY BE REQUIRED WITHIN FLOODPLAIN LOCATIONS. WATER CROSSING DESIGNS SHALL BE COMPLETED IN ACCORDANCE WITH THE LATEST AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS OR OTHER AGREED UPON DESIGN SPECIFICATIONS.

3. GENERAL NOTES:

1. TOPOGRAPHY IS PROVIDED BY AN AERIAL SCAN SURVEY, AS WELL AS, GIS TOPO.
2. ALL SLOPES WILL BE PLANTED WITH THICK VEGETATION.



SITE MAP

SCALE: 1"=1000'

SHEET INDEX

KCI TECHNOLOGIES
ENGINEERS
PLANNERS
SCIENTISTS
CONSTRUCTION MANAGERS
936 RIDGEBROOK ROAD
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FAX: (410) 316-7818

REVISIONS

NO.	DATE	DESCRIPTION	BY

DATE: 12/1/2021
SCALE:
DESIGNED BY: JDL
DRAWN BY: AS

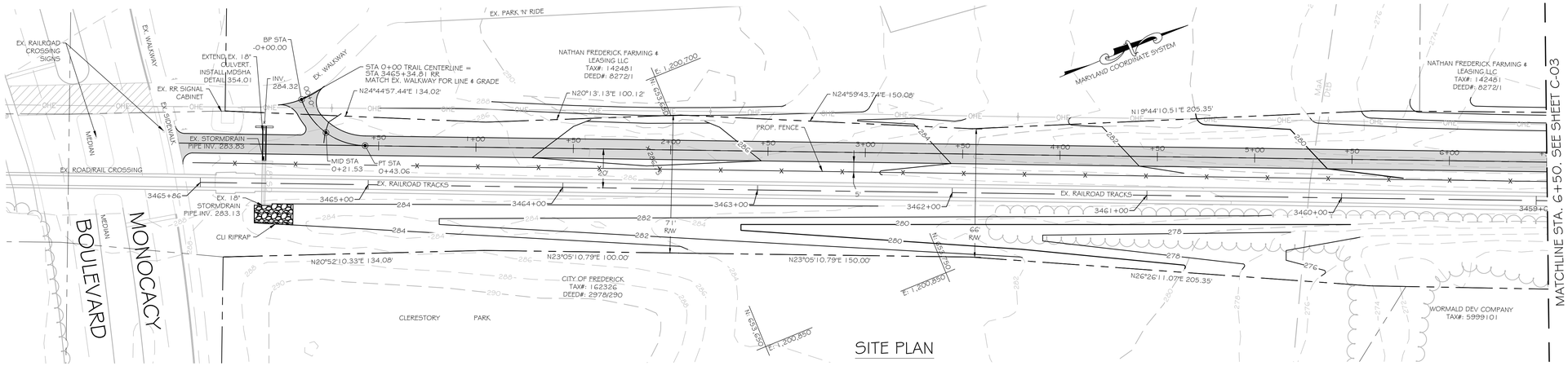
COVER SHEET

FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-01

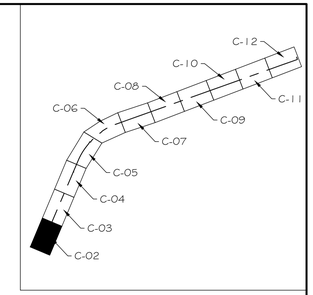
SHEET 1 OF 55

KCI JOB NUMBER 272006468



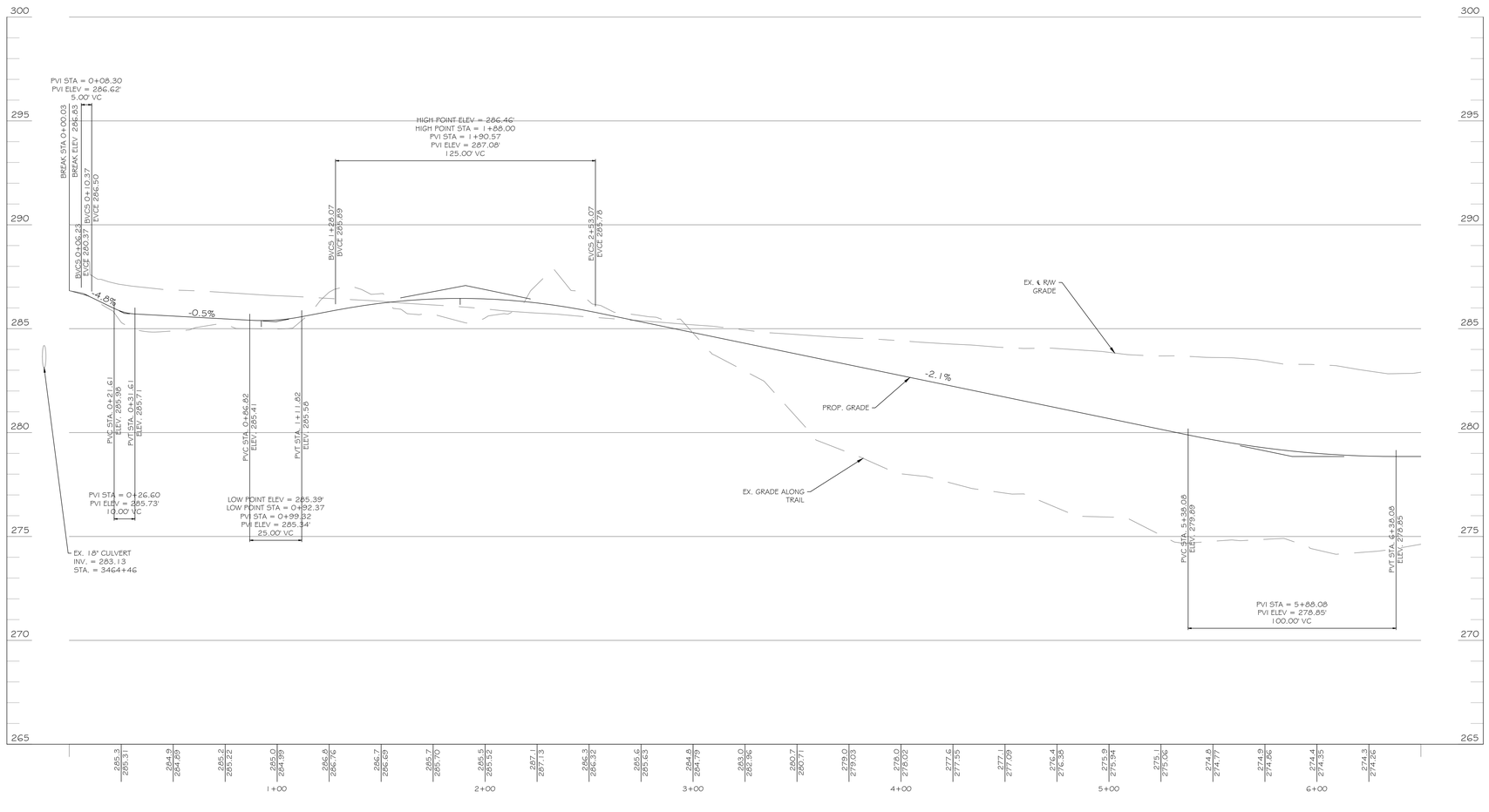
SITE PLAN

SCALE: 1"=30'



TRAIL LOCATION MAP

SCALE: 1"=2000'



TRAIL PROFILE

H. SCALE: 1"=30'
V. SCALE 1"=3'

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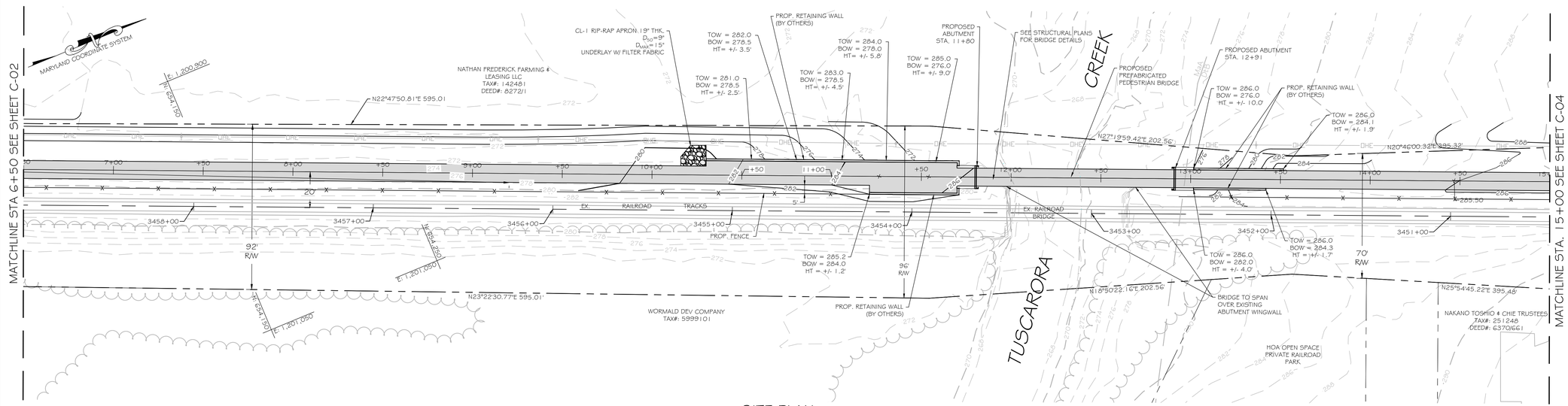
NO.	DATE	DESCRIPTION	BY

DATE 12/1/2021
SCALE
DESIGNED BY JDL
DRAWN BY AS

SITE PLAN AND PROFILE
STA. 0+00 - 6+50
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-02
SHEET 2 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



SITE PLAN

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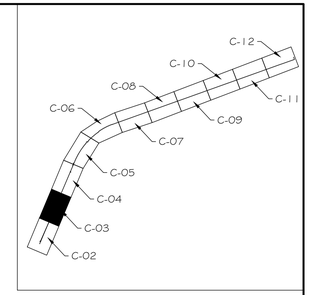

TRAIL LOCATION MAP

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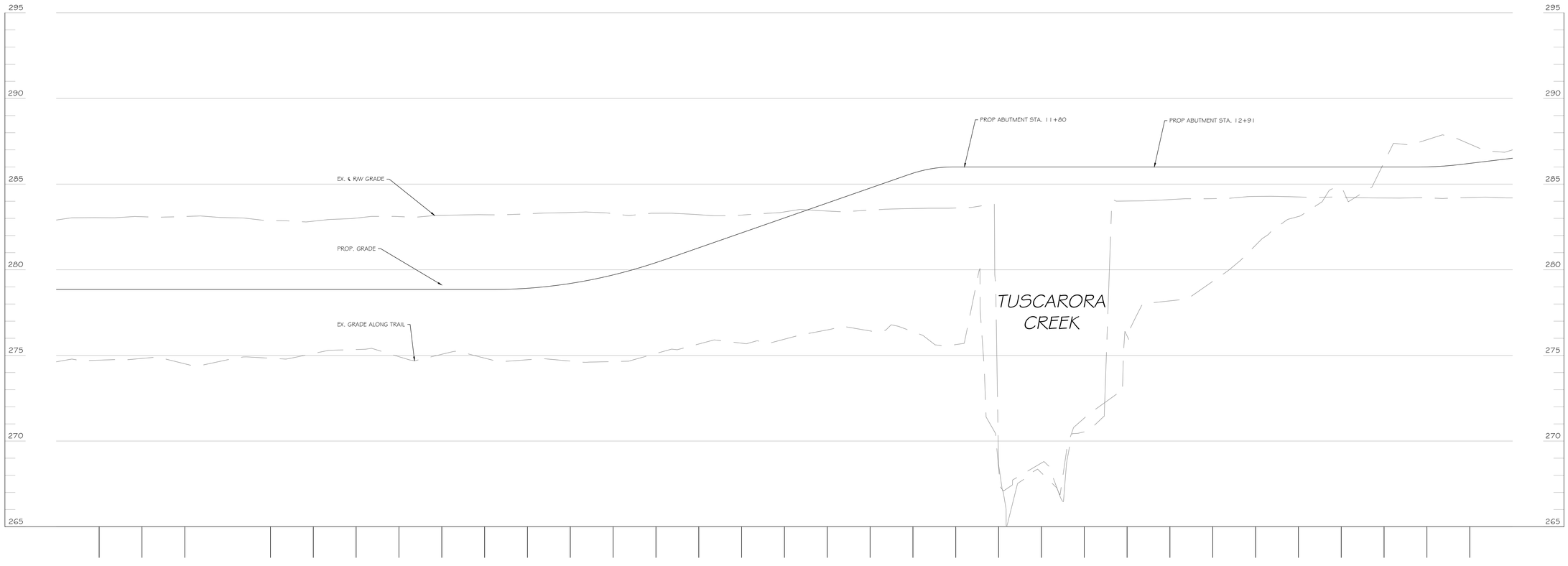

TRAIL PROFILE

H. SCALE: 1"=30'
V. SCALE 1"=3'

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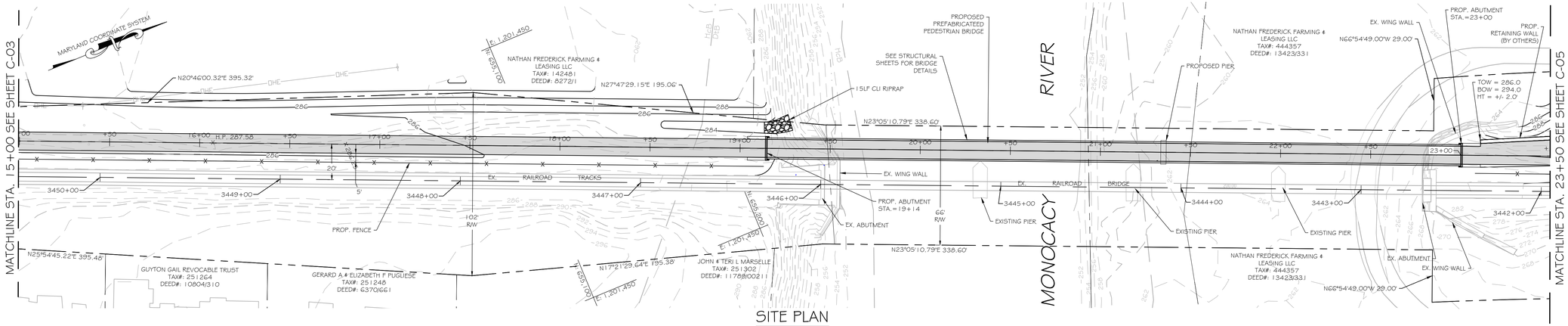
DATE: 12/1/2021
SCALE:
DESIGNED BY: JDL
DRAWN BY: AS

SITE PLAN AND PROFILE
STA. 6+50 - 15+00
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-03
SHEET 3 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



SITE PLAN

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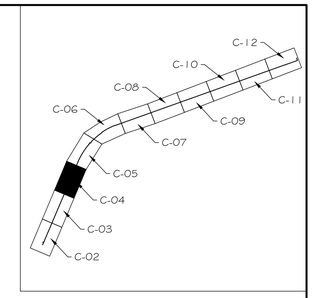
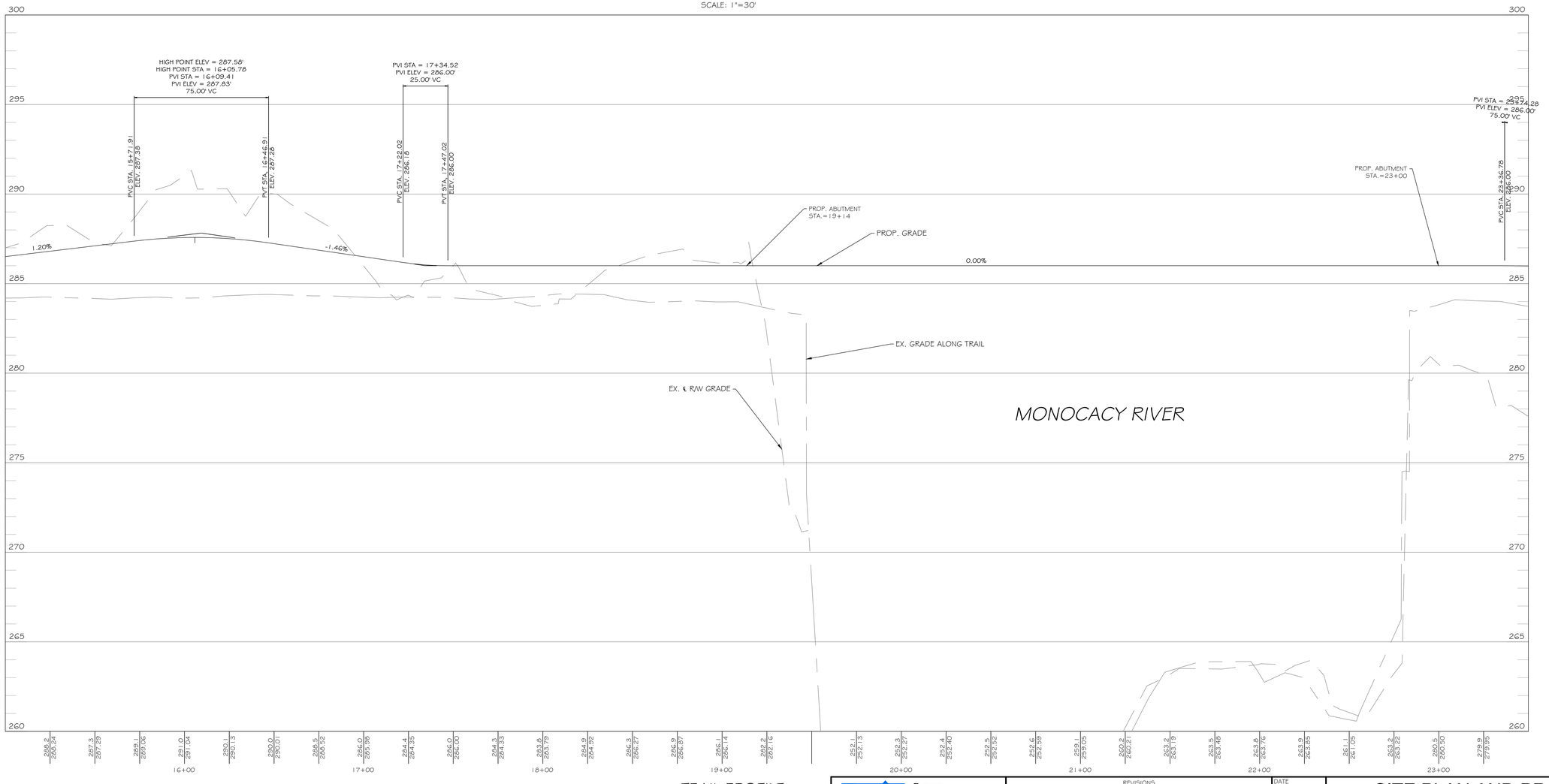


TRAIL LOCATION MAP

SCALE: 1"=2000'



TRAIL PROFILE

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V. SCALE 1"=3'

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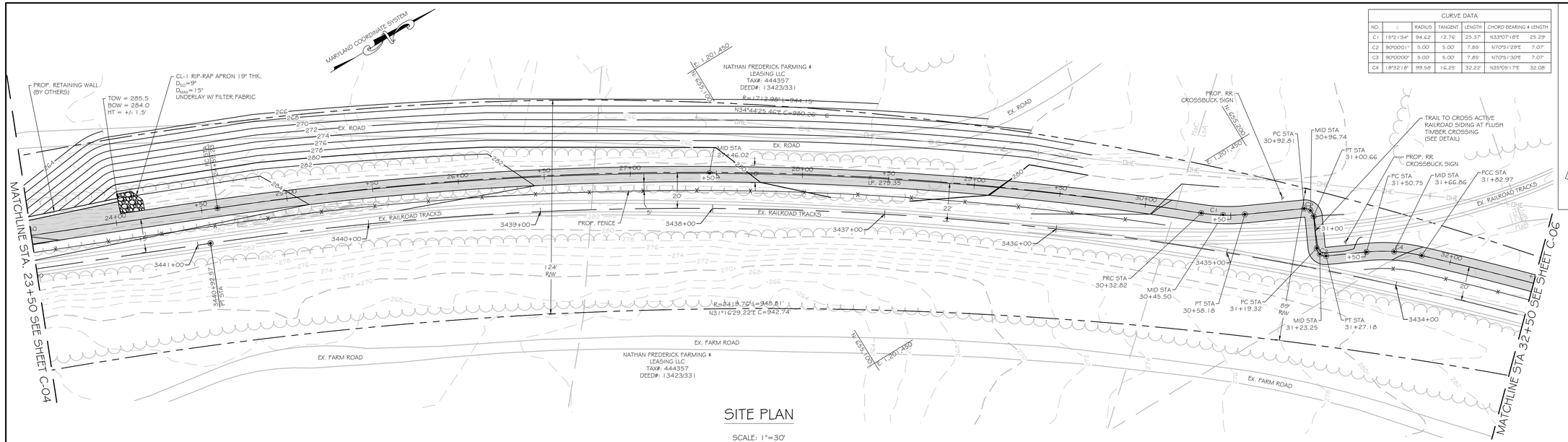
REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 12/1/2021
SCALE:
DESIGNED BY: JDL
DRAWN BY: AS

SITE PLAN AND PROFILE
STA. 15+00 - 23+50
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-04
SHEET 4 OF 55
KCI JOB NUMBER 272006468

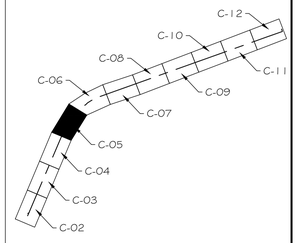
PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



SITE PLAN

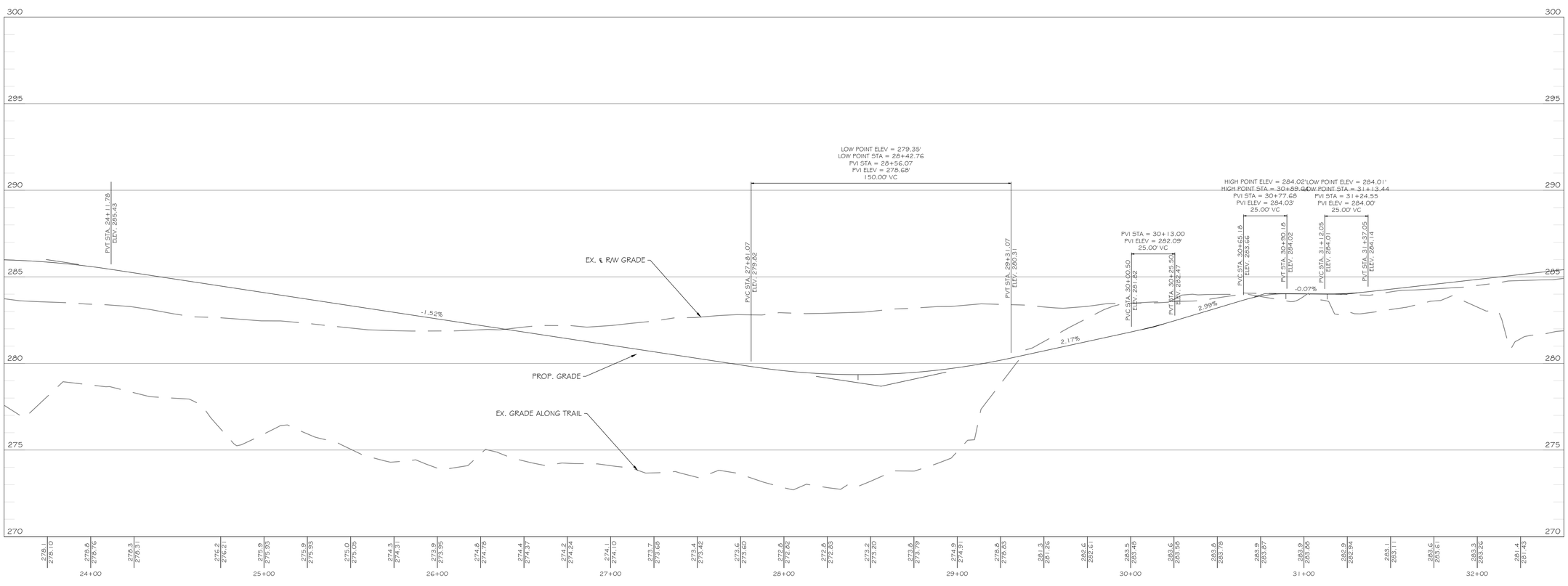
SCALE: 1"=30'

CURVE DATA					
NO.	Δ	RADIUS	TANGENT	LENGTH	CHORD BEARING & LENGTH
C1	15°21'34"	94.62'	12.76'	25.37'	N33°07'18"E 25.29'
C2	90°00'01"	5.00'	5.00'	7.85'	N70°51'29"E 7.07'
C3	90°00'00"	5.00'	5.00'	7.85'	N70°51'30"E 7.07'
C4	18°32'18"	99.58'	16.25'	32.22'	N35°05'17"E 32.08'



TRAIL LOCATION MAP

SCALE: 1"=2000'



TRAIL PROFILE

H. SCALE: 1"=30'
V. SCALE 1"=3'

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 12/1/2021
SCALE:
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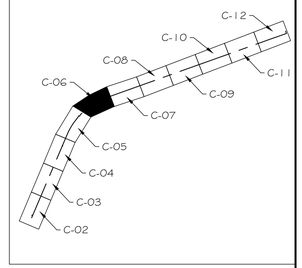
SITE PLAN AND PROFILE
STA. 23+50 - 32+50
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-05
SHEET 5 OF 55
KCI JOB NUMBER 272006468

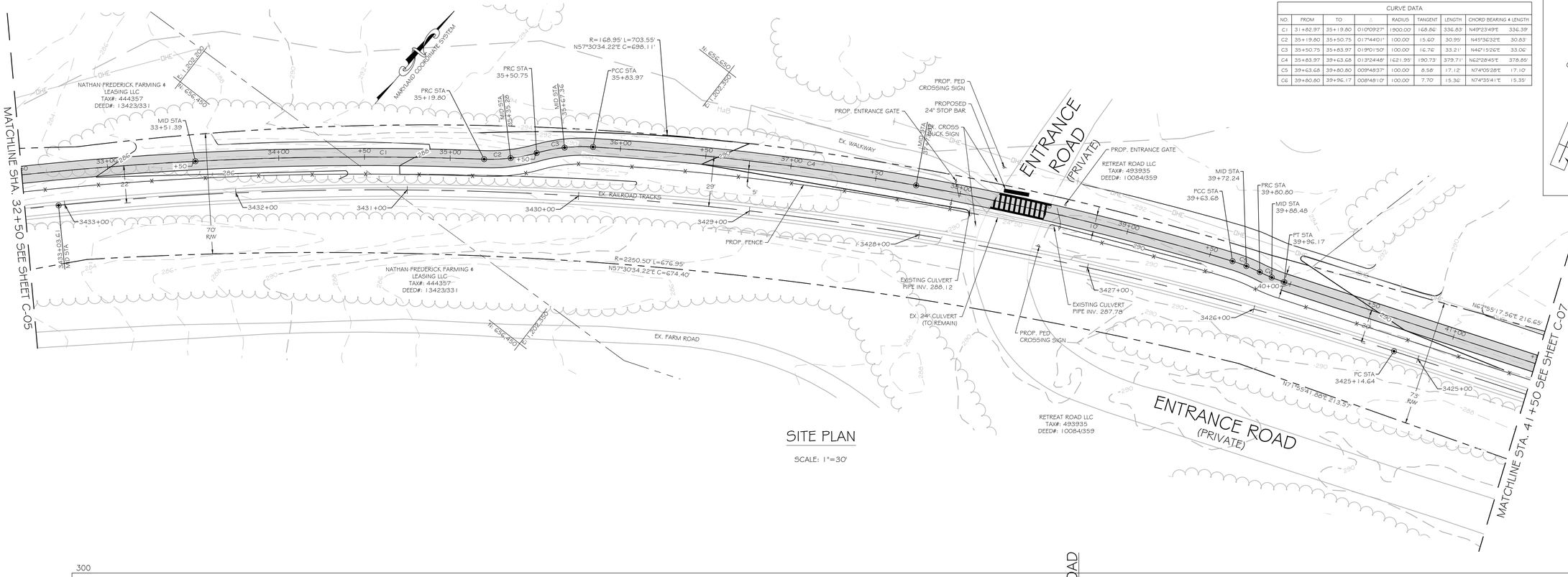
PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

CURVE DATA							
NO.	FROM	TO	Δ	RADIUS	TANGENT	LENGTH	CHORD BEARING & LENGTH
C1	31+82.97	35+19.80	010°09'27"	1900.00'	168.66'	336.83'	N49°23'49"E 336.39'
C2	35+19.80	35+50.75	017°44'01"	100.00'	15.60'	30.95'	N45°36'32"E 30.83'
C3	35+50.75	35+83.97	019°01'50"	100.00'	16.76'	33.21'	N46°15'26"E 33.06'
C4	35+83.97	39+63.68	013°24'48"	1621.95'	190.73'	379.71'	N62°28'45"E 378.85'
C5	39+63.68	39+80.80	009°48'37"	100.00'	8.58'	17.12'	N74°05'28"E 17.10'
C6	39+80.80	39+96.17	008°48'10"	100.00'	7.70'	15.36'	N74°35'41"E 15.35'



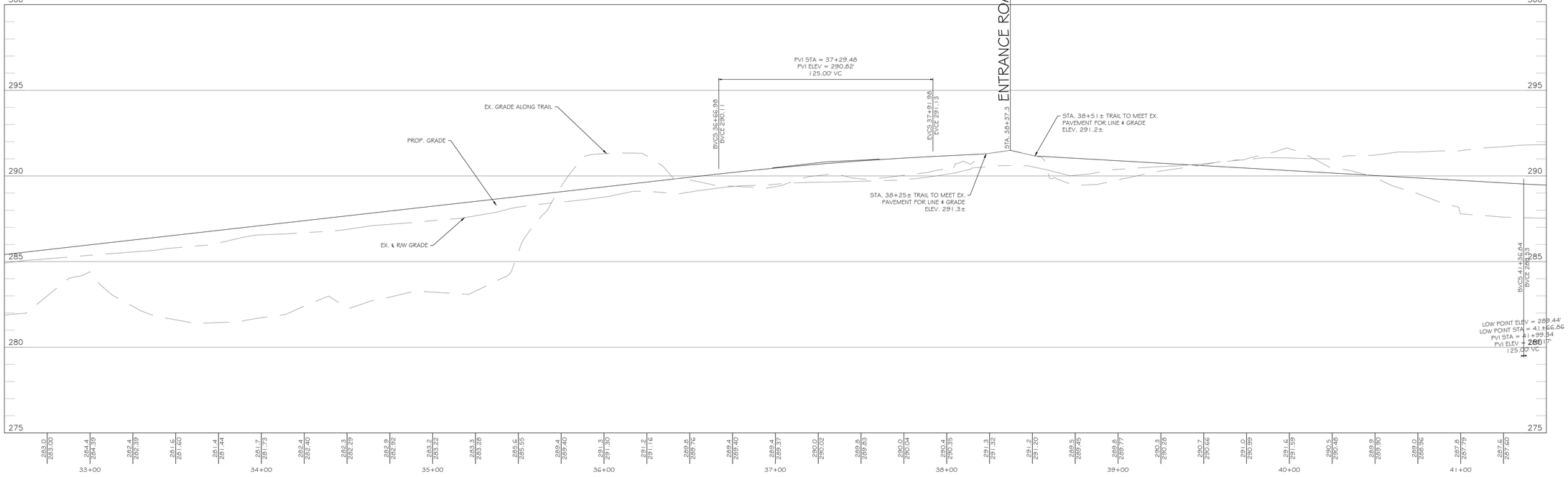
TRAIL LOCATION MAP

SCALE: 1"=2000'



SITE PLAN

SCALE: 1"=30'



TRAIL PROFILE

H. SCALE: 1"=30'
V. SCALE 1"=3'

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE 12/1/2021
SCALE
DESIGNED BY JDL
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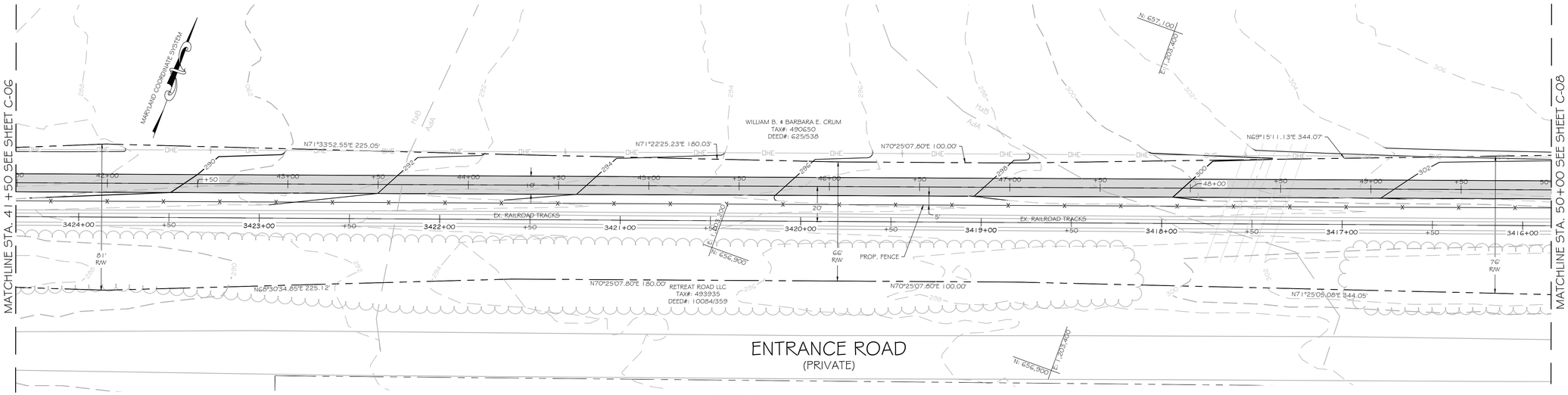
SITE PLAN AND PROFILE
STA. 32+50 - 41+50
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-06
SHEET 6 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



SITE PLAN

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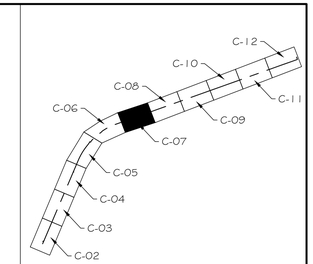
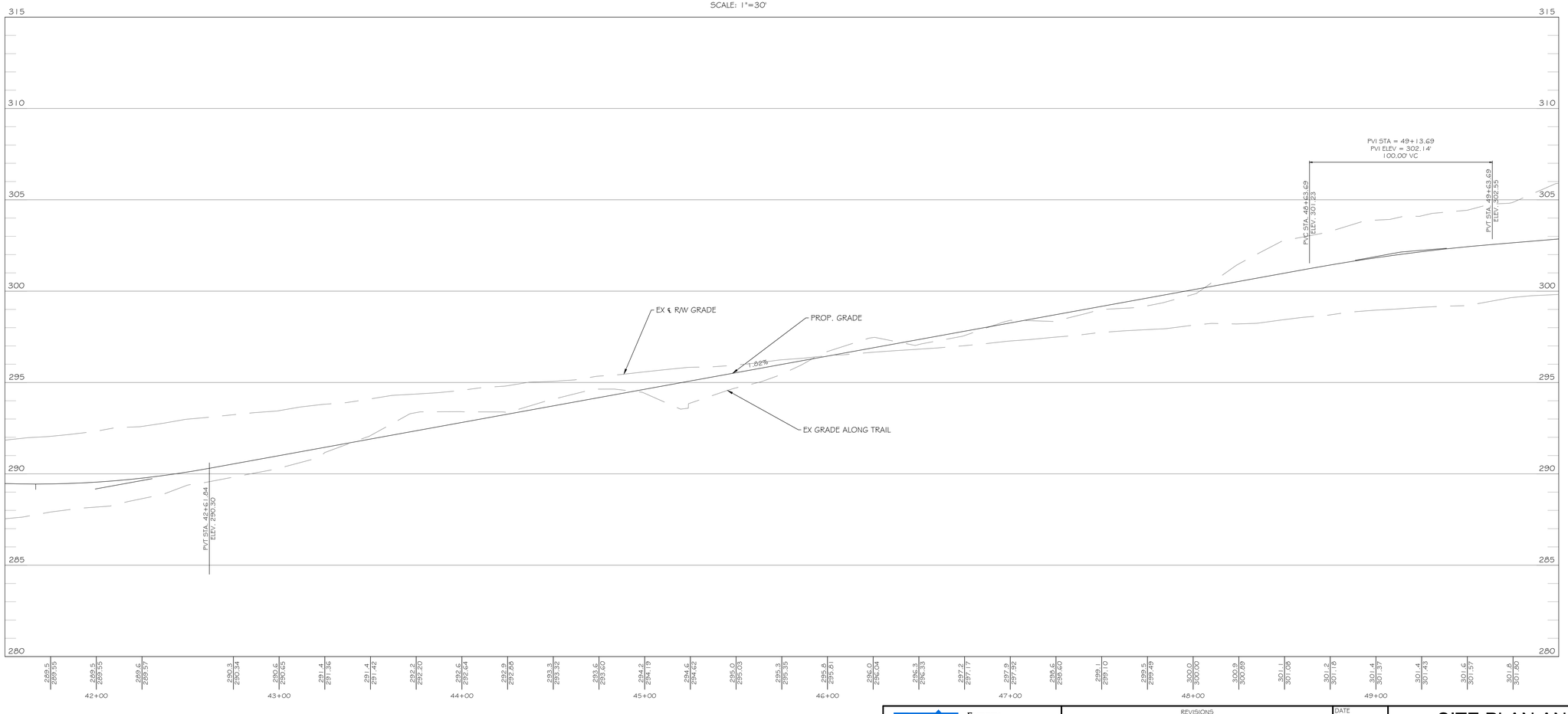


TRAIL LOCATION MAP

SCALE: 1"=2000'



TRAIL PROFILE

H. SCALE: 1"=30'
V. SCALE 1"=3'

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 12/1/2021
SCALE:
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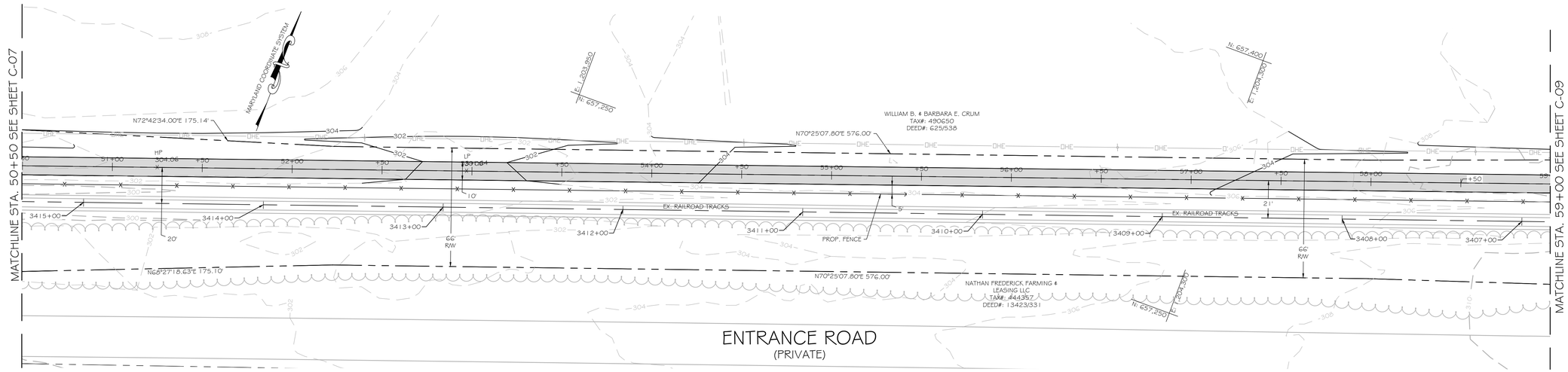
SITE PLAN AND PROFILE
STA. 41+50 - 50+00
FREDERICK AND PENNSYLVANIA
LINE RAILROAD TRAIL

DRAWING NO. C-07
SHEET 7 OF 55
KCI JOB NUMBER 272006468

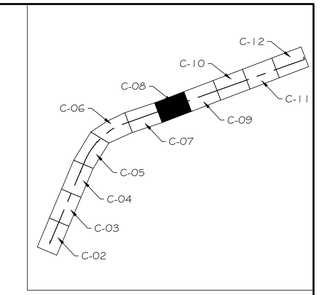
PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



ENTRANCE ROAD
(PRIVATE)

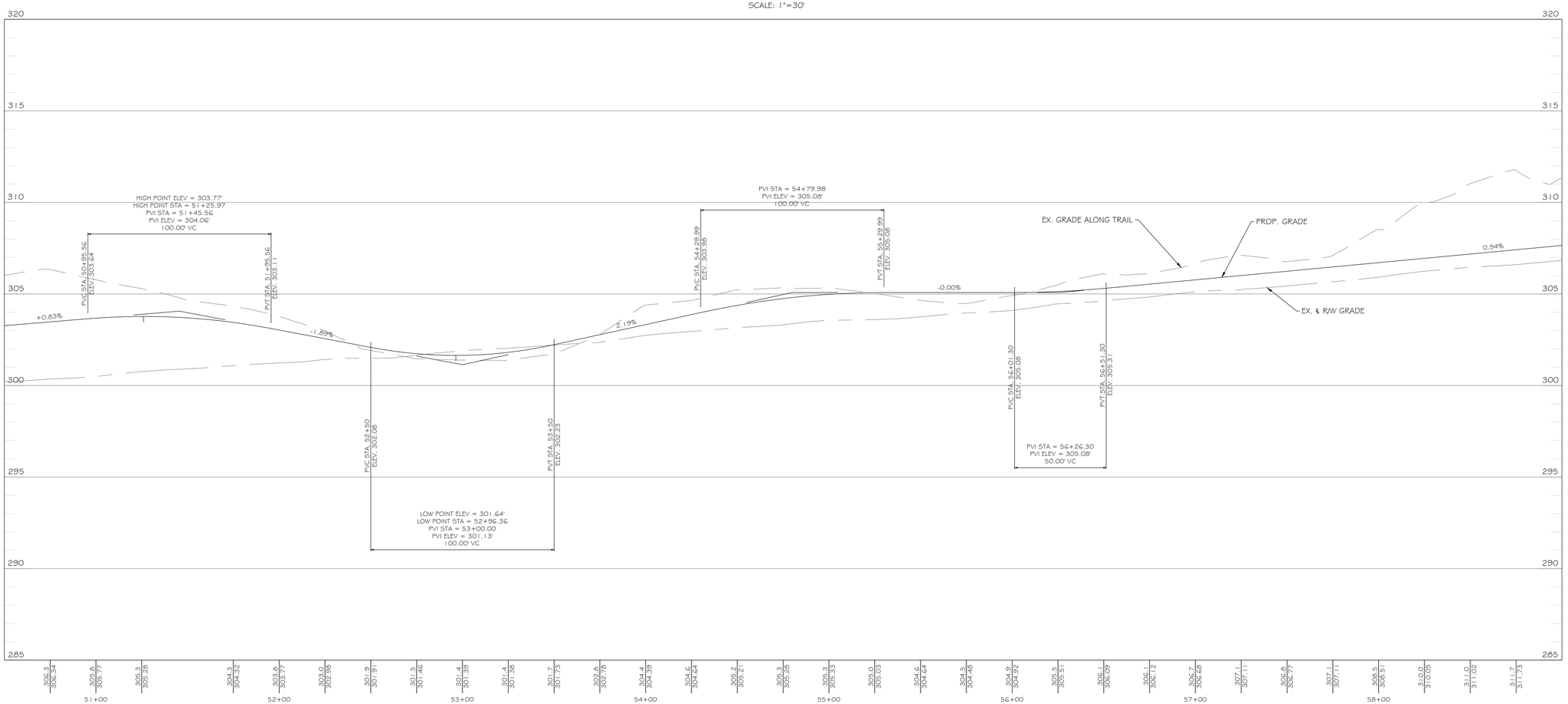
SITE PLAN

SCALE: 1"=30'



TRAIL LOCATION MAP

SCALE: 1"=2000'



TRAIL PROFILE

H. SCALE: 1"=30'
V. SCALE 1"=3'

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 12/1/2021
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DESIGNED BY: JDL
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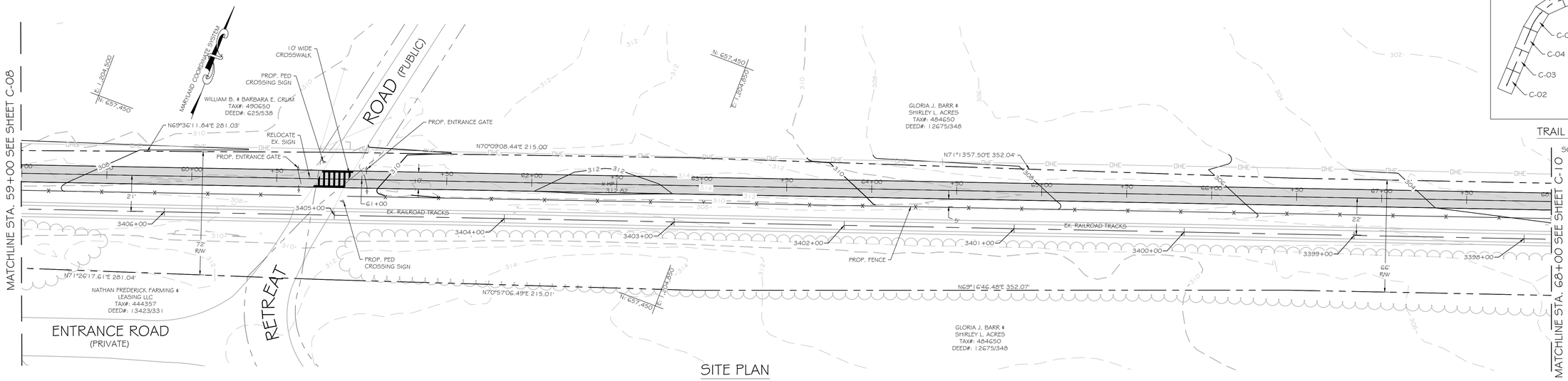
SITE PLAN AND PROFILE
STA. 50+50 - 59+00
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

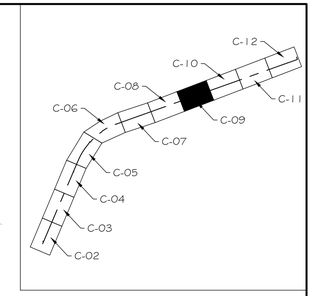
DRAWING NO.
C-08
SHEET 8 OF 55
KCI JOB NUMBER
272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



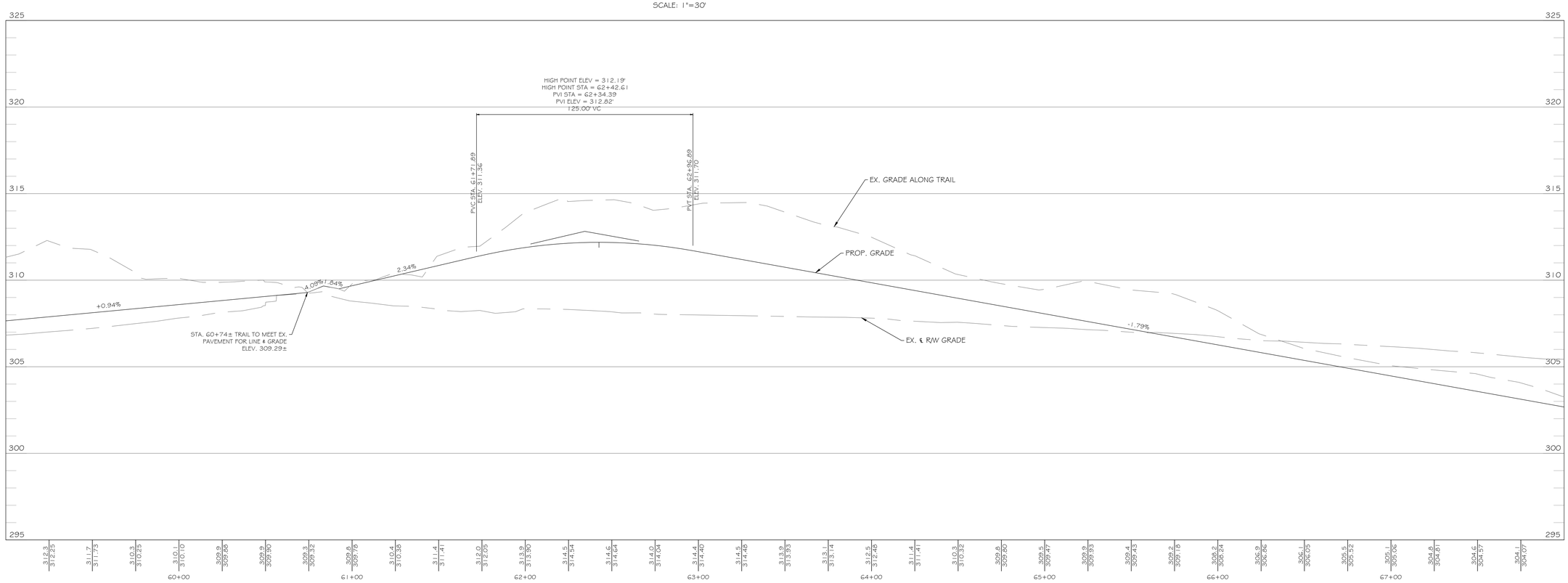
SITE PLAN

SCALE: 1"=30'



TRAIL LOCATION MAP

SCALE: 1"=2000'



TRAIL PROFILE

H. SCALE: 1"=30'
V. SCALE 1"=3'

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

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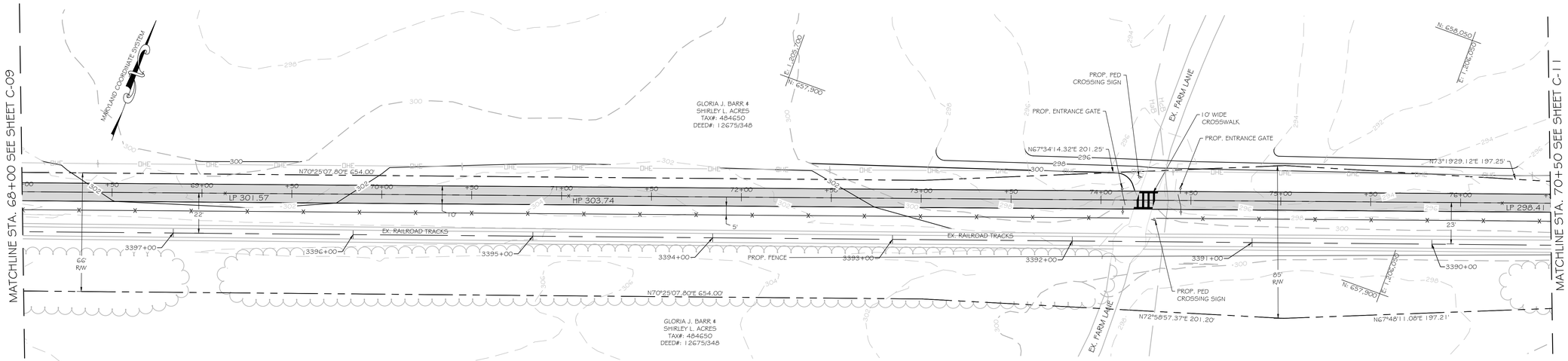
SCALE:
DESIGNED BY: JDL
DRAWN BY: AS

SITE PLAN AND PROFILE
STA. 59+00 - 68+00
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

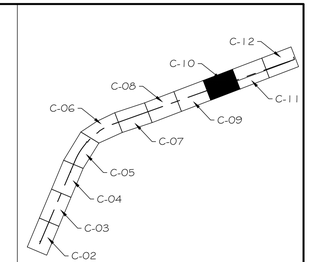
DRAWING NO. C-09
SHEET 9 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



SITE PLAN

SCALE: 1"=30'



TRAIL LOCATION MAP

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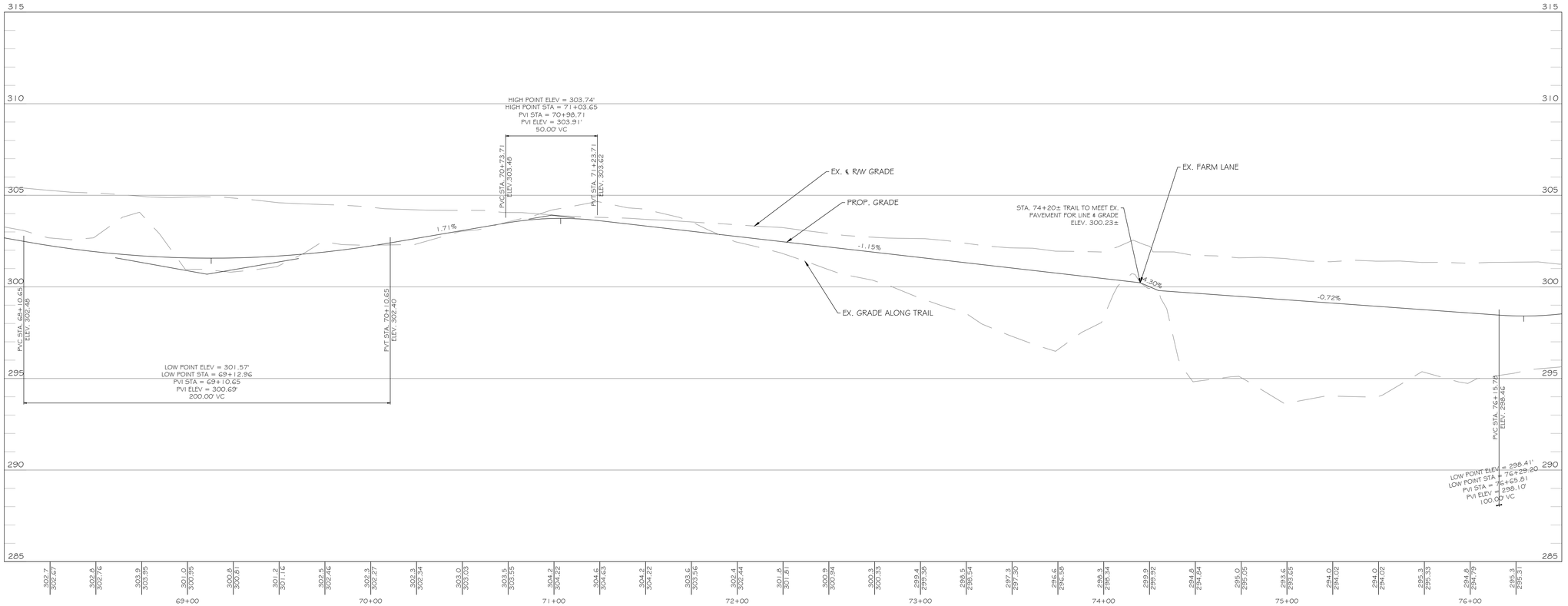

TRAIL PROFILE

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V. SCALE 1"=3'

KCI TECHNOLOGIES

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REVISIONS			
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SCALE:
DESIGNED BY: JDL
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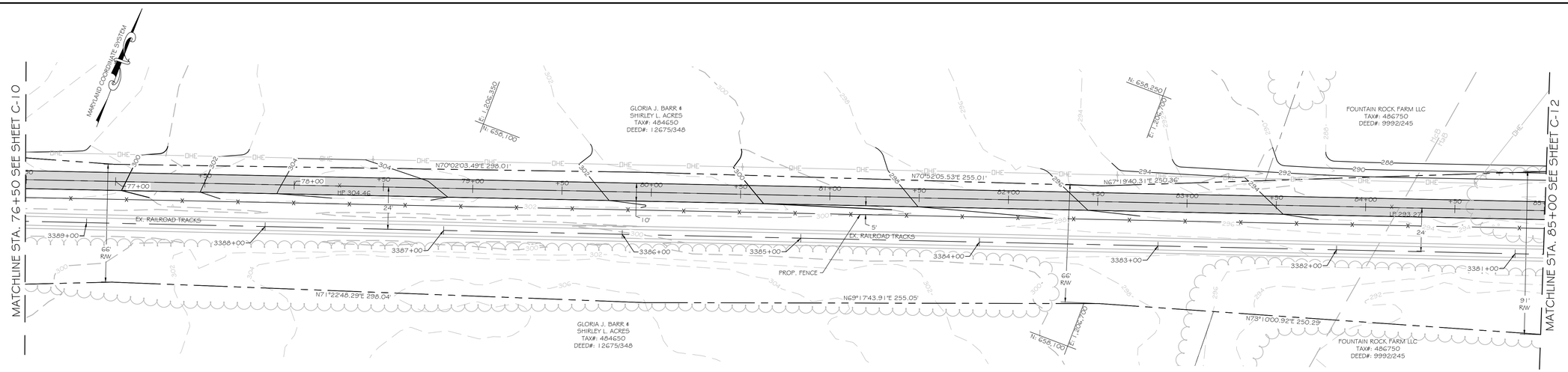
SITE PLAN AND PROFILE
STA. 68+00 - 70+00
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

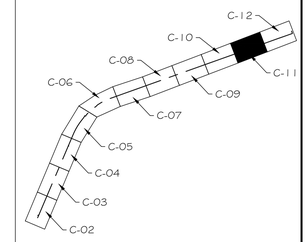
DRAWING NO. C-10
SHEET 10 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



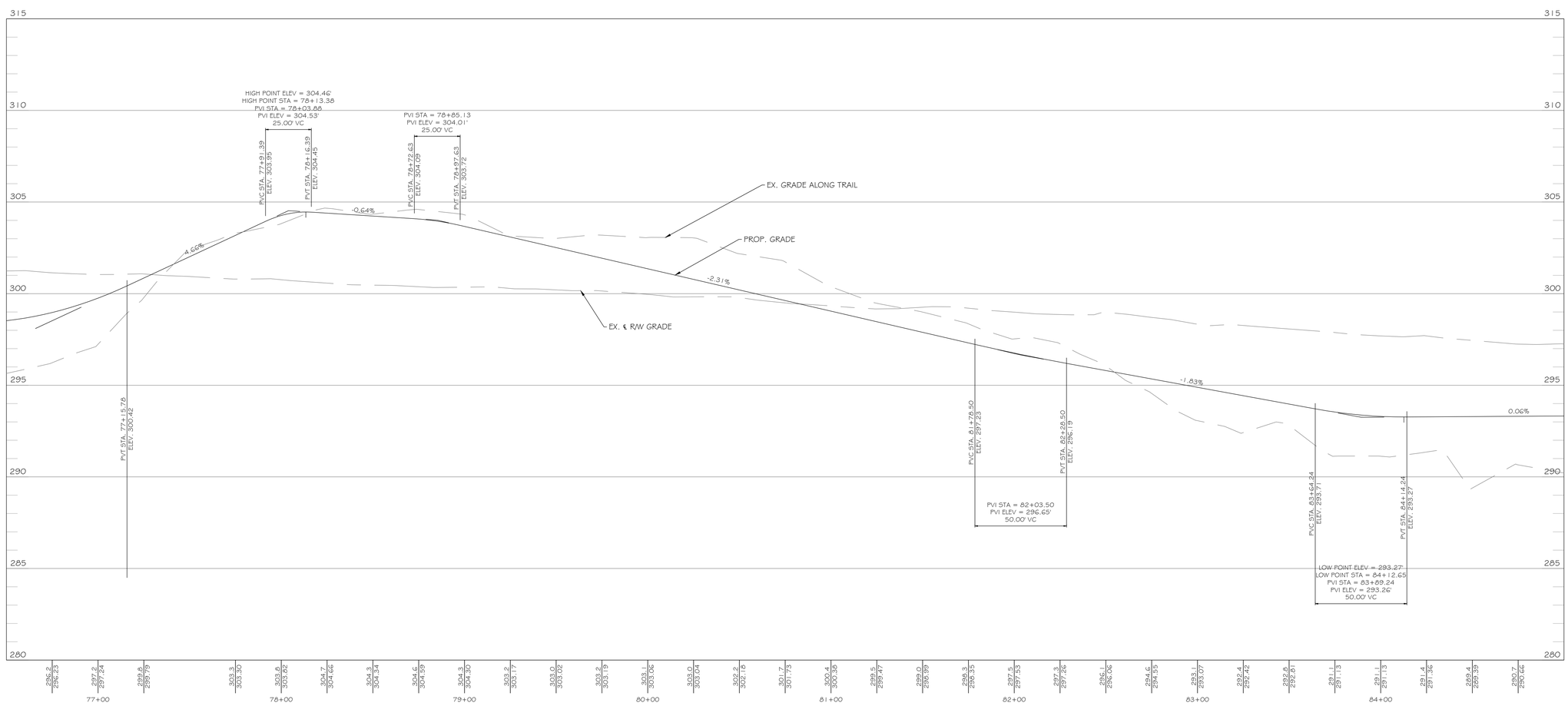
SITE PLAN

SCALE: 1"=30'



TRAIL LOCATION MAP

SCALE: 1"=2000'



TRAIL PROFILE

H. SCALE: 1"=30'
V. SCALE: 1" = 3'

KCI TECHNOLOGIES
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PLANNERS
SCIENTISTS
CONSTRUCTION MANAGERS
936 RIDGEBROOK ROAD
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FAX: (410) 316-7818

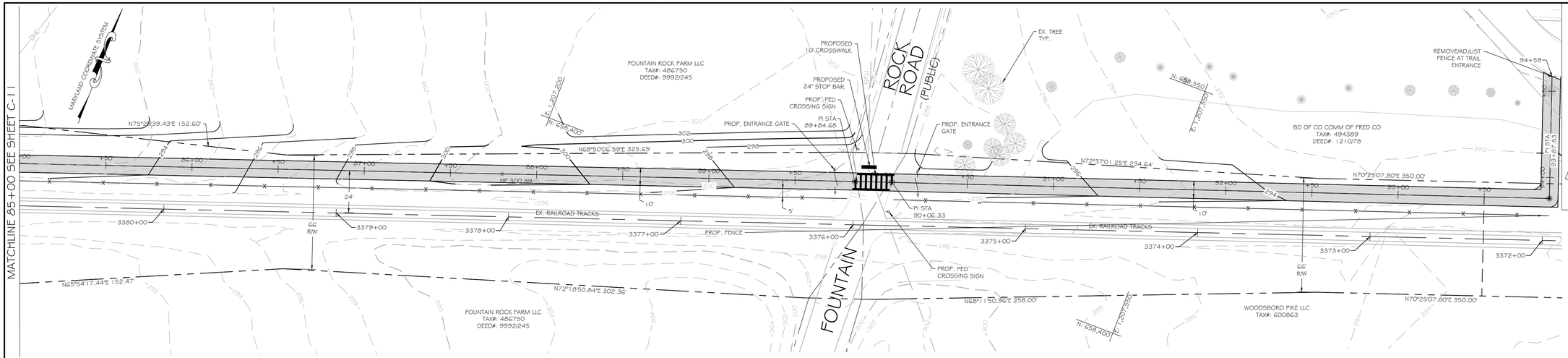
REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 12/1/2021
SCALE:
DESIGNED BY: JDL
DRAWN BY: AS

SITE PLAN AND PROFILE
STA. 76+50 - 85+00
FREDERICK AND PENNSYLVANIA
LINE RAILROAD TRAIL

DRAWING NO. C-11
SHEET 11 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



SITE PLAN

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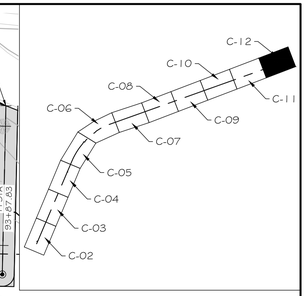

TRAIL LOCATION MAP

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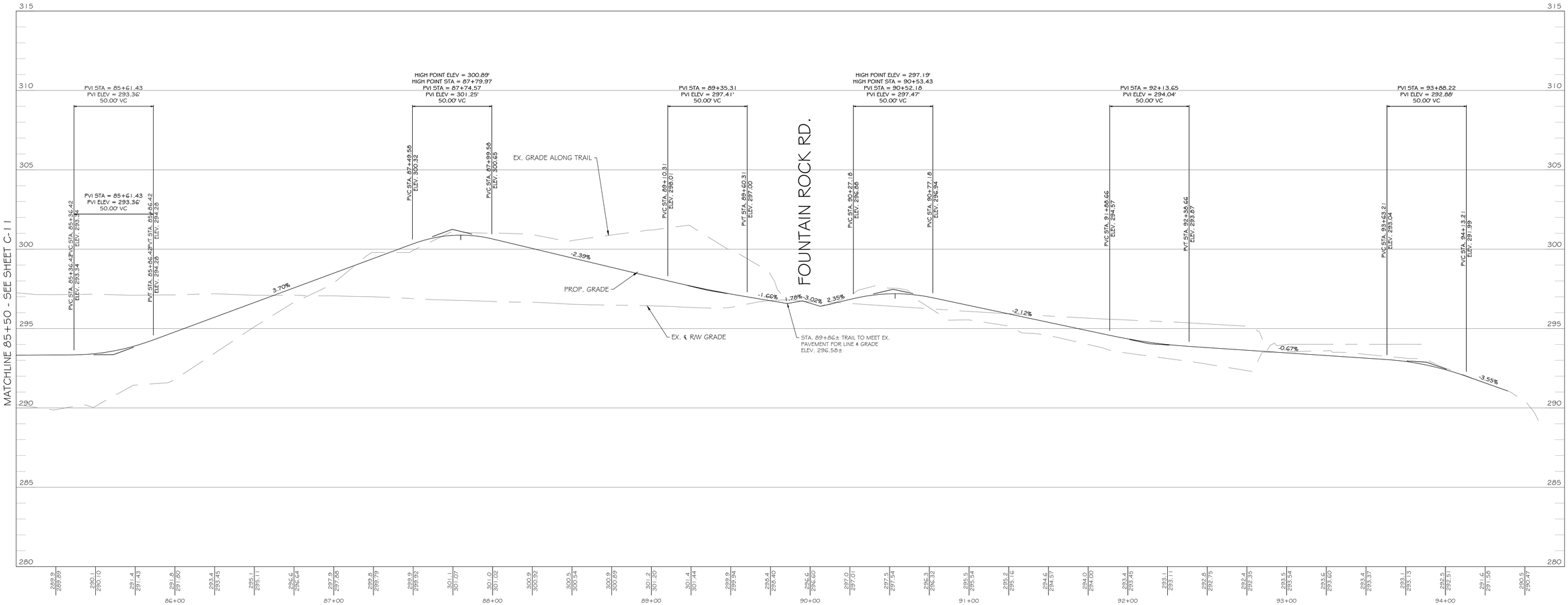

TRAIL PROFILE

H. SCALE: 1"=30'
V. SCALE: 1" = 3'

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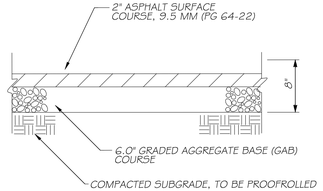
REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 12/1/2021
SCALE:
DESIGNED BY: JDL
DRAWN BY: AS

SITE PLAN AND PROFILE
STA. 85+00 - 94+59
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-12
SHEET 12 OF 55
KCI JOB NUMBER 272006468

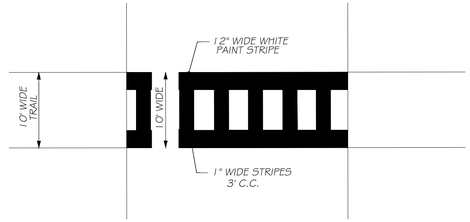
PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



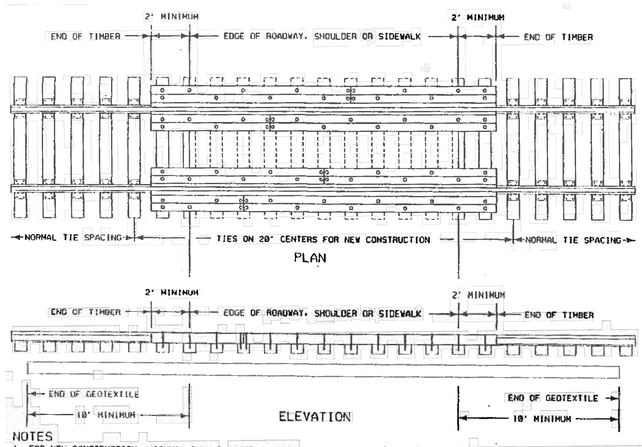
NOTES:

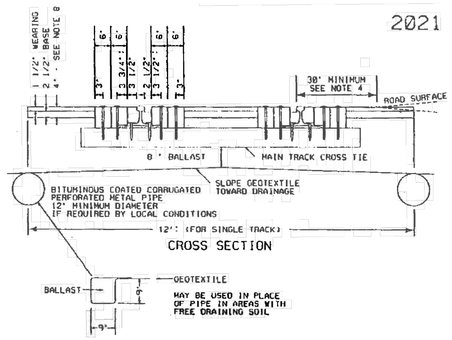
1. PROOFROLLING TO BE PREFORMED AFTER THE BUILDING (INCLUDING FOOTINGS, SLABS, AND OTHER STRUCTURES) AND EXISTING PAVEMENT ARE REMOVED
2. ANY SIGNIFICANT "PUMPING" AREAS AND POCKETS OF SOFT SOIL SHOULD BE UNDERCUT AND REPLACED WITH SUITABLE CONTROLLED FILL OR GAB
3. TOP 12" OF SUBGRADE SHOULD BE COMPACTED TO 95% AND BELOW 12" COMPACTED TO 90% ACCORDING TO ASTM D-1557
4. IF CLAY IS PRESENT AT FINAL SUBGRADE SHOULD BE UNDERCUT AT LEAST 12" AND REPLACED WITH CONTROLLED FILL OR GAB

(1) 10' WIDE PEDESTRIAN TRAIL PAVING DETAIL SCALE: N.T.S.



(2) CROSS WALK PAINT STRIPING SCALE: N.T.S.





NOTES

1. FOR NEW CONSTRUCTION, HIGHWAY SHOULD INTERSECT RAILROAD AT OR NEARLY RIGHT ANGLES.
2. FOR NEW CONSTRUCTION, HIGHWAY SURFACE SHOULD NOT BE MORE THAN 3" HIGHER NOR 6" LOWER THAN TOP OF NEAR RAIL 30' FROM AND AT RIGHT ANGLES TO THE RAIL UNLESS TRACK SUPERELEVATION DICTATES OTHERWISE.
3. IF PRACTICABLE IN MULTIPLE TRACK CROSSINGS, ALL TOPS OF RAIL SHOULD BE BROUGHT TO THE SAME ELEVATION.
4. ROAD SURFACE TO BE PARALLEL WITH TOP OF TIE FOR 30' FROM GAGE ON FIELD SIDE OF RAIL.
5. WHEN USED, GEOTEXTILE WILL EXTEND A MINIMUM OF 10' BEYOND EDGE OF CROSSING OR 5' BEYOND INSULATED JOINTS IF PRESENT FOR CROSSING WARNING CIRCUITS.
6. MAIN TRACK TIES WILL BE USED ON ALL TRACKS THROUGH THE CROSSING.
7. WELDED RAIL WILL BE USED TO ELIMINATE JOINTS IN THE CROSSING.
8. BITUMINOUS CONCRETE TO BE IN ACCORDANCE WITH THE STATE SPECIFICATION IN WHICH CROSSING LOCATES. PAVEMENT THICKNESS PER STATE REQUIREMENTS. IF NONE, USE 2 1/2" BASE AND 1 1/2" WEARING SURFACE. TOTAL OF 4" AFTER TAMPING.
9. CRUSHED STONE MAY BE USED IN PLACE OF BITUMINOUS CONCRETE FOR FARM CROSSINGS.
10. CROSSINGS SHOULD BE CONTINOUS BETWEEN ROADWAY OR SIDEWALK EDGES. IF NOT PRACTICABLE, ADEQUATE DRAINAGE MUST BE PROVIDED BETWEEN CROSSING AREAS TO ELIMINATE WATER POCKETS.
11. IF STATE REGULATIONS REQUIRE RECESSED HARDWARE, USE CANCAR 5/8-5 TORX SQUARE WASHER HEAD TIMBER SCREW INSTALLED IN 1 3/4" DIAMETER HOLE 5/8" DEEP.

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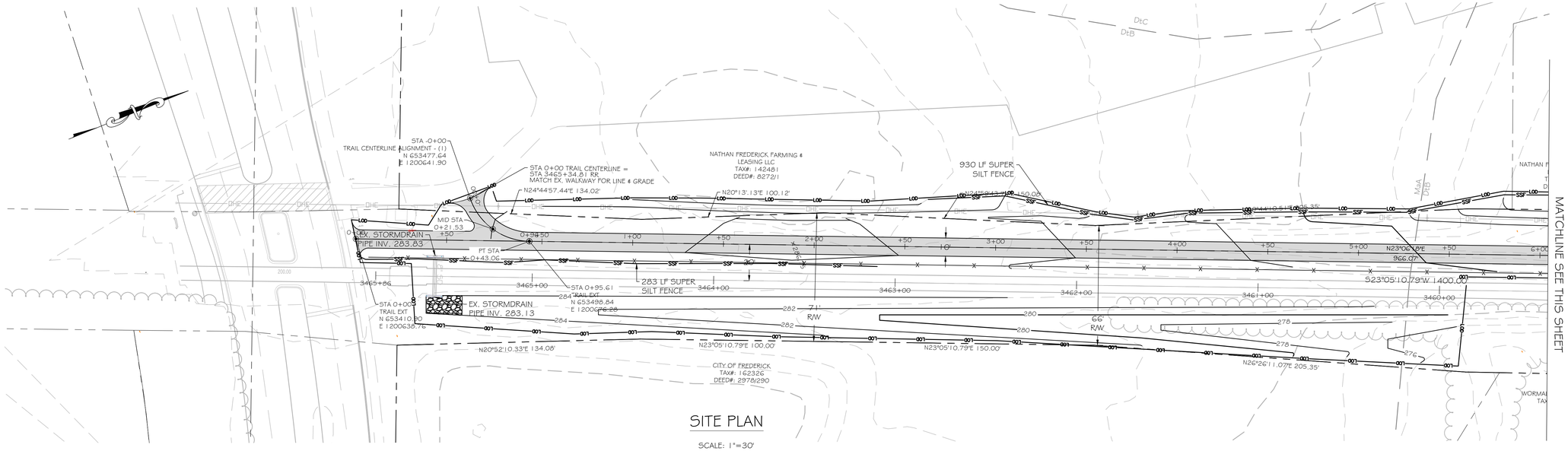
REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE 12/1/2021
SCALE
DESIGNED BY JDL
DRAWN BY AS

SITE DETAILS

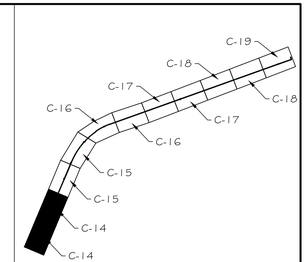
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-13
SHEET 13 OF 55
KCI JOB NUMBER 272006468



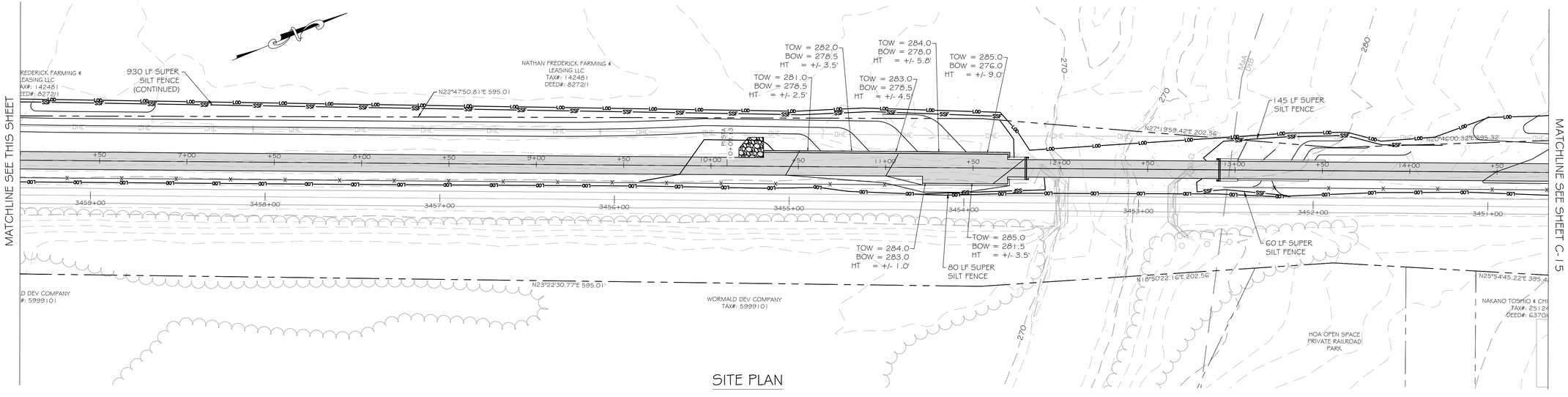
SITE PLAN

SCALE: 1"=30'



TRAIL LOCATION MAP

SCALE: 1"=2000'



SITE PLAN

SCALE: 1"=30'

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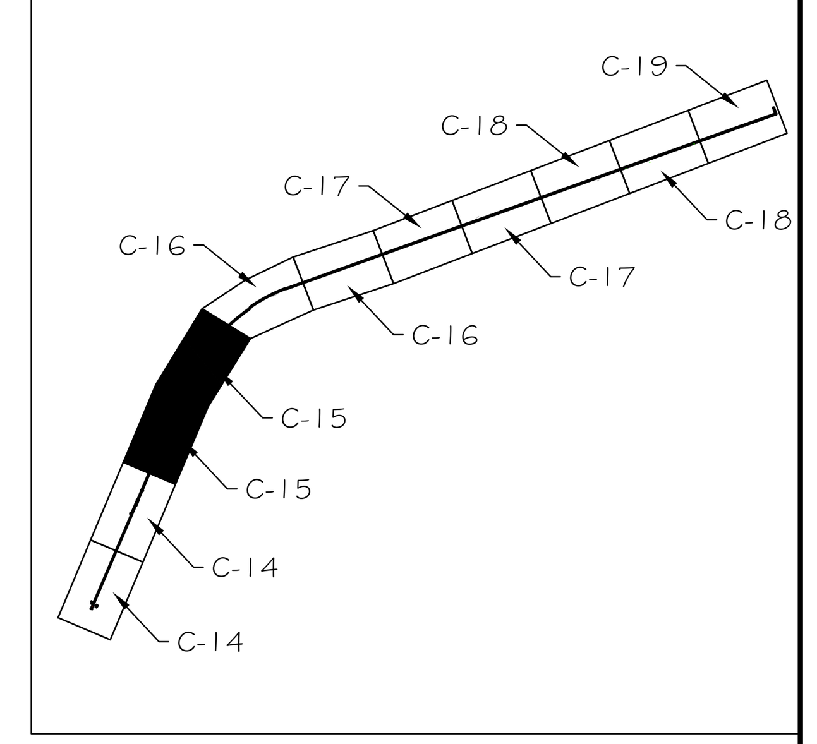
REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 12/1/2021
SCALE:
DESIGNED BY: JDL
DRAWN BY: AS

ESC SITE PLAN
STA. 0+00 - 14+80
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

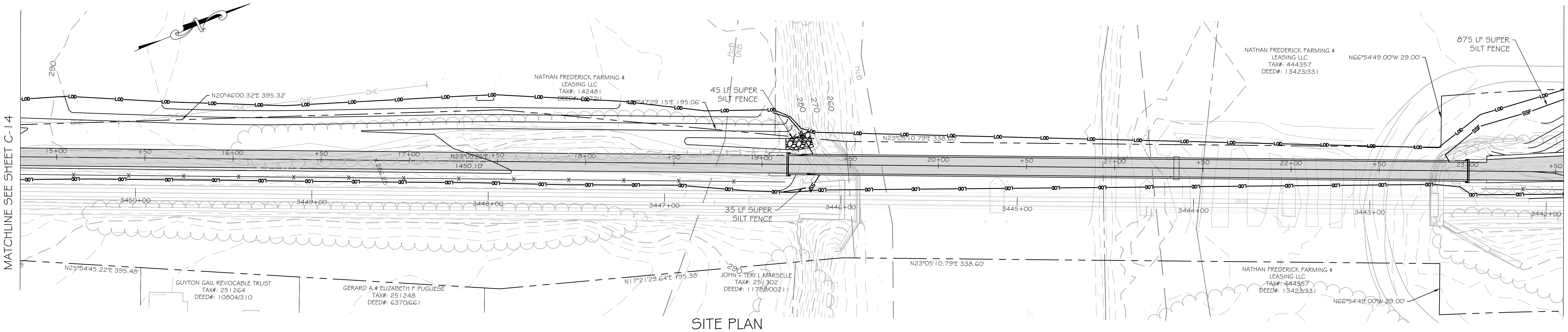
DRAWING NO. C-14
SHEET 14 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



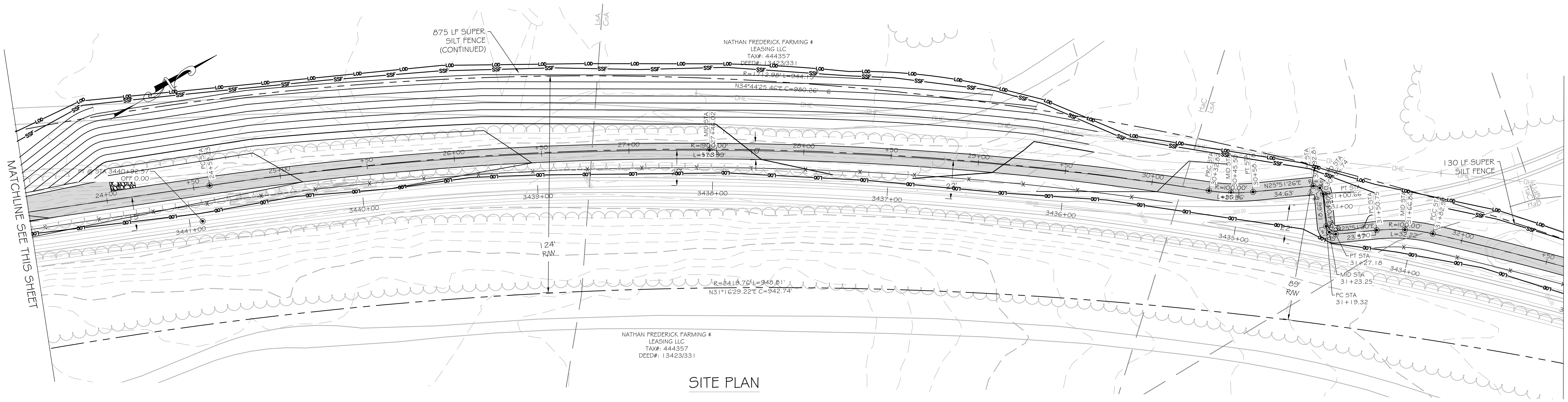
TRAIL LOCATION MAP

SCALE: 1"=2000'



SITE PLAN

SCALE: 1"=30'



SITE PLAN

SCALE: 1"=30'

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REVISIONS			
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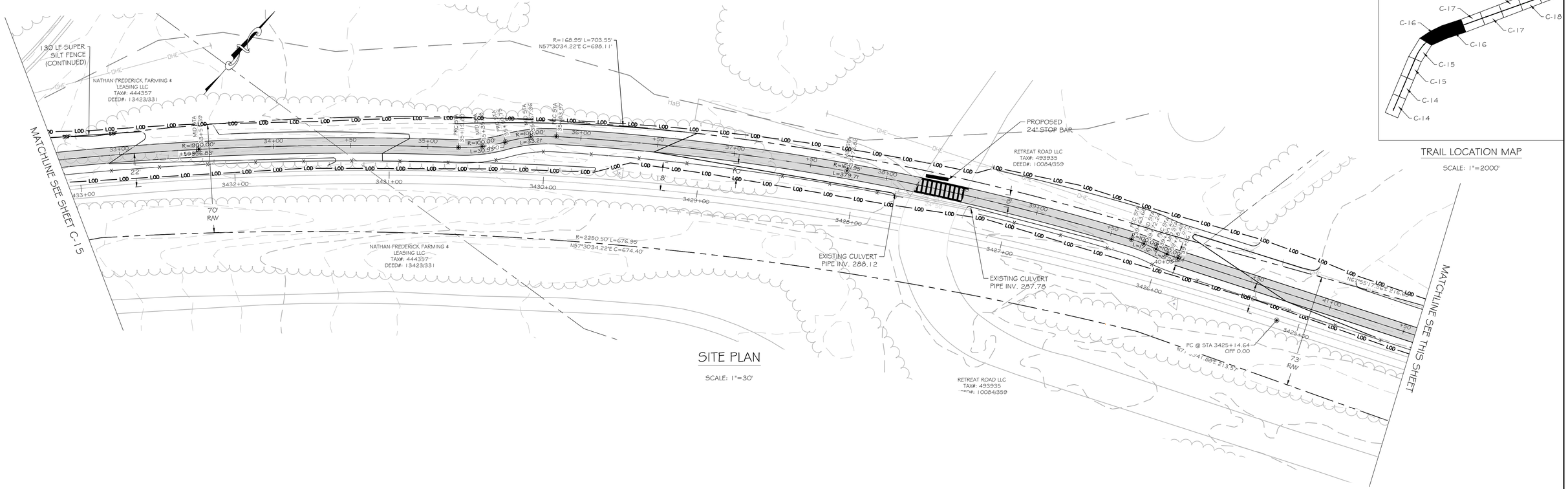
ESC SITE PLAN
STA. 14+80 - 32+45
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-15

KCI JOB NUMBER 272006468



PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

KCI TECHNOLOGIES

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DATE 12/1/2021
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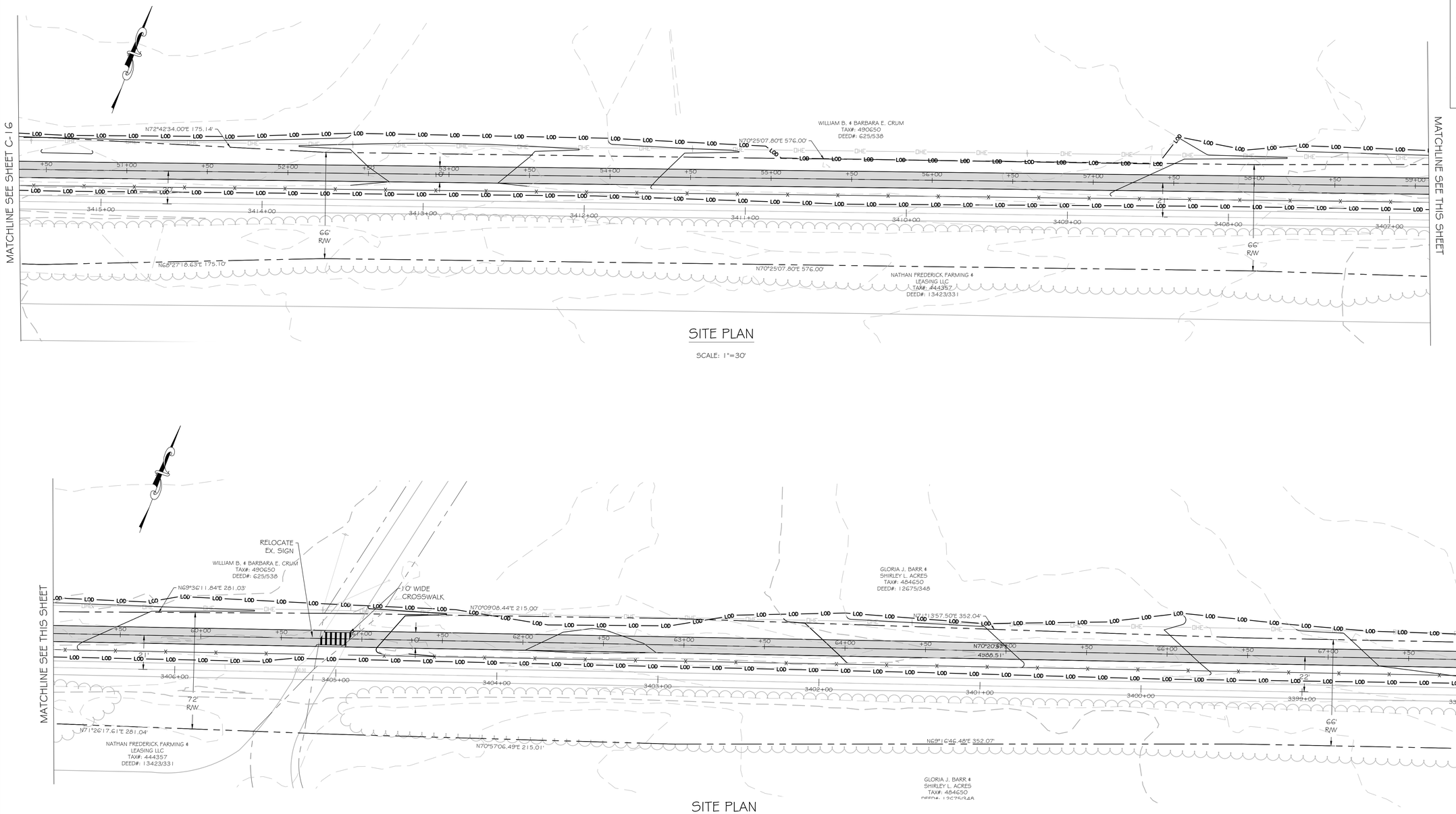
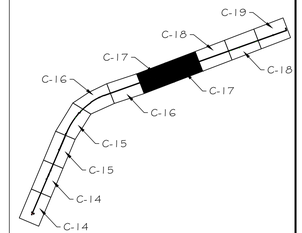
ESC SITE PLAN
STA. 32+45 - 50+10
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-16
SHEET 16 OF 55
KCI JOB NUMBER 272006468



SITE PLAN

SCALE: 1"=30'



TRAIL LOCATION MAP

SCALE: 1"=2000'

SITE PLAN

SCALE: 1"=30'

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE 12/1/2021
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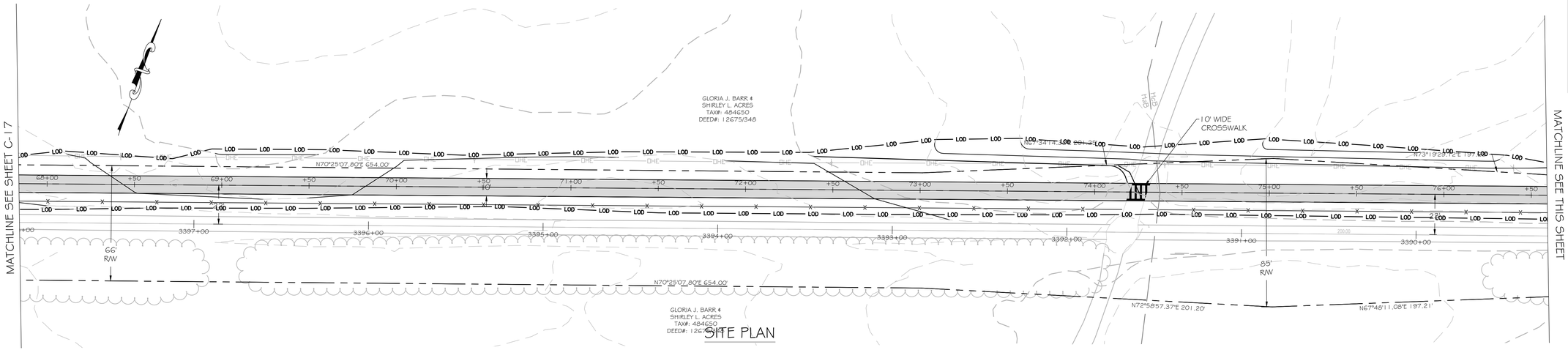
DRAWN BY AS

ESC SITE PLAN
STA. 50+10 - 67+60
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

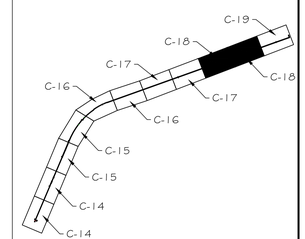
DRAWING NO. C-17
SHEET 17 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



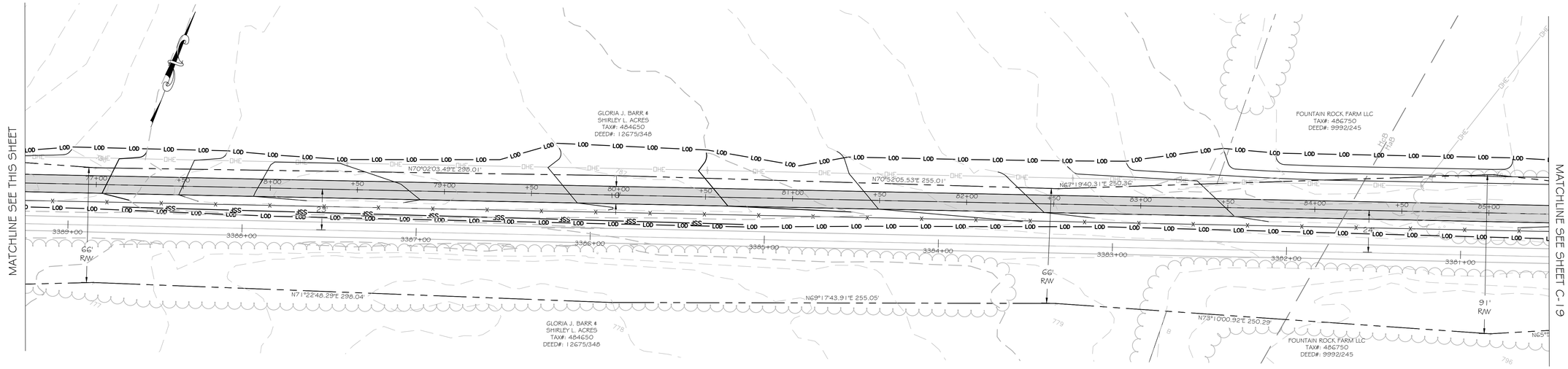
SITE PLAN

SCALE: 1"=30'



TRAIL LOCATION MAP

SCALE: 1"=2000'



SITE PLAN

SCALE: 1"=30'

KCI TECHNOLOGIES

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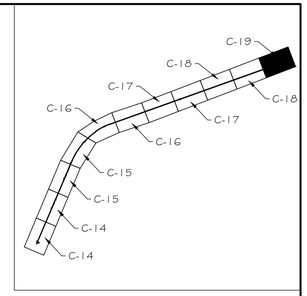
DRAWN BY: AS

ESC SITE PLAN
STA. 67+60 - 85+10
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

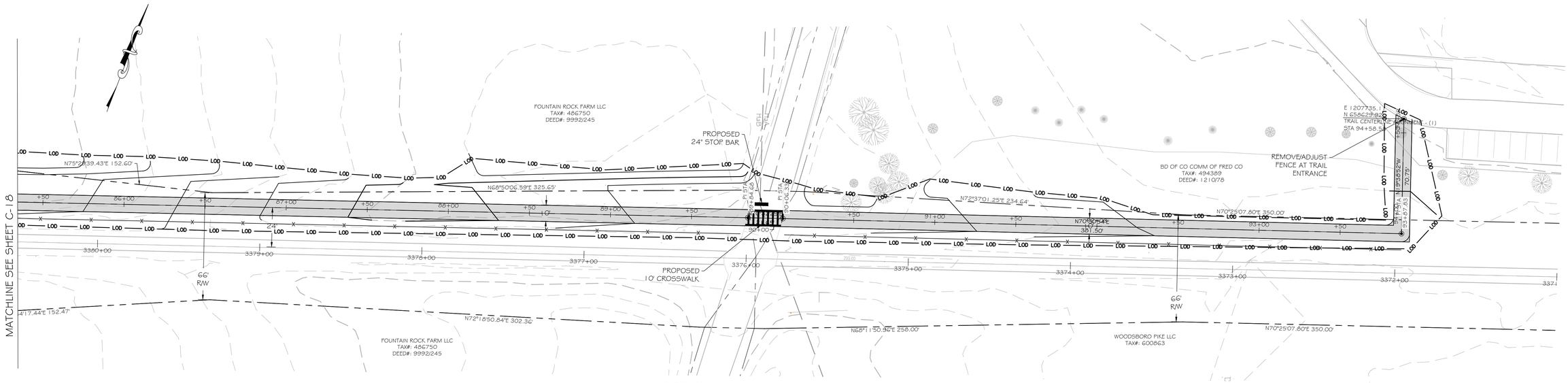
DRAWING NO. C-18
SHEET 18 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



TRAIL LOCATION MAP

SCALE: 1"=2000'



SITE PLAN

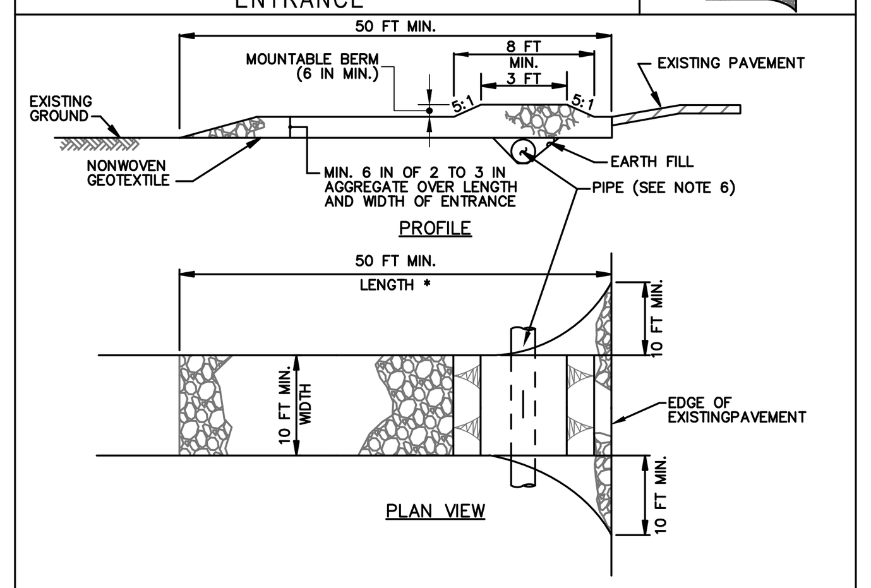
SCALE: 1"=30'

KCI TECHNOLOGIES	REVISIONS				DATE	ESC SITE PLAN	DRAWING NO.
Engineers *Planners* *Scientists* *Construction Managers*	NO.	DATE	DESCRIPTION	BY	12/1/2021	STA. 85+10 - 94+39	C-19
936 Ridgebrook Road Sparks, Maryland 21152 Telephone: (410) 316-7800 Fax: (410) 316-7818					SCALE	FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL	SHEET 19 OF 55
					DESIGNED BY JDL		KCI JOB NUMBER 272006468
					DRAWN BY AS		

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

DETAIL B-1 STABILIZED CONSTRUCTION ENTRANCE

STANDARD SYMBOL: SCE



CONSTRUCTION SPECIFICATIONS

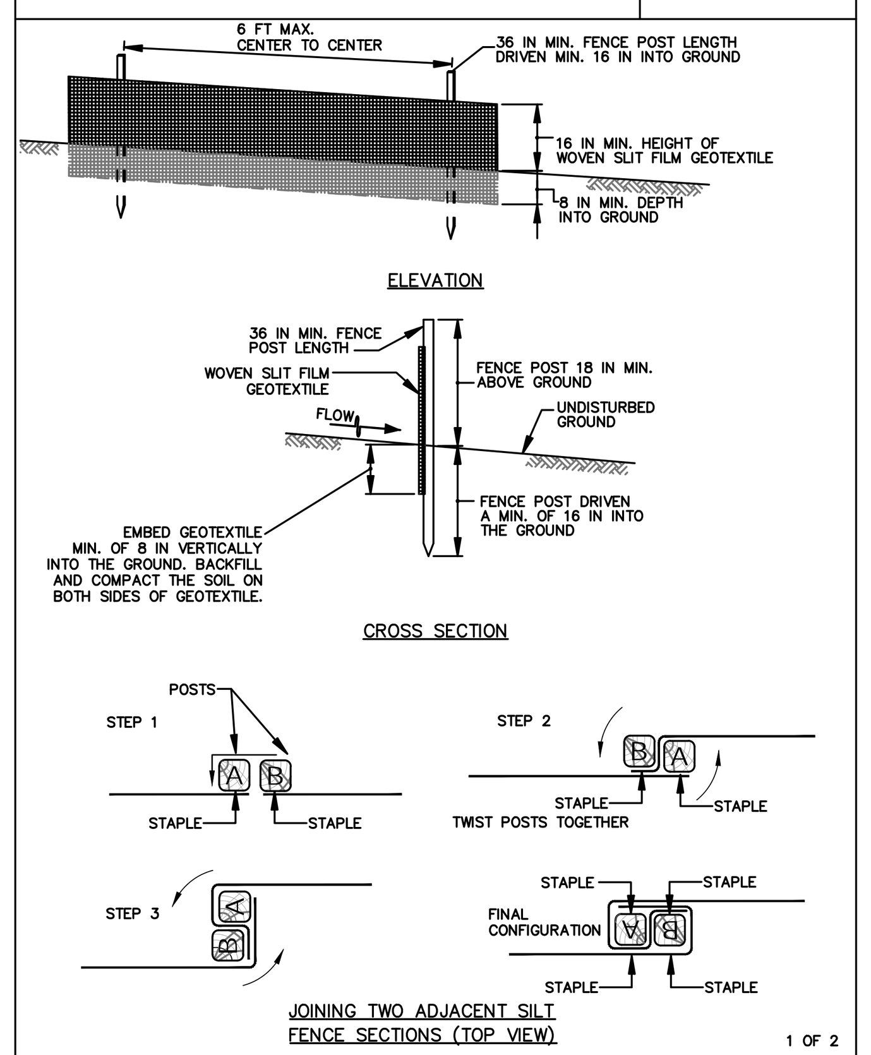
1. PLACE STABILIZED CONSTRUCTION ENTRANCE IN ACCORDANCE WITH THE APPROVED PLAN. VEHICLES MUST TRAVEL OVER THE ENTIRE LENGTH OF THE SCE. USE MINIMUM LENGTH OF 50 FEET (*30 FEET FOR SINGLE RESIDENCE LOT). USE MINIMUM WIDTH OF 10 FEET. FLARE SCE 10 FEET MINIMUM AT THE EXISTING ROAD TO PROVIDE A TURNING RADIUS.
2. PIPE ALL SURFACE WATER FLOWING TO OR DIVERTED TOWARD THE SCE UNDER THE ENTRANCE, MAINTAINING POSITIVE DRAINAGE. PROTECT PIPE INSTALLED THROUGH THE SCE WITH A MOUNTABLE BERM WITH 5:1 SLOPES AND A MINIMUM OF 12 INCHES OF STONE OVER THE PIPE. PROVIDE PIPE AS SPECIFIED ON APPROVED PLAN. WHEN THE SCE IS LOCATED AT A HIGH SPOT AND HAS NO DRAINAGE TO CONVEY, A PIPE IS NOT NECESSARY. A MOUNTABLE BERM IS REQUIRED WHEN SCE IS NOT LOCATED AT A HIGH SPOT.
3. PREPARE SUBGRADE AND PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS.
4. PLACE CRUSHED AGGREGATE (2 TO 3 INCHES IN SIZE) OR EQUIVALENT RECYCLED CONCRETE (WITHOUT REBAR) AT LEAST 6 INCHES DEEP OVER THE LENGTH AND WIDTH OF THE SCE.
5. MAINTAIN ENTRANCE IN A CONDITION THAT MINIMIZES TRACKING OF SEDIMENT. ADD STONE OR MAKE OTHER REPAIRS AS CONDITIONS DEMAND TO MAINTAIN CLEAN SURFACE, MOUNTABLE BERM, AND SPECIFIED DIMENSIONS. IMMEDIATELY REMOVE STONE AND/OR SEDIMENT SPILLED, DROPPED, OR TRACKED ONTO ADJACENT ROADWAY BY VACUUMING, SCRAPING, AND/OR SWEEPING. WASHING ROADWAY TO REMOVE MUD TRACKED ONTO PAVEMENT IS NOT ACCEPTABLE UNLESS WASH WATER IS DIRECTED TO AN APPROVED SEDIMENT CONTROL PRACTICE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-1 SILT FENCE

STANDARD SYMBOL: SF



1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-1 SILT FENCE

STANDARD SYMBOL: SF

CONSTRUCTION SPECIFICATIONS

1. USE WOOD POSTS 1¾ X 1¾ ± 1⁄16 INCH (MINIMUM) SQUARE CUT OF SOUND QUALITY HARDWOOD. AS AN ALTERNATIVE TO WOODEN POST USE STANDARD "T" OR "U" SECTION STEEL POSTS WEIGHING NOT LESS THAN 1 POUND PER LINEAR FOOT.
2. USE 36 INCH MINIMUM POSTS DRIVEN 16 INCH MINIMUM INTO GROUND NO MORE THAN 6 FEET APART.
3. USE WOVEN SLIT FILM GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS AND FASTEN GEOTEXTILE SECURELY TO UPSLOPE SIDE OF FENCE POSTS WITH WIRE TIES OR STAPLES AT TOP AND MID-SECTION.
4. PROVIDE MANUFACTURER CERTIFICATION TO THE AUTHORIZED REPRESENTATIVE OF THE INSPECTION/ENFORCEMENT AUTHORITY SHOWING THAT THE GEOTEXTILE USED MEETS THE REQUIREMENTS IN SECTION H-1 MATERIALS.
5. EMBED GEOTEXTILE A MINIMUM OF 8 INCHES VERTICALLY INTO THE GROUND. BACKFILL AND COMPACT THE SOIL ON BOTH SIDES OF FABRIC.
6. WHERE TWO SECTIONS OF GEOTEXTILE ADJOIN: OVERLAP, TWIST, AND STAPLE TO POST IN ACCORDANCE WITH THIS DETAIL.
7. EXTEND BOTH ENDS OF THE SILT FENCE A MINIMUM OF FIVE HORIZONTAL FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS OF THE SILT FENCE.
8. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN SILT FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL FENCE.

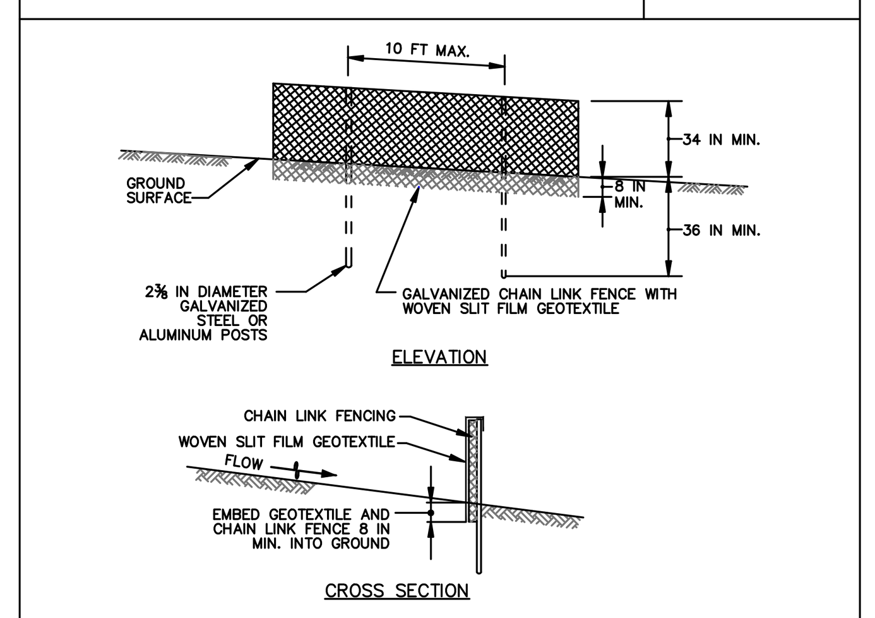
2 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-3 SUPER SILT FENCE

STANDARD SYMBOL: SSF



CONSTRUCTION SPECIFICATIONS

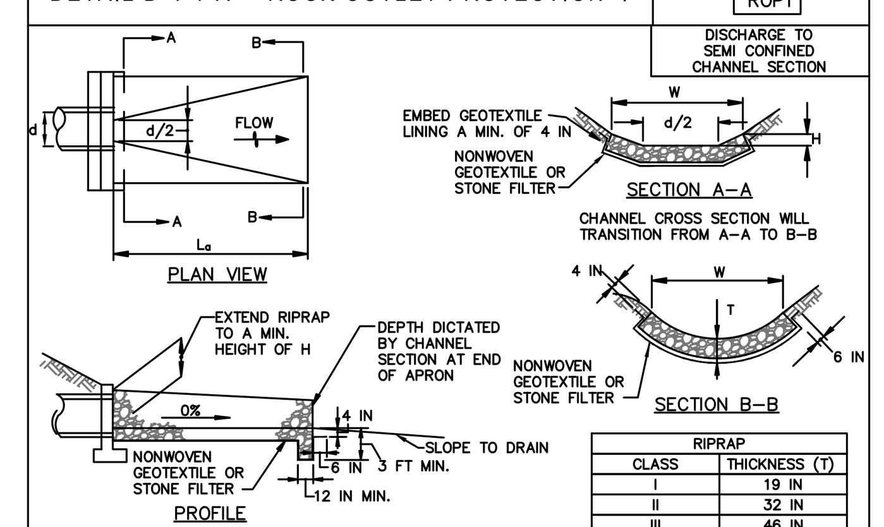
1. INSTALL 2⅜ INCH DIAMETER GALVANIZED STEEL POSTS OF 0.095 INCH WALL THICKNESS AND SIX FOOT LENGTH SPACED NO FURTHER THAN 10 FEET APART. DRIVE THE POSTS A MINIMUM OF 36 INCHES INTO THE GROUND.
2. FASTEN 9 GAUGE OR HEAVIER GALVANIZED CHAIN LINK FENCE (2⅜ INCH MAXIMUM OPENING) 42 INCHES IN HEIGHT SECURELY TO THE FENCE POSTS WITH WIRE TIES OR HUG RINGS.
3. FASTEN WOVEN SLIT FILM GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS, SECURELY TO THE UPSLOPE SIDE OF CHAIN LINK FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP AND MID SECTION. EMBED GEOTEXTILE AND CHAIN LINK FENCE A MINIMUM OF 8 INCHES INTO THE GROUND.
4. WHERE ENDS OF THE GEOTEXTILE COME TOGETHER, THE ENDS SHALL BE OVERLAPPED BY 6 INCHES, FOLDED, AND STAPLED TO PREVENT SEDIMENT BY PASS.
5. EXTEND BOTH ENDS OF THE SUPER SILT FENCE A MINIMUM OF FIVE HORIZONTAL FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS OF THE SUPER SILT FENCE.
6. PROVIDE MANUFACTURER CERTIFICATION TO THE INSPECTION/ENFORCEMENT AUTHORITY SHOWING THAT GEOTEXTILE USED MEETS THE REQUIREMENTS IN SECTION H-1 MATERIALS.
7. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL CHAIN LINK FENCING AND GEOTEXTILE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL D-4-1-A ROCK OUTLET PROTECTION I

STANDARD SYMBOL: ROP1



RIPRAP	
CLASS	THICKNESS (T)
I	19 IN
II	32 IN
III	46 IN

CONSTRUCTION SPECIFICATIONS

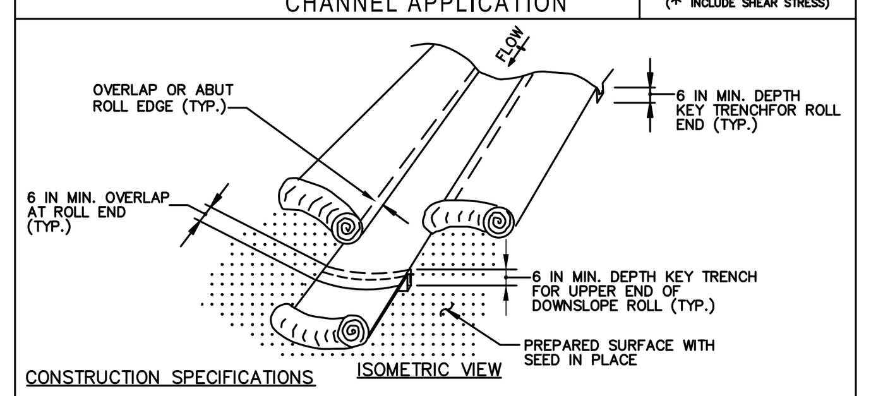
1. RIPRAP AND STONE MUST CONFORM TO THE SPECIFIED CLASS.
2. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS, AND PROTECT FROM PUNCTURING, CUTTING, OR TEARING. REPAIR ANY DAMAGE OTHER THAN AN OCCASIONAL SMALL HOLE BY PLACING ANOTHER PIECE OF GEOTEXTILE OVER THE DAMAGED PART OR BY COMPLETELY REPLACING THE GEOTEXTILE. PROVIDE A MINIMUM OF ONE FOOT OVERLAP FOR ALL REPAIRS AND FOR JOINING TWO PIECES OF GEOTEXTILE TOGETHER.
3. PREPARE THE SUBGRADE FOR GEOTEXTILE OR STONE FILTER (⅜ TO 1½ INCH STONE FOR 6 INCH MINIMUM DEPTH) AND RIPRAP TO THE REQUIRED LINES AND GRADES. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO A DENSITY OF APPROXIMATELY THAT OF THE SURROUNDING UNDISTURBED MATERIAL.
4. EXTEND GEOTEXTILE AT LEAST 6 INCHES BEYOND EDGES OF RIPRAP AND EMBED AT LEAST 4 INCHES AT SIDES OF THE RIPRAP.
5. CONSTRUCT RIPRAP OUTLET TO FULL COURSE THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO AVOID DISPLACEMENT OF UNDERLYING MATERIALS. PLACE STONE FOR RIPRAP OUTLET IN A MANNER THAT WILL ENSURE THAT IT IS REASONABLY HOMOGENOUS WITH THE SMALLER STONES AND SPALLS FILLING THE VOIDS BETWEEN THE LARGER STONES. PLACE RIPRAP IN A MANNER TO PREVENT DAMAGE TO THE STONE FILTER BLANKET OR GEOTEXTILE. HAND PLACE TO THE EXTENT NECESSARY.
6. WHERE NO ENDWALL IS USED, CONSTRUCT THE UPSTREAM END OF THE APRON SO THAT THE WIDTH IS TWO TIMES THE DIAMETER OF THE OUTLET PIPE, AND EXTEND THE STONE UNDER THE OUTLET BY A MINIMUM OF 18 INCHES.
7. CONSTRUCT APRON WITH 0% SLOPE ALONG ITS LENGTH AND WITHOUT OBSTRUCTIONS. PLACE STONE SO THAT IT BLENDS IN WITH EXISTING GROUND.
8. MAINTAIN LINE, GRADE, AND CROSS SECTION. KEEP OUTLET FREE OF EROSION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. AFTER HIGH FLOWS INSPECT FOR SCOUR AND DISLODGED RIPRAP. MAKE NECESSARY REPAIRS IMMEDIATELY.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL B-4-6-A TEMPORARY SOIL STABILIZATION MATTING CHANNEL APPLICATION

STANDARD SYMBOL: TSSMC – * lb/ft² (* INCLUDE SHEAR STRESS)



CONSTRUCTION SPECIFICATIONS

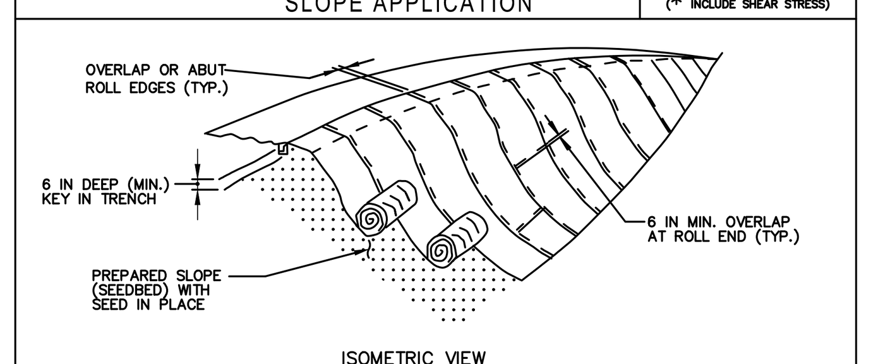
1. USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR STRESS DESIGNATED ON APPROVED PLANS.
2. USE TEMPORARY SOIL STABILIZATION MATTING MADE OF DEGRADABLE (LASTS 6 MONTHS MINIMUM) NATURAL OR MAN-MADE FIBERS (MOSTLY ORGANIC). MAT MUST HAVE UNIFORM THICKNESS AND DISTRIBUTION OF FIBERS THROUGHOUT AND BE SMOLDER RESISTANT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2x2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
3. SECURE MATTING USING STEEL STAPLES, WOOD STAKES, OR BIODEGRADABLE EQUIVALENT. STAPLES MUST BE "U" OR "T" SHAPED STEEL WIRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1½ INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "T" SHAPED STAPLES MUST HAVE A MINIMUM 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND A MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1x3 INCH IN CROSS SECTION, AND WEDGE SHAPED AT THE BOTTOM.
4. PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
5. UNROLL MATTING IN DIRECTION OF WATER FLOW, CENTERING THE FIRST ROLL ON THE CHANNEL CENTERLINE. WORK FROM CENTER OF CHANNEL OUTWARD WHEN PLACING ROLLS. LAY MAT SMOOTHLY AND FIRMLY ON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING.
6. KEY-IN UPSTREAM END OF EACH MAT ROLL BY DIGGING A 6 INCH (MINIMUM) TRENCH AT THE UPSTREAM END OF THE MATTING, PLACING THE ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END.
7. OVERLAP OR ABUT THE ROLL EDGES PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSTREAM MAT OVERLAPPING ON TOP OF THE NEXT DOWNSTREAM MAT.
8. STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.
9. ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL B-4-6-B TEMPORARY SOIL STABILIZATION MATTING SLOPE APPLICATION

STANDARD SYMBOL: TSSMS – * lb/ft² (* INCLUDE SHEAR STRESS)



CONSTRUCTION SPECIFICATIONS

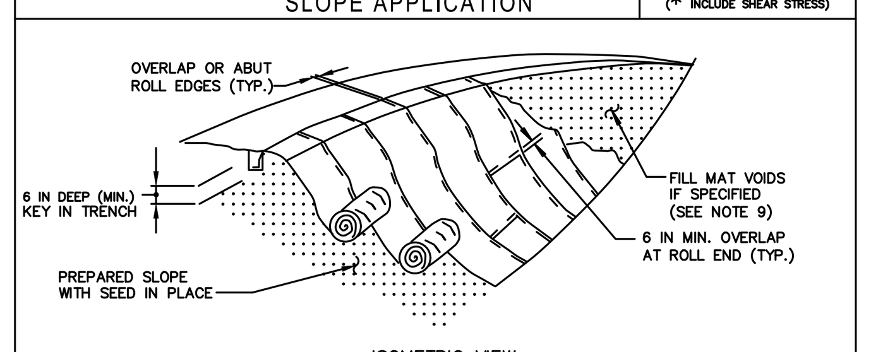
1. USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR STRESS DESIGNATED ON APPROVED PLANS.
2. USE TEMPORARY SOIL STABILIZATION MATTING MADE OF DEGRADABLE (LASTS 6 MONTHS MINIMUM) NATURAL OR MAN-MADE FIBERS (MOSTLY ORGANIC). MAT MUST HAVE UNIFORM THICKNESS AND DISTRIBUTION OF FIBERS THROUGHOUT AND BE SMOLDER RESISTANT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2x2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
3. SECURE MATTING USING STEEL STAPLES, WOOD STAKES, OR BIODEGRADABLE EQUIVALENT. STAPLES MUST BE "U" OR "T" SHAPED STEEL WIRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1½ INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "T" SHAPED STAPLES MUST HAVE A MINIMUM 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND A MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1x3 INCH IN CROSS SECTION, AND WEDGE SHAPED AT THE BOTTOM.
4. PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION & SEDIMENT CONTROL PLAN.
5. UNROLL MATTING DOWNSLOPE. LAY MAT SMOOTHLY AND FIRMLY UPON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING.
6. OVERLAP OR ABUT ROLL EDGES PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSLOPE MAT OVERLAPPING ON TOP OF THE DOWNSLOPE MAT.
7. KEY IN THE UPSLOPE END OF MAT 6 INCHES (MINIMUM) BY DIGGING A TRENCH, PLACING THE MATTING ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END IN THE KEY.
8. STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.
9. ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL B-4-6-D PERMANENT SOIL STABILIZATION MATTING SLOPE APPLICATION

STANDARD SYMBOL: PSSMS – * lb/ft² (* INCLUDE SHEAR STRESS)



CONSTRUCTION SPECIFICATIONS

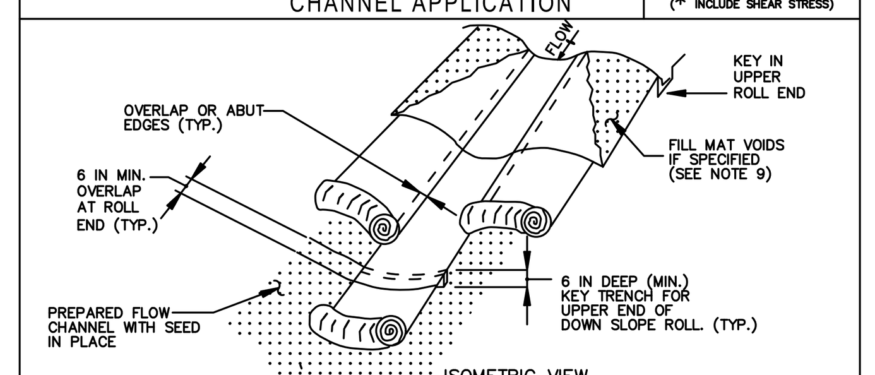
1. USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR STRESS DESIGNATED ON APPROVED PLANS.
2. USE PERMANENT SOIL STABILIZATION MATTING MADE OF OPEN WEAVE SYNTHETIC, NON-DEGRADABLE FIBERS OR ELEMENTS OF UNIFORM THICKNESS AND DISTRIBUTION THROUGHOUT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2x2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
3. SECURE MATTING USING STEEL STAPLES OR WOOD STAKES. STAPLES MUST BE "U" OR "T" SHAPED STEEL WIRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1½ INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "T" SHAPED STAPLES MUST HAVE A MINIMUM 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1x3 INCH IN CROSS SECTION, AND WEDGE SHAPE AT THE BOTTOM.
4. PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS, UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
5. UNROLL MATTING DOWN SLOPE. LAY MATTING SMOOTHLY AND FIRMLY UPON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING.
6. OVERLAP OR ABUT EDGES OF MATTING ROLLS PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSTREAM MAT OVERLAPPING ON TOP OF THE DOWNSLOPE MAT.
7. KEY IN THE TOP OF SLOPE END OF MAT 6 INCHES (MINIMUM) BY DIGGING A TRENCH, PLACING THE MATTING ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END IN THE KEY.
8. STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.
9. IF SPECIFIED BY THE DESIGNER OR MANUFACTURER AND DEPENDING ON THE TYPE OF MAT BEING INSTALLED, ONCE THE MATTING IS KEYED AND STAPLED IN PLACE, FILL THE MAT VOIDS WITH TOP SOIL OR GRANULAR MATERIAL AND LIGHTLY COMPACT OR ROLL TO MAXIMIZE SOIL/MAT CONTACT WITHOUT CRUSHING MAT.
10. ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL B-4-6-C PERMANENT SOIL STABILIZATION MATTING CHANNEL APPLICATION

STANDARD SYMBOL: PSSMC – * lb/ft² (* INCLUDE SHEAR STRESS)



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5. UNROLL MATTING IN DIRECTION OF WATER FLOW, CENTERING THE FIRST ROLL ON THE CHANNEL CENTER LINE. WORK FROM CENTER OF CHANNEL OUTWARD WHEN PLACING ROLLS. LAY MATTING SMOOTHLY AND FIRMLY UPON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING.
6. OVERLAP OR ABUT EDGES OF MATTING ROLLS PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSTREAM MAT OVERLAPPING ON TOP OF THE NEXT DOWNSTREAM MAT.
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9. IF SPECIFIED BY THE DESIGNER OR MANUFACTURER AND DEPENDING ON THE TYPE OF MAT BEING INSTALLED, ONCE THE MATTING IS KEYED AND STAPLED IN PLACE, FILL THE MAT VOIDS WITH TOP SOIL OR GRANULAR MATERIAL AND LIGHTLY COMPACT OR ROLL TO MAXIMIZE SOIL/MAT CONTACT WITHOUT CRUSHING MAT.
10. ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 12/1/2021
SCALE:
DESIGNED BY: JDL
DRAWN BY: AS

ESC DETAILS

FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-20

SHEET 20 OF 55

KCI JOB NUMBER 272006468

B-4 STANDARDS AND SPECIFICATIONS FOR VEGETATIVE STABILIZATION

DEFINITION
USING VEGETATION AS COVER TO PROTECT EXPOSED SOIL FROM EROSION.

PURPOSE
TO PROMOTE THE ESTABLISHMENT OF VEGETATION ON EXPOSED SOIL.

CONDITIONS WHERE PRACTICE APPLIES
ON ALL DISTURBED AREAS NOT STABILIZED BY OTHER METHODS. THIS SPECIFICATION IS DIVIDED INTO SECTIONS ON INCREMENTAL STABILIZATION; SOIL PREPARATION, SOIL AMENDMENTS AND TOPSOILING; SEEDING AND MULCHING; TEMPORARY STABILIZATION; AND PERMANENT STABILIZATION.

EFFECTS ON WATER QUALITY AND QUANTITY
STABILIZATION PRACTICES ARE USED TO PROMOTE THE ESTABLISHMENT OF VEGETATION ON EXPOSED SOIL. WHEN SOIL IS STABILIZED WITH VEGETATION, THE SOIL IS LESS LIKELY TO ERODE AND MORE LIKELY TO ALLOW INFILTRATION OF RAINFALL, THEREBY REDUCING SEDIMENT LOADS AND RUNOFF TO DOWNSTREAM AREAS. PLANTING VEGETATION IN DISTURBED AREAS WILL HAVE AN EFFECT ON THE WATER BUDGET, ESPECIALLY ON VOLUMES AND RATES OF RUNOFF, INFILTRATION, EVAPORATION, TRANSPIRATION, PERCOLATION, AND GROUNDWATER RECHARGE. OVER TIME, VEGETATION WILL INCREASE ORGANIC MATTER CONTENT AND IMPROVE THE WATER HOLDING CAPACITY OF THE SOIL AND SUBSEQUENT PLANT GROWTH. VEGETATION WILL HELP REDUCE THE MOVEMENT OF SEDIMENT, NUTRIENTS, AND OTHER CHEMICALS CARRIED BY RUNOFF TO RECEIVING WATERS. PLANTS WILL ALSO HELP PROTECT GROUNDWATER SUPPLIES BY ASSIMILATING THOSE SUBSTANCES PRESENT WITHIN THE ROOT ZONE. SEDIMENT CONTROL PRACTICES MUST REMAIN IN PLACE DURING GRADING, SEEDBED PREPARATION, SEEDING, MULCHING,AND VEGETATIVE ESTABLISHMENT.

ADEQUATE VEGETATIVE ESTABLISHMENT
INSPECT SEEDED AREAS FOR VEGETATIVE ESTABLISHMENT AND MAKE NECESSARY REPAIRS, REPLACEMENTS, AND RESEEDINGS WITHIN THE PLANTING SEASON.
1. ADEQUATE VEGETATIVE STABILIZATION REQUIRES 95 PERCENT GROUNDCOVER.
2. IF AN AREA HAS LESS THAN 40 PERCENT GROUNDCOVER, RESTABILIZE FOLLOWING THE ORIGINAL RECOMMENDATIONS FOR LIME, FERTILIZER, SEEDBED PREPARATION, AND SEEDING.
3. IF AN AREA HAS BETWEEN 40 AND 94 PERCENT GROUNDCOVER, OVER-SEED AND FERTILIZE USING HALF OF THE RATES ORIGINALLY SPECIFIED.
4. MAINTENANCE FERTILIZER RATES FOR PERMANENT SEEDING ARE SHOWN IN TABLE B.6.

B-4-1 STANDARDS AND SPECIFICATIONS FOR INCREMENTAL STABILIZATION

DEFINITION
ESTABLISHMENT OF VEGETATIVE COVER ON CUT AND FILL SLOPES.

PURPOSE
TO PROVIDE TIMELY VEGETATIVE COVER ON CUT AND FILL SLOPES AS WORK PROGRESSES.

CONDITIONS WHERE PRACTICE APPLIES
ANY CUT OR FILL SLOPE GREATER THAN 15 FEET IN HEIGHT. THIS PRACTICE ALSO APPLIES TO STOCKPILES.

CRITERIA
A. INCREMENTAL STABILIZATION – CUT SLOPES
  1. EXCAVATE AND STABILIZE CUT SLOPES IN INCREMENTS NOT TO EXCEED 15 FEET IN HEIGHT. PREPARE SEEDBED AND APPLY SEED AND MULCH ON ALL CUT SLOPES AS THE WORK PROGRESSES.
  2. CONSTRUCTION SEQUENCE EXAMPLE (REFER TO FIGURE B.1):
    a. CONSTRUCT AND STABILIZE ALL TEMPORARY SWALES OR DIKES THAT WILL BE USED TO CONVEY RUNOFF AROUND THE EXCAVATION.
    b. PERFORM PHASE 1 EXCAVATION, PREPARE SEEDBED, AND STABILIZE.
    c. PERFORM PHASE 2 EXCAVATION, PREPARE SEEDBED, AND STABILIZE. OVERSEED PHASE 1 AREAS AS NECESSARY.
    d. PERFORM FINAL PHASE EXCAVATION, PREPARE SEEDBED, AND STABILIZE. OVERSEED PREVIOUSLY SEEDED AREAS AS NECESSARY.
    NOTE: ONCE EXCAVATION HAS BEGUN THE OPERATION SHOULD BE CONTINUOUS FROM GRUBBING THROUGH THE COMPLETION OF GRADING AND PLACEMENT OF TOPSOIL (IF REQUIRED) AND PERMANENT SEED AND MULCH. ANY INTERRUPTIONS IN THE OPERATION OR COMPLETING THE OPERATION OUT OF THE SEEDING SEASON WILL NECESSITATE THE APPLICATION OF TEMPORARY STABILIZATION.

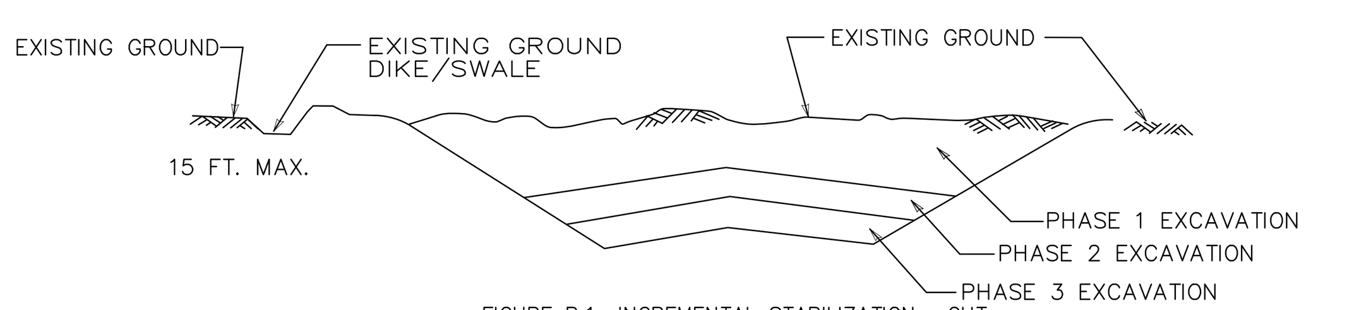

FIGURE B.1: INCREMENTAL STABILIZATION . CUT

B. INCREMENTAL STABILIZATION – FILL SLOPES
  1. CONSTRUCT AND STABILIZE FILL SLOPES IN INCREMENTS NOT TO EXCEED 15 FEET IN HEIGHT. PREPARE SEEDBED AND APPLY SEED APPLY SEED AND MULCH ON ALL SLOPES AS THE WORK PROGRESSES.
  2. STABILIZE SLOPES IMMEDIATELY WHEN THE VERTICAL HEIGHT OF A LIFT REACHES 15 FEET, OR WHEN THE GRADING OPERATION CEASES AS PRESCRIBED IN THE PLANS.
  3. AT THE END OF EACH DAY, INSTALL TEMPORARY WATER CONVEYANCE PRACTICE(S), AS NECESSARY, TO INTERCEPT SURFACE RUNOFF AND CONVEY IT DOWN THE SLOPE IN A NON–EROSIVE MANNER.
  4. CONSTRUCTION SEQUENCE EXAMPLE (REFER TO FIGURE B.2):
    a. CONSTRUCT AND STABILIZE ALL TEMPORARY SWALES OR DIKES THAT WILL BE USED TO DIVERT RUNOFF AROUND THE FILL. CONSTRUCT SILT FENCE ON LOW SIDE OF FILL UNLESS OTHER METHODS SHOWN ON THE PLANS ADDRESS THIS AREA.
    b. AT THE END OF EACH DAY, INSTALL TEMPORARY WATER CONVEYANCE PRACTICE(S), AS NECESSARY, TO INTERCEPT SURFACE RUNOFF AND CONVEY IT DOWN THE SLOPE IN A NON–EROSIVE MANNER.
    c. PLACE PHASE 1 FILL, PREPARE SEEDBED, AND STABILIZE.
    d. PLACE PHASE 2 FILL, PREPARE SEEDBED, AND STABILIZE.
    e. PLACE FINAL PHASE FILL, PREPARE SEEDBED, AND STABILIZE. OVERSEED PREVIOUSLY SEEDED AREAS AS NECESSARY.
    NOTE: ONCE THE PLACEMENT OF FILL HAS BEGUN THE OPERATION SHOULD BE CONTINUOUS FROM GRUBBING THROUGH THE COMPLETION OF GRADING AND PLACEMENT OF TOPSOIL (IF REQUIRED) AND PERMANENT SEED AND MULCH. ANY INTERRUPTIONS IN THE OPERATION OR COMPLETING THE OPERATION OUT OF THE SEEDING SEASON WILL NECESSITATE THE APPLICATION OF TEMPORARY STABILIZATION.

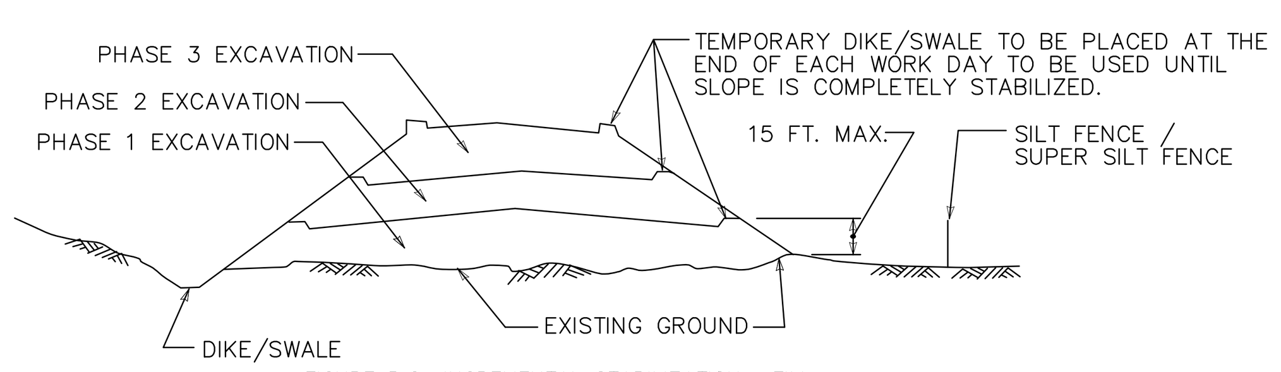

FIGURE B.2: INCREMENTAL STABILIZATION . FILL

DAILY STABILIZATION NOTE

CONTRACTOR SHALL ONLY DISTURB THAT AREA WHICH CAN BE STABILIZED BY THE END OF EACH WORK DAY. STABILIZATION SHALL BE AS FOLLOWS: FOR SIDEWALK AREAS OR AREAS TO BE PAVED, THE APPLICATION OF STONE. FOR AREAS TO BE VEGETATIVELY STABILIZED, PERMANENT SEED, EROSION CONTROL MATTING FOR SWALES AND PERMANENT SEED AND MULCH FOR ALL OTHER AREAS.

B.3 PLANT HARDNESS ZONE

PLANT HARDINESS ZONE	6b
IF AREA TO BE VEGETATIVELY STABILIZED EXCEEDS 5 ACRES, THE FOLLOWING APPLIES: AT THE TIME OF FINAL GRADING SOILS TEST TO BE PERFORMED TO DETERMINE FERTILIZER AND LIME RATE	

B-4-2 STANDARDS AND SPECIFICATIONS FOR SOIL PREPERATION, TOPSOILING, AND SOIL AMENDMENTS

DEFINITION
THE PROCESS OF PREPARING THE SOILS TO SUSTAIN ADEQUATE VEGETATIVE STABILIZATION.

PURPOSE
TO PROVIDE A SUITABLE SOIL MEDIUM FOR VEGETATIVE GROWTH.

CONDITIONS WHERE PRACTICE APPLIES
WHERE VEGETATIVE STABILIZATION IS TO BE ESTABLISHED.

CRITERIA

A. SOIL PREPARATION
  1. TEMPORARY STABILIZATION
    A. SEEDBED PREPARATION CONSISTS OF LOOSENING SOIL TO A DEPTH OF 3 TO 5 OF SUITABLE AGRICULTURAL OR CONSTRUCTION EQUIPMENT, SUCH AS DI SC HARROWS OR CHISEL PLOWS OR RIPPERS MOUNTED ON CONSTRUCTION EQUIPMENT. AFTER THE SOIL IS LOOSENED, IT MUST NOT BE ROLLED OR DRAGGED SMOOTH BUT LEFT IN THE ROUGHENED CONDITION. SLOPES 3:1 OR FLATTER ARE TO BE TRACKED WITH RIDGES RUNNING PARALLEL TO THE CONTOUR OF THE SLOPE.
    B. APPLY FERTILIZER AND LIME AS PRESCRIBED ON THE PLANS.
    C. INCORPORATE LIME AND FERTILIZER INTO THE TOP 3 TO 5 INCHES OF SOIL BY DISKING OR OTHER SUITABLE MEANS.
  2. PERMANENT STABILIZATION
    A. A SOIL TEST IS REQUIRED FOR ANY EARTH DISTURBANCE OF 5 ACRES OR MORE. THE MINIMUM SOIL CONDITIONS REQUIRED FOR PERMANENT VEGETATIVE ESTABLISHMENT ARE:
      I. SOIL PH BETWEEN 6.0 AND 7.0.
      II. SOLUBLE SALTS LESS THAN 500 PARTS PER MILLION (PPM).
      III. SOIL CONTAINS LESS THAN 40 PERCENT CLAY BUT ENOUGH FINE GRAINED MATERIAL (GREATER THAN 30 PERCENT SILT PLUS CLAY) TO PROVIDE THE CAPACITY TO HOLD A MODERATE AMOUNT OF MOISTURE. AN EXCEPTION: IF LOVEGRASS WILL BE PLANTED, THEN A SANDY SOIL (LESS THAN 30 PERCENT SILT PLUS CLAY) WOULD BE ACCEPTABLE.
      IV. SOIL CONTAINS 1.5 PERCENT MINIMUM ORGANIC MATTER BY WEIGHT.
      V. SOIL CONTAINS SUFFICIENT PORE SPACE TO PERMIT ADEQUATE ROOT PENETRATION.
    B. APPLICATION OF AMENDMENTS OR TOPSOIL IS RE QUIRED IF ON–SITE SOILS DO NOT MEET THE ABOVE CONDITIONS.
    C. GRADED AREAS MUST BE MAINTAINED IN A TRUE AND EVEN GRADE AS SPECIFIED ON THE APPROVED PLAN, THEN SCARIFIED OR OTHERWISE LOOSENED TO A DEPTH OF 3 TO 5 INCHES.
    D. APPLY SOIL AMENDMENTS AS SPECIFIED ON THE APPROVED PLAN OR AS INDICATED BY THE RESULTS OF A SOIL TEST.
    E. MIX SOIL AMENDMENTS INTO THE TOP 3 TO 5 INCHES OF SOIL BY DISKING OR OTHER SUITABLE MEANS. RAKE LAWN AREAS TO SMOOTH THE SURFACE, REMOVE LARGE OBJECTS LIKE STONES AND BRANCHES, AND READY THE AREA FOR SEED APPLICATION. LOOSEN SURFACE SOIL BY DRAGGING WITH A HEAVY CHAIN OR OTHER EQUIPMENT TO ROUGHEN THE SURFACE WHERE SITE CONDITIONS WILL NOT PERMIT NORMAL SEEDBED PREPARATION. TRACK SLOPES 3:1 OR FLATTER WITH TRACKED EQUIPMENT LEAVING THE SOIL IN AN IRREGULAR CONDITION WITH RIDGES RUNNING PARALLEL TO THE CONTOUR OF THE SLOPE. LEAVE THE TOP 1 TO 3 INCHES OF SOIL LOOSE AND FRIABLE. SEEDBED LOOSENING MAY BE UNNECESSARY ON NEWLY DISTURBED AREAS.

B. TOPSOILING
  1. TOPSOIL IS PLACED OVER PREPARED SUBSOIL PRIOR TO ESTABLISHMENT OF PERMANENT VEGETATION. THE PURPOSE IS TO PROVIDE A SUITABLE SOIL MEDIUM FOR VEGETATIVE GROWTH. SOILS OF CONCERN HAVE LOW MOISTURE CONTENT, LOW NUTRIENT LEVELS, LOW PH, MATERIALS TOXIC TO PLANTS, AND/OR UNACCEPTABLE SOIL GRADATION.
  2. TOPSOIL SALVAGED FROM AN EXISTING SITE MAY BE USED PROVIDED IT MEETS THE STANDARDS AS SET FORTH IN THESE SPECIFICATIONS. TYPICALLY, THE DEPTH OF TOPSOIL TO BE SALVAGED FOR A GIVEN SOIL TYPE CAN BE FOUND IN THE REPRESENTATIVE SOIL PROFILE SECTION IN THE SOIL SURVEY PUBLISHED BY USDA–NRCS.
  3. TOPSOILING IS LIMITED TO AREAS HAVING 2:1 OR FLATTER SLOPES WHERE:
    A. THE TEXTURE OF THE EXPOSED SUBSOIL/PARENT MATERIAL IS NOT ADEQUATE TO PRODUCE VEGETATIVE GROWTH.
    B. THE SOIL MATERIAL IS SO SHALLOW THAT THE ROOTING ZONE IS NOT DEEP ENOUGH TO SUPPORT PLANTS OR FURNISH CONTINUING SUPPLIES OF MOISTURE AND PLANT NUTRIENTS.
    C. THE ORIGINAL SOIL TO BE VEGETATED CONTAINS MATERIAL TOXIC TO PLANT GROWTH.
    D. THE SOIL IS SO ACIDIC THAT TREATMENT WITH LIMESTONE IS NOT FEASIBLE.
  4. AREAS HAVING SLOPES STEEPER THAN 2:1 REQUIRE SPECIAL CONSIDERATION AND DESIGN.
  5. TOPSOIL SPECIFICATIONS: SOIL TO BE USED AS TOPSOIL MUST MEET THE FOLLOWING CRITERIA:
    A. TOPSOIL MUST BE A LOAM, SANDY LOAM, CLAY LOAM, SILT LOAM, SANDY CLAY LOAM, OR LOAMY SAND. OTHER SOILS MAY BE USED IF RECOMMENDED BY AN AGRONOMIST OR SOIL SCIENTIST AND APPROVED BY THE APPROPRIATE APPROVAL AUTHORITY. TOPSOIL MUST NOT BE A MIXTURE OF CONTRASTING TEXTURED SUBSOILS AND MUST CONTAIN LESS THAN 5 PERCENT BY VOLUME OF CINDERS, STONES, SLAG, COARSE FRAGMENTS, GRAVEL, STICKS, ROOTS, TRASH, OR OTHER MATERIALS LARGER THAN 1½ INCHES IN DIAMETER.
    B. TOPSOIL MUST BE FREE OF NOXIOUS PLANTS OR PLANT PARTS SUCH AS BERMUDA GRASS, QUACK GRASS, JOHNSON GRASS, NUT SEDGE, POISON IVY, THISTLE, OR OTHERS AS SPECIFIED.
    C. TOPSOIL SUBSTITUTES OR AMENDMENTS, AS RECOMMENDED BY A QUALIFIED AGRONOMIST OR SOIL SCIENTIST AND APPROVED BY THE APPROPRIATE APPROVAL AUTHORITY, MAY BE USED IN LIEU OF NATURAL TOPSOIL.
  6. TOPSOIL APPLICATION
    A. EROSION AND SEDIMENT CONTROL PRACTICES MUST BE MAINTAINED WHEN APPLYING TOPSOIL.
    B. UNIFORMLY DISTRIBUTE TOPSOIL IN A 5 TO 8 INCH LAYER AND LIGHTLY COMPACT TO A MINIMUM THICKNESS OF 4 INCHES. SPREADING IS TO BE PERFORMED IN SUCH A MANNER THAT SODDING OR SEEDING CAN PROCEED WITH A MINIMUM OF ADDITIONAL SOIL PREPARATION AND TILLAGE. ANY IRREGULARITIES IN THE SURFACE RESULTING FROM TOPSOILING OR OTHER OPERATIONS MUST BE CORRECTED IN ORDER TO PREVENT THE FORMATION OF DEPRESSIONS OR WATER POCKETS.
    C. TOPSOIL MUST NOT BE PLACED IF THE TOPSOIL OR SUBSOIL IS IN A FROZEN OR MUDDY CONDITION, WHEN THE SUBSOIL IS EXCESSIVELY WET OR IN A CONDITION THAT MAY OTHERWISE BE DETRIMENTAL TO PROPER GRADING AND SEEDBED PREPARATION.

C. SOIL AMENDMENTS (FERTILIZER AND LIME SPECIFICATIONS)
  1. SOIL TESTS MUST BE PERFORMED TO DETERMINE THE EXACT RATIOS AND APPLICATION RATES FOR BOTH LIME AND FERTILIZER ON SITES HAVING DISTURBED AREAS OF 5 ACRES OR MORE. SOIL ANALYSIS MAY BE PERFORMED BY A RECOGNIZED PRIVATE OR COMMERCIAL LABORATORY. SOIL SAMPLES TAKEN FOR ENGINEERING PURPOSES MAY ALSO BE USED FOR CHEMICAL ANALYSES.
  2. FERTILIZERS MUST BE UNIFORM IN COMPOSITION, FREE FLOWING AND SUITABLE FOR ACCURATE APPLICATION BY APPROPRIATE EQUIPMENT. MANURE MAY BE SUBSTITUTED FOR FERTILIZER WITH PRIOR APPROVAL FROM THE APPROPRIATE APPROVAL AUTHORITY. FERTILIZERS MUST ALL BE DELIVERED TO THE SITE FULLY LABELED ACCORDING TO THE APPLICABLE LAWS AND MUST BEAR THE NAME, TRADE NAME OR TRADEMARK AND WARRANTY OF THE PRODUCER.
  3. LIME MATERIALS MUST BE GROUND LIMESTONE (HYDRATED OR BURNT LIME MAY BE SUBSTITUTED EXCEPT WHEN HYDROSEEDING) WHICH CONTAINS AT LEAST 50 PERCENT TOTAL OXIDES (CALCIUM OXIDE PLUS MAGNESIUM OXIDE). LIMESTONE MUST BE GROUND TO SUCH FINENESS THAT AT LEAST 50 PERCENT WILL PASS THROUGH A #100 MESH SIEVE AND 98 TO 100 PERCENT WILL PASS THROUGH A #20 MESH SIEVE.
  4. LIME AND FERTILIZER ARE TO BE EVENLY DISTRIBUTED AND INCORPORATED INTO THE TOP 3 TO 5 INCHES OF SOIL BY DISKING OR OTHER SUITABLE MEANS.
  5. WHERE THE SUBSOIL IS EITHER HIGHLY ACIDIC OR COMPOSED OF HEAVY CLAYS, SPREAD GROUND LIMESTONE AT THE RATE OF 4 TO 8 TONS/ACRE (200–400 POUNDS PER 1,000 SQUARE FEET) PRIOR TO THE PLACEMENT OF TOPSOIL.

B.1 Temporary Seeding Rates, Depths, and Dates

PLANT SPECIES	SEEDING RATE LB/AC	SEEDING RATE LB/100 FT²	SEEDING DEPTH (INCHES)	SEEDING RATE 5B AND 6A	SEEDING RATE 6B	SEEDING RATE 7A AND 7B
[redacted]						
ANNUAL RYEGRASS (LOLIUM PERENNE SSP. MULTIFORM)	40	1.0	0.5	MAR 15 TO MAY 31; AUG 1 TO SEP 30	MAR 1 TO MAY 15; AUG 1 TO OCT 15	FEB 15 TO APR 30; AUG 15 TO NOV 30
BARLEY (HORDEUM VULGARE)	96	2.2	1.0	MAR 15 TO MAY 31; AUG 1 TO SEP 30	MAR 1 TO MAY 15; AUG 1 TO OCT 15	FEB 15 TO APR 30; AUG 15 TO NOV 30
OATS (AVENA SATIVA)	72	1.7	1.0	MAR 15 TO MAY 31; AUG 1 TO SEP 30	MAR 1 TO MAY 15; AUG 1 TO OCT 15	FEB 15 TO APR 30; AUG 15 TO NOV 30
WHEAT (TRITICUM AESTIVUM)	120	2.8	1.0	MAR 15 TO MAY 31; AUG 1 TO SEP 30	MAR 1 TO MAY 15; AUG 1 TO OCT 15	FEB 15 TO APR 30; AUG 15 TO NOV 30
CEREAL RYE (SECALE CEREALE)	112	2.8	1.0	MAR 15 TO MAY 31; AUG 1 TO OCT 31	MAR 1 TO MAY 15; AUG 1 TO OCT 15	FEB 15 TO APR 30; AUG 15 TO DEC 15
WAR[redacted]						
FOXTAIL MILLET (SETARIA ITALICA)	30	0.7	0.5	JUN 1 TO JUL 31	MAY 16 TO JUL 31	MAY 1 TO AUG 14
PEARL MILLET (PENNISETUM GLAUCUM)	20	0.5	0.5	JUN 1 TO JUL 31	MAY 16 TO JUL 31	MAY 1 TO AUG 14

B-4-3 STANDARDS AND SPECIFICATIONS FOR SEEDING AND MULCHING

DEFINITION
THE APPLICATION OF SEED AND MULCH TO ESTABLISH VEGETATIVE COVER.

PURPOSE
TO PROTECT DISTURBED SOILS FROM EROSION DURING AND AT THE END OF CONSTRUCTION.

CONDITIONS WHERE PRACTICE APPLIES
TO THE SURFACE OF ALL PERIMETER CONTROLS, SLOPES, AND ANY DISTURBED AREA NOT UNDER ACTIVE GRADING.

CRITERIA

A. SEEDING
  1. SPECIFICATIONS
    A. ALL SEED MUST MEET THE REQUIREMENTS OF THE MARYLAND STATE SEED LAW. ALL SEED MUST BE SUBJECT TO RE–TESTING BY A RECOGNIZED SEED LABORATORY. ALL SEED USED MUST HAVE BEEN TESTED WITHIN THE 6 MONTHS IMMEDIATELY PRECEDING THE DATE OF SOWING SUCH MATERIAL ON ANY PROJECT. REFER TO TABLE B.4 REGARDING THE QUALITY OF SEED. SEED TAGS MUST BE AVAILABLE UPON REQUEST TO THE INSPECTOR TO VERIFY TYPE OF SEED AND SEEDING RATE.
    B. MULCH ALONE MAY BE APPLIED BETWEEN THE FALL AND SPRING SEEDING DATES ONLY IF THE GROUND IS FROZEN. THE APPROPRIATE SEEDING MIXTURE MUST BE APPLIED WHEN THE GROUND THAWS.
    C. INOCULANTS: THE INOCULANT FOR TREATING LEGUME SEED IN THE SEED MIXTURES MUST BE A PURE CULTURE OF NITROGEN FIXING BACTERIA PREPARED SPECIFICALLY FOR THE SPECIES. INOCULANTS MUST NOT BE USED LATER THAN THE DATE INDICATED ON THE CONTAINER. ADD FRESH INOCULANTS AS DIRECTED ON THE PACKAGE. USE FOUR TIMES THE RECOMMENDED RATE WHEN HYDROSEEDING. NOTE: IT IS VERY IMPORTANT TO KEEP INOCULANT AS COOL AS POSSIBLE UNTIL USED. TEMPERATURES ABOVE 75 TO 80 DEGREES FAHRENHEIT CAN WEAKEN BACTERIA AND MAKE THE INOCULANT LESS EFFECTIVE.
    D. SOD OR SEED MUST NOT BE PLACED ON SOIL WHICH HAS BEEN TREATED WITH SOIL STERILANTS OR CHEMICALS USED FOR WEED CONTROL UNTIL SUFFICIENT TIME HAS ELAPSED (14 DAYS MIN.) TO PERMIT DISSIPATION OF PHYTO–TOXIC MATERIALS.
  2. APPLICATION
    A. DRY SEEDING: THIS INCLUDES USE OF CONVENTIONAL DROP OR BROADCAST SPREADERS.
      I. INCORPORATE SEED INTO THE SUBSOIL AT THE RATES PRESCRIBED ON TEMPORARY SEEDING TABLE B.1, PERMANENT SEEDING TABLE B.3, OR SITE–SPECIFIC SEEDING SUMMARIES.
      II. APPLY SEED IN TWO DIRECTIONS, PERPENDICULAR TO EACH OTHER. APPLY HALF THE SEEDING RATE IN EACH DIRECTION. ROLL THE SEEDED AREA WITH A WEIGHTED ROLLER TO PROVIDE GOOD SEED TO SOIL CONTACT.

B.
    B. DRILL OR CULTIPACKER SEEDING: MECHANIZED SEEDERS THAT APPLY AND COVER SEED WITH SOIL.
      I. CULTIPACKING SEEDERS ARE REQUIRED TO BURY THE SEED IN SUCH A FASHION AS TO PROVIDE AT LEAST 1/4 INCH OF SOIL COVERING. SEEDBED MUST BE FIRM AFTER PLANTING.
      II. APPLY SEED IN TWO DIRECTIONS, PERPENDICULAR TO EACH OTHER. APPLY HALF THE SEEDING RATE IN EACH DIRECTION.
    C. HYDROSEEDING: APPLY SEED UNIFORMLY WITH HYDROSEEDER (SLURRY INCLUDES SEED AND FERTILIZER).
      I. IF FERTILIZER IS BEING APPLIED AT THE TIME OF SEEDING, THE APPLICATION RATES SHOULD NOT EXCEED THE FOLLOWING: NITROGEN, 100 POUNDS PER ACRE TOTAL OF SOLUBLE NITROGEN; P205 (PHOSPHOROUS), 200 POUNDS PER ACRE; K20 (POTASSIUM), 200 POUNDS PER ACRE.
      II. LIME: USE ONLY GROUND AGRICULTURAL LIMESTONE (UP TO 3 TONS PER ACRE MAY BE APPLIED BY HYDROSEEDING). NORMALLY, NOT MORE THAN 2 TONS ARE APPLIED BY HYDROSEEDING AT ANY ONE TIME. DO NOT USE BURNT OR HYDRATED LIME WHEN HYDROSEEDING.
      III. MIX SEED AND FERTILIZER ON SITE AND SEED IMMEDIATELY AND WITHOUT INTERRUPTION.
      IV. WHEN HYDROSEEDING DO NOT INCORPORATE SEED INTO THE SOIL.

MULCHING
  1. MULCH MATERIALS (IN ORDER OF PREFERENCE)
    A. STRAW CONSISTING OF THOROUGHLY THRESHED WHEAT, RYE, OAT, OR BARLEY AND REASONABLY BRIGHT IN COLOR. STRAW IS TO BE FREE OF NOXIOUS WEED SEEDS AS SPECIFIED IN THE MARYLAND SEED LAW AND NOT MUSTY, MOLDY, CAKED, DECAYED, OR EXCESSIVELY DUSTY. NOTE: USE ONLY STERILE STRAW MULCH IN AREAS WHERE ONE SPECIES OF GRASS IS DESIRED.
    B. WOOD CELLULOSE FIBER MULCH (WCFM) CONSISTING OF SPECIALLY PREPARED WOOD CELLULOSE PROCESSED INTO A UNIFORM FIBROUS PHYSICAL STATE.
      I. WCFM IS TO BE DYED GREEN OR CONTAIN A GREEN DYE IN THE PACKAGE THAT WILL PROVIDE AN APPROPRIATE COLOR TO FACILITATE VISUAL INSPECTION OF THE UNIFORMLY SPREAD SLURRY.
      II. WCFM, INCLUDING DYE, MUST CONTAIN NO GERMINATION OR GROWTH INHIBITING FACTORS.
      III. WCFM MATERIALS ARE TO BE MANUFACTURED AND PROCESSED IN SUCH A MANNER THAT THE WOOD CELLULOSE FIBER MULCH WILL REMAIN IN UNIFORM SUSPENSION IN WATER UNDER AGITATION AND WILL BLEND WITH SEED, FERTILIZER AND OTHER ADDITIVES TO FORM A HOMOGENEOUS SLURRY. THE MULCH MATERIAL MUST FORM A BLOTTER–LIKE GROUND COVER, ON APPLICATION, HAVING MOISTURE ABSORPTION AND PERCOLATION PROPERTIES AND MUST COVER AND HOLD GRASS SEED IN CONTACT WITH THE SOIL WITHOUT INHIBITING THE GROWTH OF THE GRASS SEEDLINGS.
      IV. WCFM MATERIAL MUST NOT CONTAIN ELEMENTS OR COMPOUNDS AT CONCENTRATION LEVELS THAT WILL BE PHYTO–TOXIC.
      V. WCFM MUST CONFORM TO THE FOLLOWING PHYSICAL REQUIREMENTS: FIBER LENGTH OF APPROXIMATELY 10 MILLIMETERS, DIAMETER APPROXIMATELY 1 MILLIMETER, PH RANGE OF 4.0 TO 8.5, ASH CONTENT OF 1.6 PERCENT MAXIMUM AND WATER HOLDING CAPACITY OF 90 PERCENT MINIMUM.
  2. APPLICATION
    A. APPLY MULCH TO ALL SEEDED AREAS IMMEDIATELY AFTER SEEDING.
    B. WHEN STRAW MULCH IS USED, SPREAD IT OVER ALL SEEDED AREAS AT THE RATE OF 2 TONS PER ACRE TO A UNIFORM LOOSE DEPTH OF 1 TO 2 INCHES. APPLY MULCH TO ACHIEVE A UNIFORM DISTRIBUTION AND DEPTH SO THAT THE SOIL SURFACE IS NOT EXPOSED. WHEN USING A MULCH ANCHORING TOOL, INCREASE THE APPLICATION RATE TO 2.5 TONS PER ACRE.
    C. WOOD CELLULOSE FIBER USED AS MULCH MUST BE APPLIED AT A NET DRY WEIGHT OF 1500 POUNDS PER ACRE. MIX THE WOOD CELLULOSE FIBER WITH WATER TO ATTAIN A MIXTURE WITH A MAXIMUM OF 50 POUNDS OF WOOD CELLULOSE FIBER PER 100 GALLONS OF WATER.
  3. ANCHORING
    A. PERFORM MULCH ANCHORING IMMEDIATELY FOLLOWING APPLICATION OF MULCH TO MINIMIZE LOSS BY WIND OR WATER. THIS MAY BE DONE BY ONE OF THE FOLLOWING METHODS (LISTED BY PREFERENCE), DEPENDING UPON THE SIZE OF THE AREA AND EROSION HAZARD:
      I. A MULCH ANCHORING TOOL IS A TRACTOR DRAWN IMPLEMENT DESIGNED TO PUNCH AND ANCHOR MULCH INTO THE SOIL SURFACE A MINIMUM OF 2 INCHES. THIS PRACTICE IS MOST EFFECTIVE ON LARGE AREAS, BUT IS LIMITED TO FLATTER SLOPES WHERE EQUIPMENT CAN OPERATE SAFELY. IF USED ON SLOPING LAND, THIS PRACTICE SHOULD FOLLOW THE CONTOUR.
      II. WOOD CELLULOSE FIBER MAY BE USED FOR ANCHORING STRAW. APPLY THE FIBER BINDER AT A NET DRY WEIGHT OF 750 POUNDS PER ACRE. MIX THE WOOD CELLULOSE FIBER WITH WATER AT A MAXIMUM OF 50 POUNDS OF WOOD CELLULOSE FIBER PER 100 GALLONS OF WATER.
      III. SYNTHETIC BINDERS SUCH AS ACRYLIC DLR (AGRO–TACK), DCA–70, PETROSET, TERRA TAX II, TERRA TACK AR OR OTHER APPROVED EQUAL MAY BE USED. FOLLOW APPLICATION RATES AS SPECIFIED BY THE MANUFACTURER. APPLICATION OF LIQUID BINDERS NEEDS TO BE HEAVIER AT THE EDGES WHERE WIND CATCHES MULCH, SUCH AS IN VALLEYS AND ON CRESTS OF BANKS. USE OF ASPHALT BINDERS IS STRICTLY PROHIBITED.
      IV. LIGHTWEIGHT PLASTIC NETTING MAY BE STAPLED OVER THE MULCH ACCORDING TO MANUFACTURER RECOMMENDATIONS. NETTING IS USUALLY AVAILABLE IN ROLLS 4 TO 15 FEET WIDE AND 300 TO 3,000 FEET LONG.

B-4-4 STANDARDS AND SPECIFICATIONS FOR TEMPORARY STABILIZATION

DEFINITION
TO STABILIZE DISTURBED SOILS WITH VEGETATION FOR UP TO 6 MONTHS.

PURPOSE
TO USE FAST GROWING VEGETATION THAT PROVIDES COVER ON DISTURBED SOILS.

CONDITIONS WHERE PRACTICE APPLIES
EXPOSED SOILS WHERE GROUND COVER IS NEEDED FOR A PERIOD OF 6 MONTHS OR LESS. FOR LONGER DURATION OF TIME, PERMANENT STABILIZATION PRACTICES ARE REQUIRED.

CRITERIA
1. SELECT ONE OR MORE OF THE SPECIES OR SEED MIXTURES LISTED IN TABLE B.1 FOR THE APPROPRIATE PLANT HARDINESS ZONE (FROM FIGURE B.3), AND ENTER THEM IN THE TEMPORARY SEEDING SUMMARY BELOW ALONG WITH APPLICATION RATES, SEEDING DATES AND SEEDING DEPTHS. IF THIS SUMMARY IS NOT PUT ON THE PLAN AND COMPLETED, THEN TABLE B.1 PLUS FERTILIZER AND LIME RATES MUST BE PUT ON THE PLAN.
2. FOR SITES HAVING SOIL TESTS PERFORMED, USE AND SHOW THE RECOMMENDED RATES BY THE TESTING AGENCY. SOIL TESTS ARE NOT REQUIRED FOR TEMPORARY SEEDING.
3. WHEN STABILIZATION IS REQUIRED OUTSIDE OF A SEEDING SEASON, APPLY SEED AND MULCH OR STRAW MULCH ALONE AS PRESCRIBED IN SECTION B–4–3.A.1.B AND MAINTAIN UNTIL THE NEXT SEEDING SEASON.

B-4-4 STANDARDS AND SPECIFICATIONS FOR TEMPORARY STABILIZATION CONTINUED

NOTES: 1. SEEDING RATES FOR WARM–SEASON GRASSES ARE IN POUNDS OF PURE LIVE SEED (PLS). ACTUAL PLANTING RATES SHALL BE ADJUSTED TO REFLECT PERCENT SEED GERMINATION AND PURITY, AS TESTED. ADJUSTMENT ARE USUALLY NOT NEEDED FOR THE COOL–SEASON GRASSES.

SEEDING RATES LISTED ABOVE ARE FOR TEMPORARY SEEDING, WHEN PLANTED ALONE. WHEN PLANTED AS A NURSE CROP WITH PERMANENT SEED MIXES, USE 1/3 OF THE SEEDING RATE LISTED ABOVE FOR BARLEY, OATS AND WHEAT. FOR – SMALLER – SEEDED GRASSES (ANUAL RYEGRASS, PEARL MILLET, FOXTAIL MILLET), DO NOT EXCEED MORE THAN 5% (BY WEIGHT) OF THE OVERALL PERMANENT SEEDING MIX. CEREAL RYE GENERALLY SHOULD NOT BE USED AS A NURSE CROP, UNLESS PLANTING WILL OCCUR IN THE VERY LATE FALL BEYOND THE SEEDING DATE FOR OTHER TEMPORARY SEEDINGS. CEREAL RYE HAS ALLELOPATHIC PROPERTIES THAT INHIBIT THE GERMINATION AND GROWTH OF OTHER PLANTS IF IT MUST BE USED AS NURSE CROP, SEED AS1/3 OF THE RATE LISTED ABOVE. OATS ARE THE RECOMMENDED NURSE CROP FOR WARM–SEASON GRASSES.

2. FOR SANDY SOILS, PLANT SEEDS AT TWICE THE DEPTH LISTED ABOVE.

3. THE PLANTING DATES LISTED ARE AVERAGES FOR EACH ZONE AND MAY REQUIRE ADJUSTMENTS TO REFLECT LOCAL CONDITIONS, ESPECIALLY NEAR THE BOUNDARIES OF THE ZONE.

B-4-5 STANDARDS AND SPECIFICATIONS FOR PERMANENT STABILIZATION

DEFINITION
TO STABILIZE DISTURBED SOILS WITH PERMANENT VEGETATION.

PURPOSE
TO USE LONG–LIVED PERENNIAL GRASSES AND LEGUMES TO ESTABLISH PERMANENT GROUND COVER ON DISTURBED SOILS.

CONDITIONS WHERE PRACTICE APPLIES
EXPOSED SOILS WHERE GROUND COVER IS NEEDED FOR 6 MONTHS OR MORE.

CRITERIA

A. SEED MIXTURES
  1. GENERAL USE
    A. SELECT ONE OR MORE OF THE SPECIES OR MIXTURES LISTED IN TABLE B.3 FOR THE APPROPRIATE PLANT HARDINESS ZONE (FROM FIGURE B.3) AND BASED ON THE SITE CONDITION OR PURPOSE FOUND ON TABLE B.2. ENTER SELECTED MIXTURE(S), APPLICATION RATES, AND SEEDING DATES IN THE PERMANENT SEEDING SUMMARY. THE SUMMARY IS TO BE PLACED ON THE PLAN.
    B. ADDITIONAL PLANTING SPECIFICATIONS FOR EXCEPTIONAL SITES SUCH AS SHORELINES, STREAM BANKS, OR DUNES OR FOR SPECIAL PURPOSES SUCH AS WILDLIFE OR AESTHETIC TREATMENT MAY BE FOUND IN USDA–NRCS TECHNICAL FIELD OFFICE GUIDE, SECTION 342 – CRITICAL AREA PLANTING.
    C. FOR SITES HAVING DISTURBED AREA OVER 5 ACRES, USE AND SHOW THE RATES RECOMMENDED BY THE SOIL TESTING AGENCY.
    D. FOR AREAS RECEIVING LOW MAINTENANCE, APPLY UREA FORM FERTILIZER (46–0–0) AT 3 1/2 POUNDS PER 1000 SQUARE FEET (150 POUNDS PER ACRE) AT THE TIME OF SEEDING IN ADDITION TO THE SOIL AMENDMENTS SHOWN IN THE PERMANENT SEEDING SUMMARY.
  2. TURFGRASS MIXTURES
    A. AREAS WHERE TURFGRASS MAY BE DESIRED INCLUDE LAWNS, PARKS, PLAYGROUNDS, AND COMMERCIAL SITES WHICH WILL RECEIVE A MEDIUM TO HIGH LEVEL OF MAINTENANCE.
    B. SELECT ONE OR MORE OF THE SPECIES OR MIXTURES LISTED BELOW BASED ON THE SITE CONDITIONS OR PURPOSE. ENTER SELECTED MIXTURE(S), APPLICATION RATES, AND SEEDING DATES IN THE PERMANENT SEEDING SUMMARY. THE SUMMARY IS TO BE PLACED ON THE PLAN.
      I. KENTUCKY BLUEGRASS: FULL SUN MIXTURE: FOR USE IN AREAS THAT RECEIVE INTESIVE MANAGEMENT. IRRIGATION REQUIRED IN THE AREAS OF CENTRAL MARYLAND AND EASTERN SHORE. RECOMMENDED CERTIFIED KENTUCKY BLUEGRASS CULTIVARS SEEDING RATE: 1.5 TO 2.0 POUNDS PER 1000 SQUARE FEET. CHOOSE A MINIMUM OF THREE KENTUCKY BLUEGRASS CULTIVARS WITH EACH RANGING FROM 10 TO 35 PERCENT OF THE TOTAL MIXTURE BY WEIGHT.
      II. KENTUCKY BLUEGRASS/PERENNIAL RYE: FULL SUN MIXTURE: FOR USE IN FULL SUN AREAS WHERE RAPID ESTABLISHMENT IS NECESSARY AND WHEN TURF WILL RECEIVE MEDIUM TO INTENSIVE MANAGEMENT. CERTIFIED PERENNIAL RYEGRASS CULTIVARS/CERTIFIED KENTUCKY BLUEGRASS SEEDING RATE: 2 POUNDS MIXTURE PER 1000 SQUARE FEET. CHOOSE A MINIMUM OF THREE KENTUCKY BLUEGRASS CULTIVARS WITH EACH RANGING FROM 10 TO 35 PERCENT OF THE TOTAL MIXTURE BY WEIGHT.
      III. TALL FESCUE/KENTUCKY BLUEGRASS: FULL SUN MIXTURE: FOR USE IN DROUGHT PRONE AREAS AND/OR FOR UPLAND AREAS RECEIVING LOW TO MEDIUM MANAGEMENT IN FULL SUN TO MEDIUM SHADE. RECOMMENDED MIXTURE INCLUDES; CERTIFIED TALL FESCUE CULTIVARS 95 TO 100 PERCENT, CERTIFIED KENTUCKY BLUEGRASS CULTIVARS 0 TO 5 PERCENT. SEEDING RATE: 5 TO 8 POUNDS PER 1000 SQUARE FEET. ONE OR MORE CULTIVARS MAY BE BLENDED.
      IV. KENTUCKY BLUEGRASS/FINE FESCUE: SHADE MIXTURE: FOR USE IN AREAS WITH SHADE IN BLUEGRASS LAWNS. FOR ESTABLISHMENT IN HIGH QUALITY, INTENSIVELY MANAGED TURF AREA. MIXTURE INCLUDES; CERTIFIED KENTUCKY BLUEGRASS CULTIVARS 30 TO 40 PERCENT AND CERTIFIED FINE FESCUE AND 60 TO 70 PERCENT. SEEDING RATE: 1 1/2 TO 3 POUNDS PER 1000 SQUARE FEET.

      NOTES:
      SELECT TURFGRASS VARIETIES FROM THOSE LISTED IN THE MOST CURRENT UNIVERSITY OF MARYLAND PUBLICATION, AGRONOMY MEMO #77, "TURFGRASS CULTIVAR RECOMMENDATIONS FOR MARYLAND"
      CHOOSE CERTIFIED MATERIAL. CERTIFIED MATERIAL IS THE BEST GUARANTEE OF CULTIVAR PURITY. THE CERTIFICATION PROGRAM OF THE MARYLAND DEPARTMENT OF AGRICULTURE, TURF AND SEED SECTION, PROVIDES A RELIABLE MEANS OF CONSUMER PROTECTION AND ASSURES A PURE GENETIC LINE.
    C. IDEAL TIMES OF SEEDING FOR TURF GRASS MIXTURES
      WESTERN MD: MARCH 15 TO JUNE 1, AUGUST 1 TO OCTOBER 1 (HARDINESS ZONES: 5B, 6A)
      CENTRAL MD: MARCH 1 TO MAY 15, AUGUST 15 TO OCTOBER 15 (HARDINESS ZONE: 6B)
      SOUTHERN MD, EASTERN SHORE: MARCH 1 TO MAY 15, AUGUST 15 TO OCTOBER 15 (HARDINESS ZONES: 7A, 7B)
    D. TILL AREAS TO RECEIVE SEED BY DISKING OR OTHER APPROVED METHODS TO A DEPTH OF 2 TO 4 INCHES, LEVEL AND RAKE THE AREAS TO PREPARE A PROPER SEEDBED. REMOVE STONES AND DEBRIS OVER 1½ INCHES IN DIAMETER. THE RESULTING SEEDBED MUST BE IN SUCH CONDITION THAT FUTURE MOWING OF GRASSES WILL POSE NO DIFFICULTY.
    E. IF SOIL MOISTURE IS DEFICIENT, SUPPLY NEW SEEDINGS WITH ADEQUATE WATER FOR PLANT GROWTH (½ TO 1 INCH EVERY 3 TO 4 DAYS DEPENDING ON SOIL TEXTURE) UNTIL THEY ARE FIRMLY ESTABLISHED. THIS IS ESPECIALLY TRUE WHEN SEEDINGS ARE MADE LATE IN THE PLANTING SEASON, IN ABNORMALLY DRY OR HOT SEASONS, OR ON ADVERSE SITES.

PERMANENT SEEDING SUMMARY FOR UPLAND AREAS

HARDINESS ZONE (from figure B.3): 6b SEED MIXTURE (from table B.1):					FERTILIZER RATE (10–20–20)			LIME RATE
NO.	SPECIES	APPLICATION RATE (lb/ac)	SEEDING DATES	SEEDING DEPTHS	N	P_2O	K_2O	
	KENTUCKY BLUEGRASS 10% TURF–TYPE TALL FESCUE 40% GRADE TALL FESCUE 30% PERENNIAL RYEGRASS 20%	250	3/15 – 5/15 OR 8/15 – 11/15	1/4 – 1/2 in.	45 POUNDS PER ACRE (1.0 lb/ 1000 sf)	90 lb/ac (2 lb/ 1000 sf)	90 lb/ac (2 lb/ 1000 sf)	2 tons/ac (90 lb/1000 sf)
	KENTUCKY BLUEGRASS 10% TURF–TYPE TALL FESCUE 40% GRADE TALL FESCUE 30% PERENNIAL RYEGRASS 20%	350	3/15 – 5/15 OR 8/15 – 11/15	1/4 – 1/2 in.				

B. SOD: TO PROVIDE QUICK COVER ON DISTURBED AREAS (2:1 GRADE OR FLATTER).
  1. GENERAL SPECIFICATIONS
    A. CLASS OF TURFGRASS SOD MUST BE MARYLAND STATE CERTIFIED. SOD LABELS MUST BE MADE AVAILABLE TO THE JOB FOREMAN AND INSPECTOR.
    B. SOD MUST BE MACHINE CUT AT A UNIFORM SOIL THICKNESS OF 3/4", PLUS OR MINUS 1/4 INCH, AT THE TIME OF CUTTING. MEASUREMENT FOR THICKNESS MUST EXCLUDE TOP GROWTH AND THATCH. BROKEN PADS AND TORN OR UNEVEN ENDS WILL NOT BE ACCEPTABLE.
    C. STANDARD SIZE SECTIONS OF SOD MUST BE STRONG ENOUGH TO SUPPORT THEIR OWN WEIGHT AND RETAIN THEIR SIZE AND SHAPE WHEN SUSPENDED VERTICALLY WITH A FIRM GRASP ON THE UPPER 10 PERCENT OF THE SECTION.
    D. SOD MUST NOT BE HARVESTED OR TRANSPLANTED WHEN MOISTURE CONTENT (EXCESSIVELY DRY OR WET) MAY ADVERSELY AFFECT ITS SURVIVAL.
    E. SOD MUST BE HARVESTED, DELIVERED, AND INSTALLED WITHIN A PERIOD OF 36 HOURS. SOD NOT TRANSPLANTED WITHIN THIS PERIOD MUST BE APPROVED BY AN AGRONOMIST OR SOIL SCIENTIST PRIOR TO ITS INSTALLATION.
  2. SOD INSTALLATION
    A. DURING PERIODS OF EXCESSIVELY HIGH TEMPERATURE OR IN AREAS HAVING DRY SUBSOIL, LIGHTLY IRRIGATE THE SUBSOIL IMMEDIATELY PRIOR TO LAYING THE SOD.
    B. LAY THE FIRST ROW OF SOD IN A STRAIGHT LINE WITH SUBSEQUENT ROWS PLACED PARALLEL TO IT AND TIGHTLY WEDGED AGAINST EACH OTHER. STAGGER LATERAL JOINTS TO PROMOTE MORE UNIFORM GROWTH AND STRENGTH. ENSURE THAT SOD IS NOT STRETCHED OR OVERLAPPED AND THAT ALL JOINTS ARE BUTTED TIGHT IN ORDER TO PREVENT VOIDS WHICH WOULD CAUSE AIR DRYING OF THE ROOTS.
    C. WHEREVER POSSIBLE, LAY SOD WITH THE LONG EDGES PARALLEL TO THE CONTOUR AND WITH STAGGERING JOINTS. ROLL AND TAMP, PEG OR OTHERWISE SECURE THE SOD TO PREVENT SLIPPAGE ON SLOPES. ENSURE SOLID CONTACT EXISTS BETWEEN SOD ROOTS AND THE UNDERLYING SOIL SURFACE.
    D. WATER THE SOD IMMEDIATELY FOLLOWING ROLLING AND TAMPING UNTIL THE UNDERSIDE OF THE NEW SOD PAD AND SOIL SURFACE BELOW THE SOD ARE THOROUGHLY WET. COMPLETE THE OPERATIONS OF LAYING, TAMPING AND IRRIGATING FOR ANY PIECE OF SOD WITHIN EIGHT HOURS.
  3. SOD MAINTENANCE
    A. IN THE ABSENCE OF ADEQUATE RAINFALL, WATER DAILY DURING THE FIRST WEEK OR AS OFTEN AND SUFFICIENTLY AS NECESSARY TO MAINTAIN MOIST SOIL TO A DEPTH OF 4 INCHES. WATER SOD DURING THE HEAT OF THE DAY TO PREVENT WILTING.
    B. AFTER THE FIRST WEEK, SOD WATERING IS REQUIRED AS NECESSARY TO MAINTAIN ADEQUATE MOISTURE CONTENT.
    C. DO NOT MOW UNTIL THE SOD IS FIRMLY ROOTED. NO MORE THAN 1/3 OF THE GRASS LEAF MUST BE REMOVED BY THE INITIAL CUTTING OR SUBSEQUENT CUTTINGS. MAINTAIN A GRASS HEIGHT OF AT LEAST 3 INCHES UNLESS OTHERWISE SPECIFIED.

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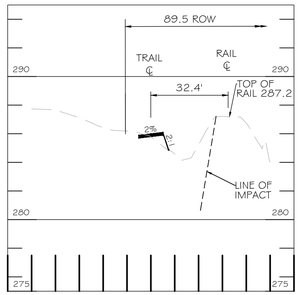
DRAWN BY	AS

ESC NOTES

FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-21

KCI JOB NUMBER 272006468



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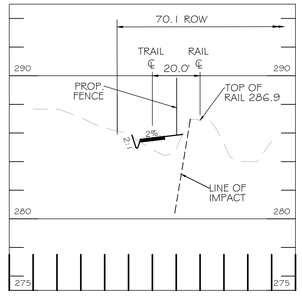

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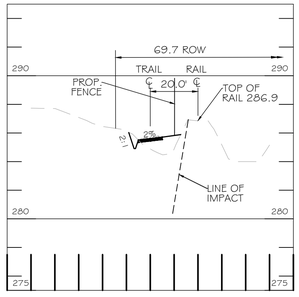

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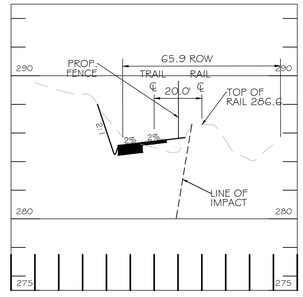

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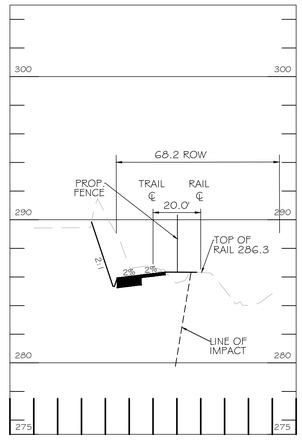

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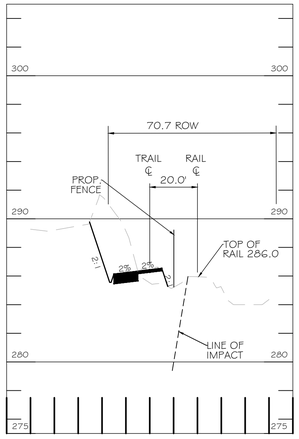

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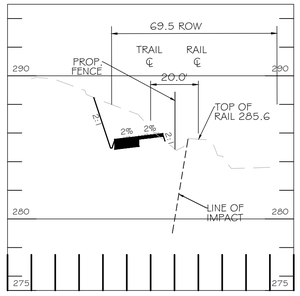

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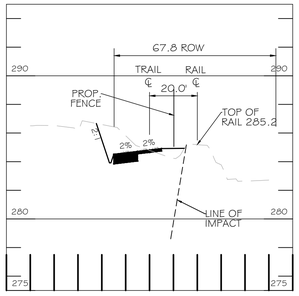

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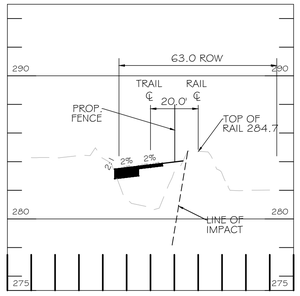

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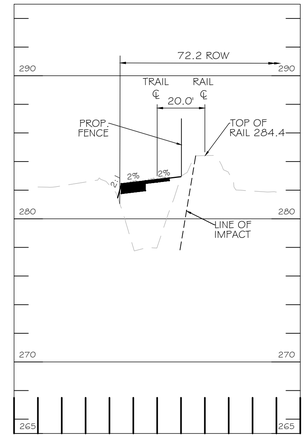

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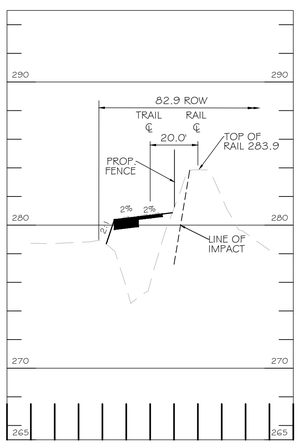

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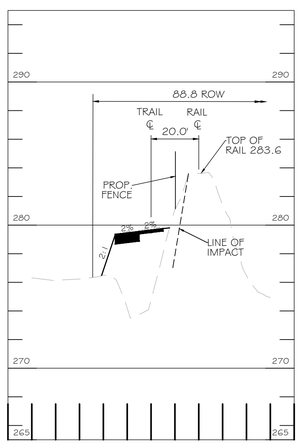

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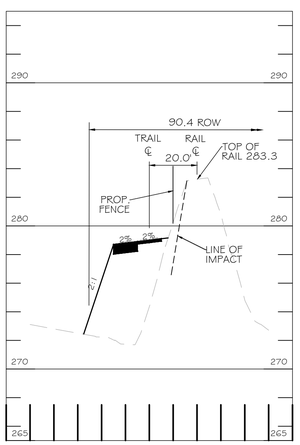

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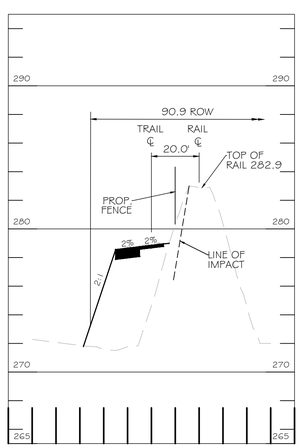

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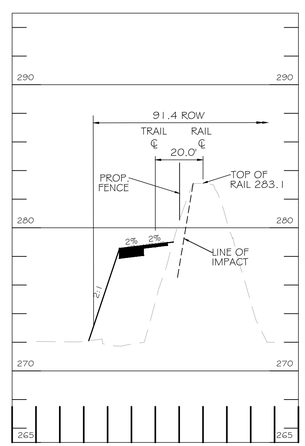

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DATE 12/1/2021
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TYPICAL CROSS SECTIONS
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FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

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SHEET 22 OF 55
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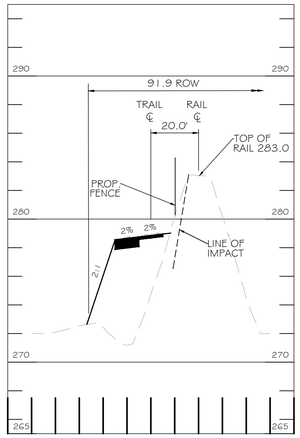

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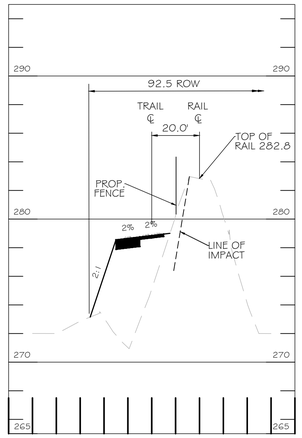

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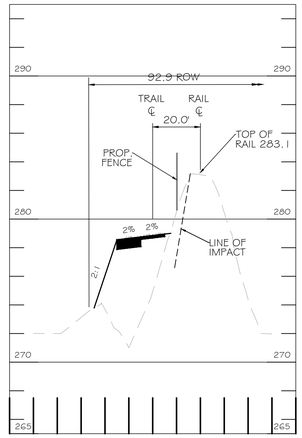

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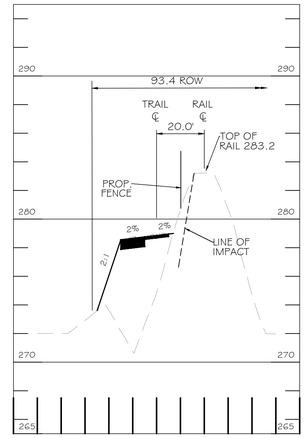

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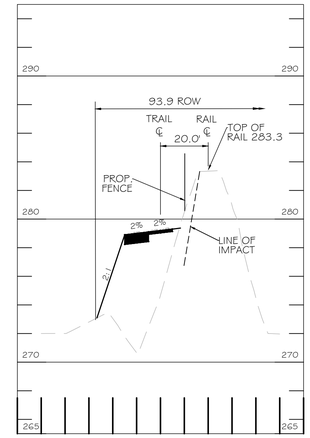

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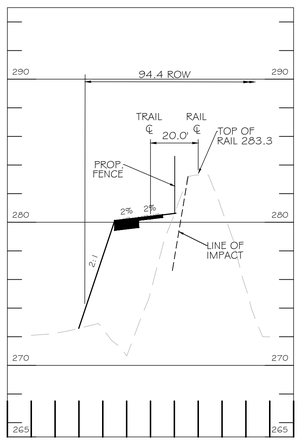

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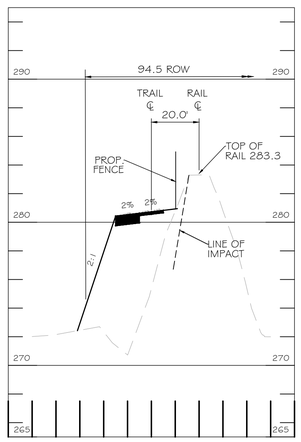

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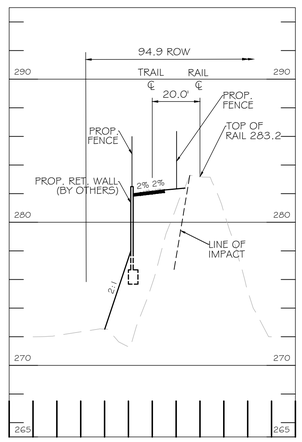

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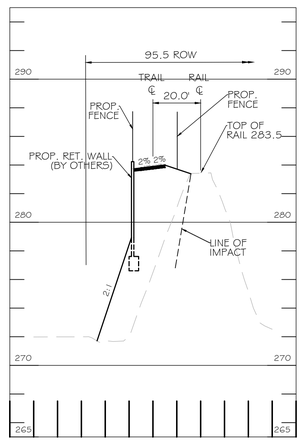

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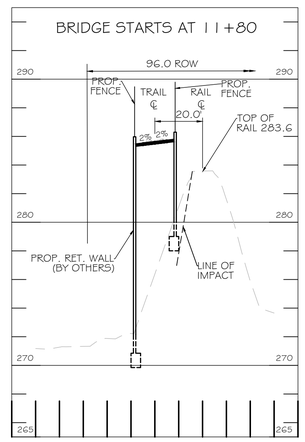

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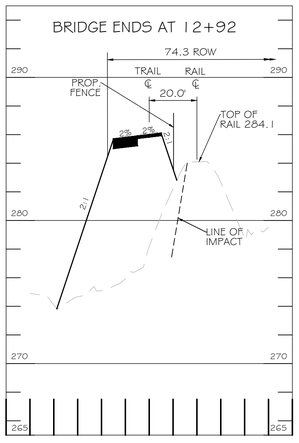

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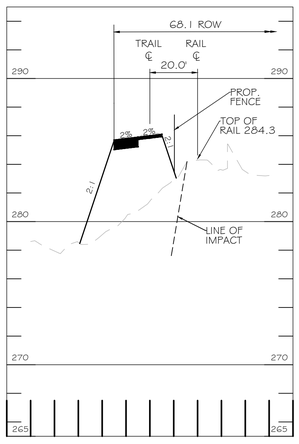

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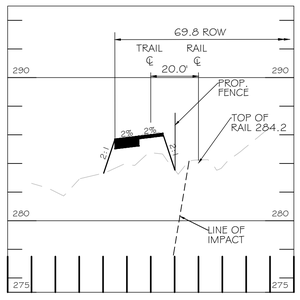

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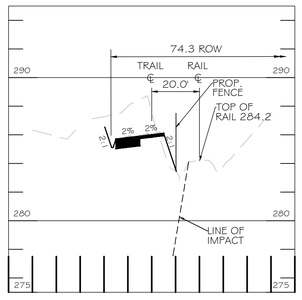

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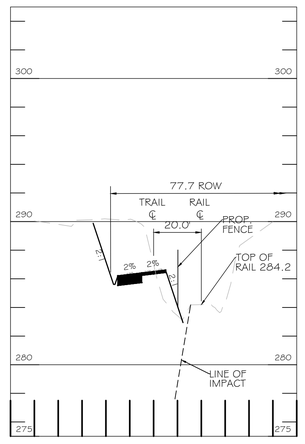

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TYPICAL CROSS SECTIONS
STA. 7+50 - 15+00
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-23
SHEET 23 OF 55
KCI JOB NUMBER 272006468

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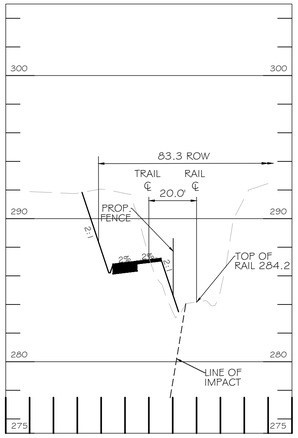

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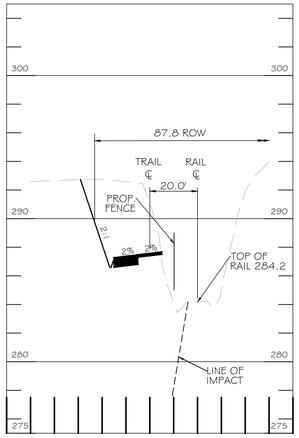

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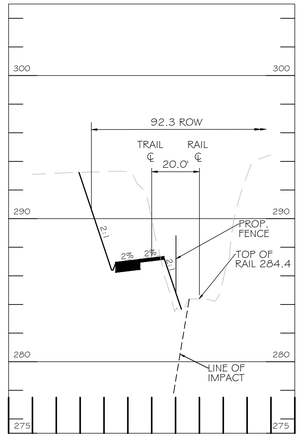

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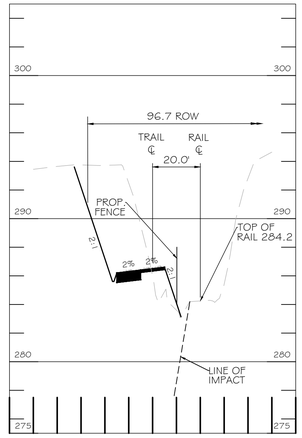

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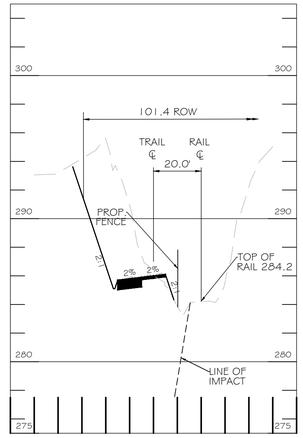

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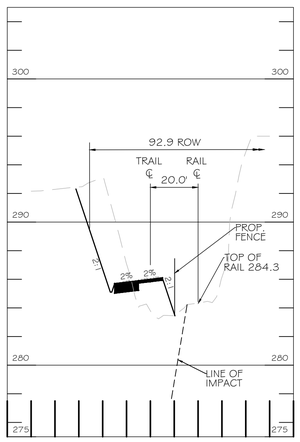

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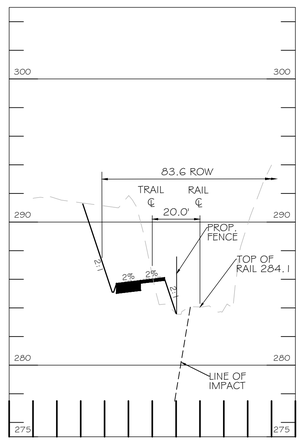

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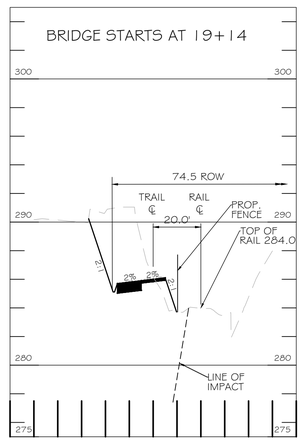

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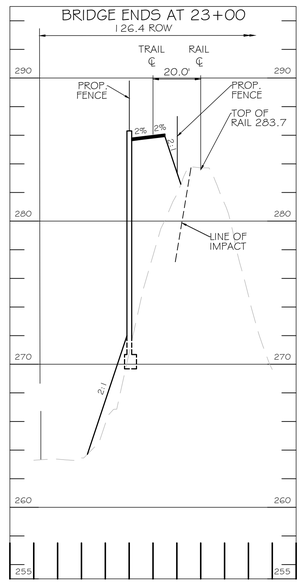

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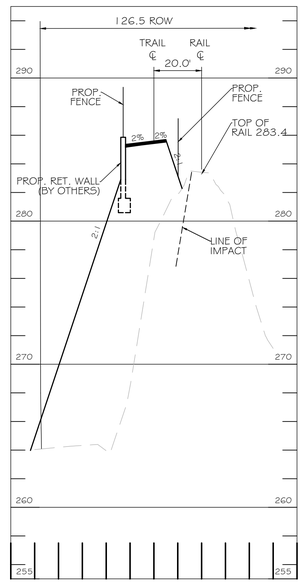

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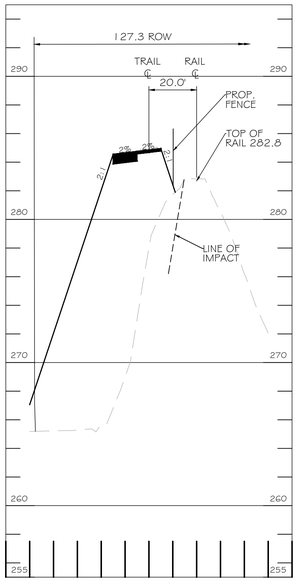

24+50
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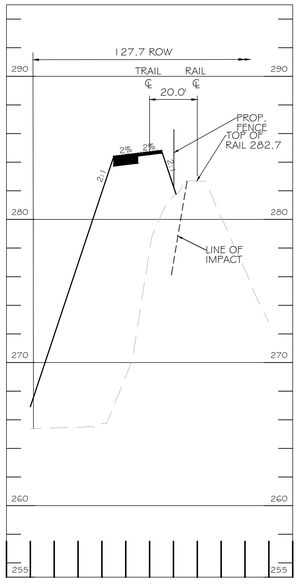

24+59.23
SCALE: 1" = 30'

KCI TECHNOLOGIES
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CONSTRUCTION MANAGERS
936 RIDGEBROOK ROAD
SPARKS, MARYLAND 21152
TELEPHONE: (410) 316-7800
FAX: (410) 316-7818

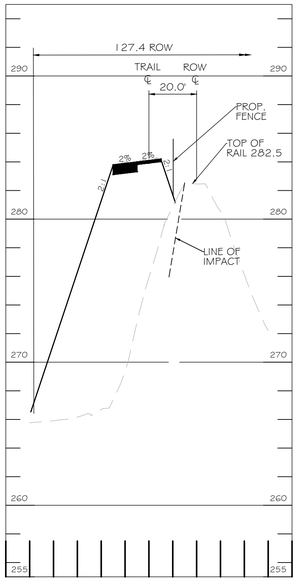
REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 12/1/2021
SCALE:
DESIGNED BY: JDL
DRAWN BY: AS

TYPICAL CROSS SECTIONS
STA. 15+50 - 24+59.23
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-24
SHEET 24 OF 55
KCI JOB NUMBER: 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



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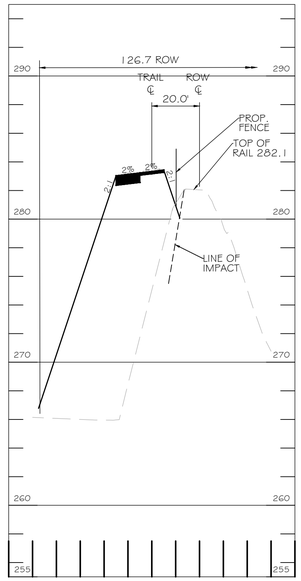

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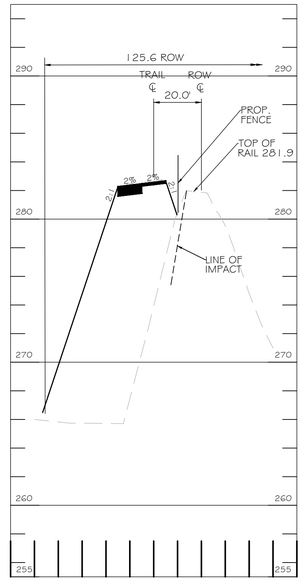

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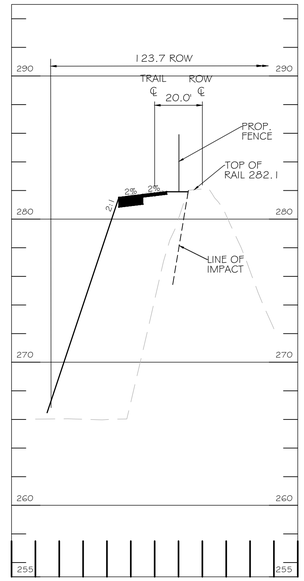

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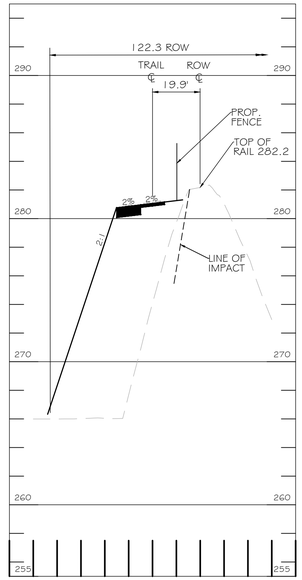

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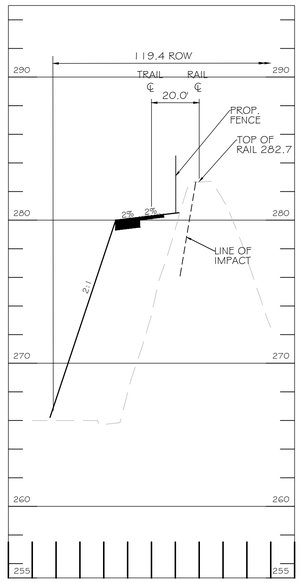

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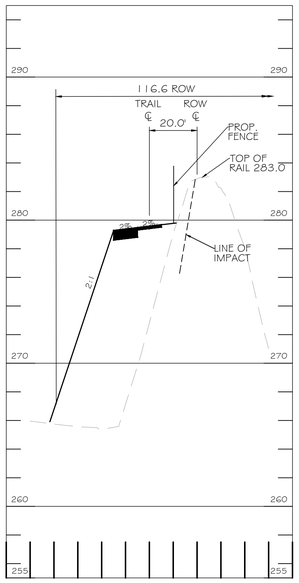

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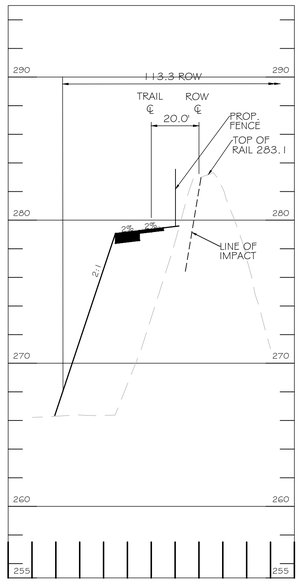

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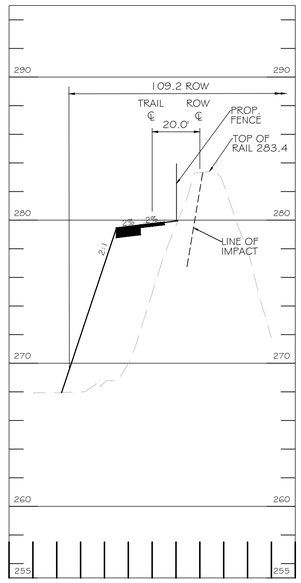

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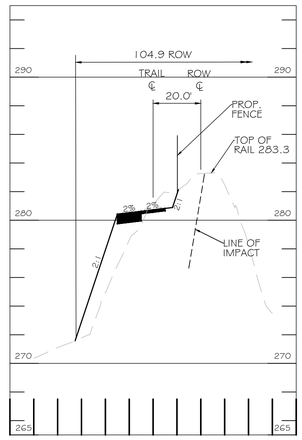

29+50
SCALE: 1" = 30'

KCI TECHNOLOGIES

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936 Ridgebrook Road
Sparks, Maryland 21152
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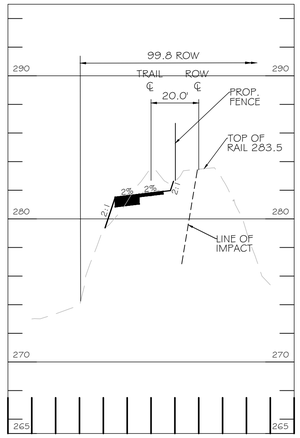
REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 12/1/2021
SCALE:
DESIGNED BY: JDL
DRAWN BY: AS

TYPICAL CROSS SECTIONS
STA. 25+00 - 29+50
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-25
SHEET 25 OF 55
KCI JOB NUMBER 272006468



30+00
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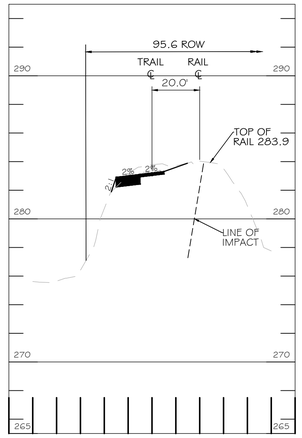

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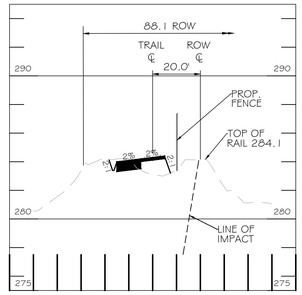

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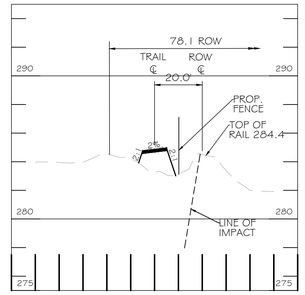

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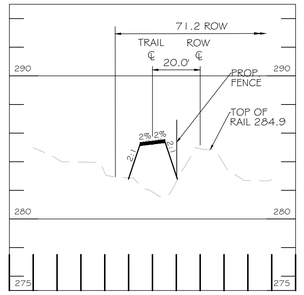

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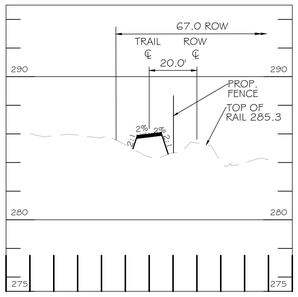

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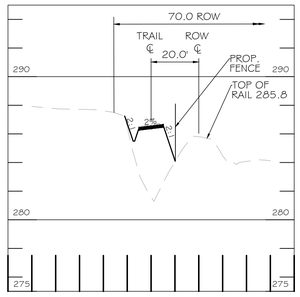

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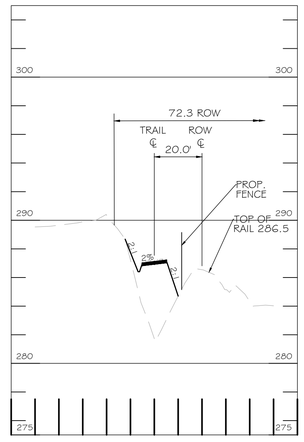

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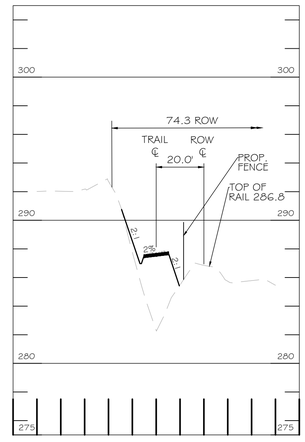

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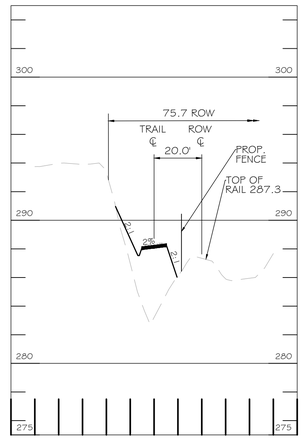

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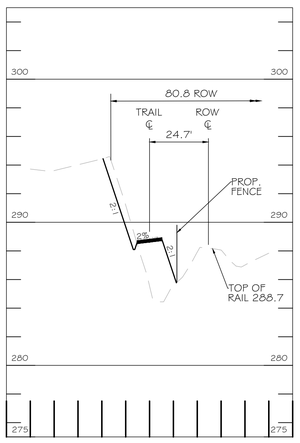

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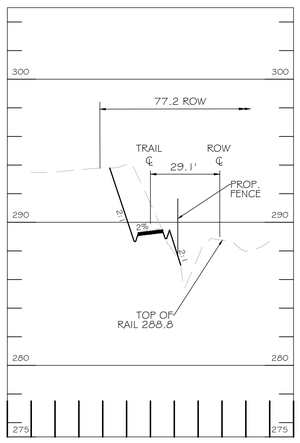

36+00
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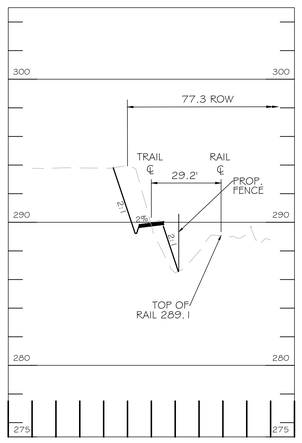

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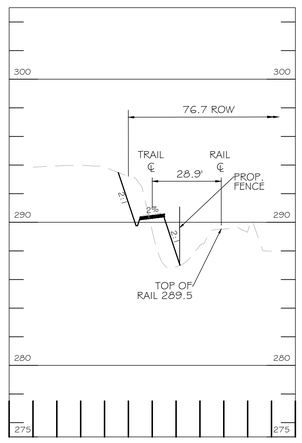

37+00
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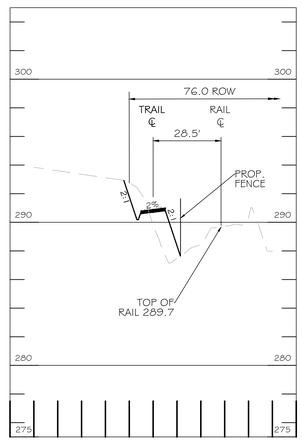

37+50
SCALE: 1" = 30'

KCI TECHNOLOGIES
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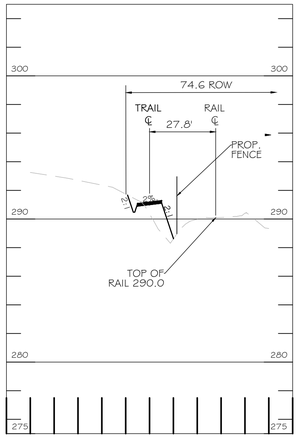
REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE 12/1/2021
SCALE
DESIGNED BY JDL
DRAWN BY AS

TYPICAL CROSS SECTIONS
STA. 30+00 - 37+50
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-26
SHEET 26 OF 55
KCI JOB NUMBER 272006468



38+00
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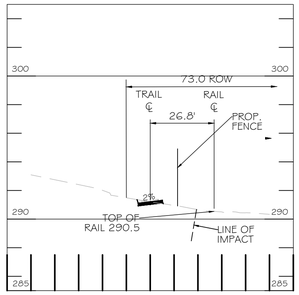

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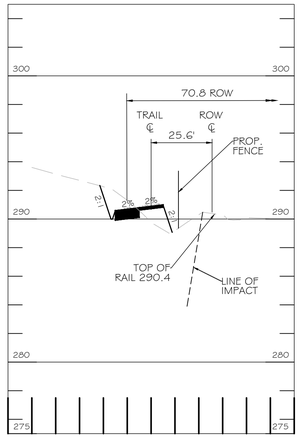

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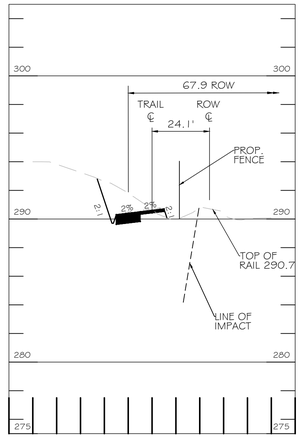

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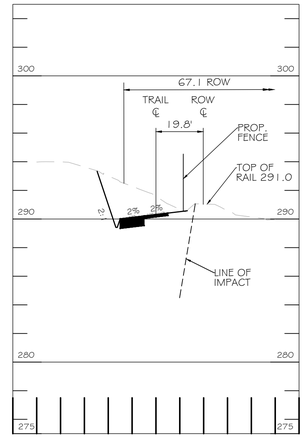

40+00
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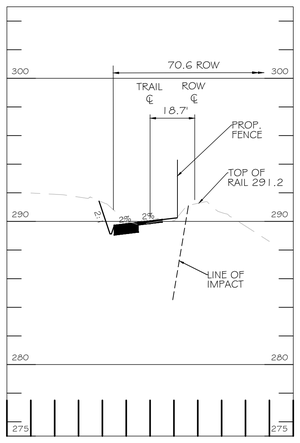

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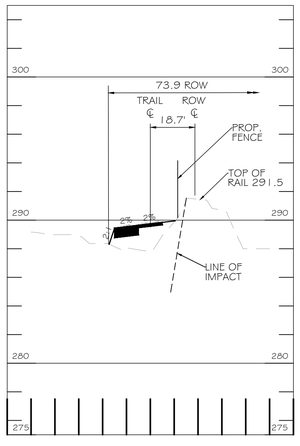

41+00
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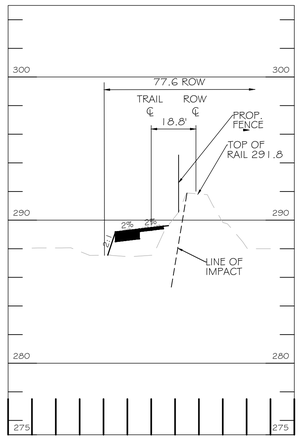

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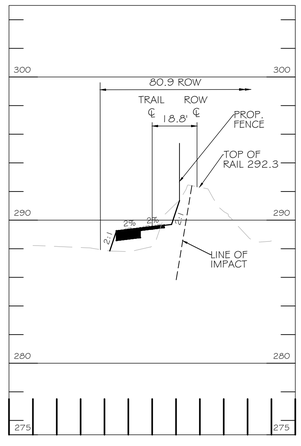

42+00
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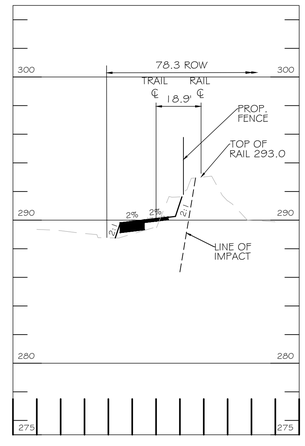

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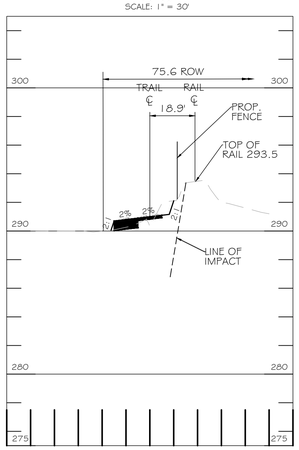

43+00
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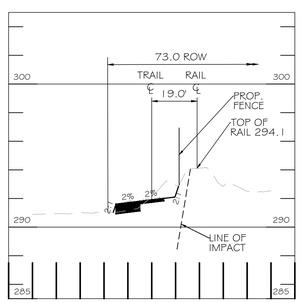

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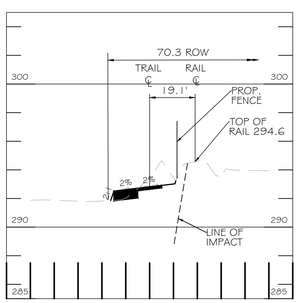

44+00
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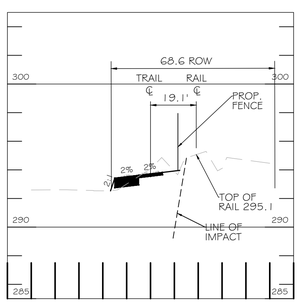

44+50
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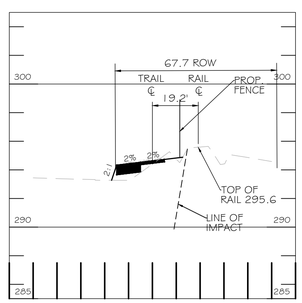

45+00
SCALE: 1" = 30'

KCI TECHNOLOGIES
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FAX: (410) 316-7818

REVISIONS

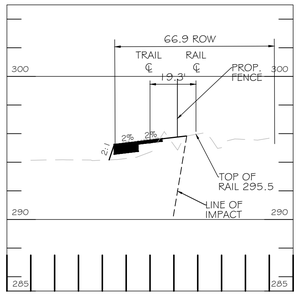
NO.	DATE	DESCRIPTION	BY

DATE 12/1/2021
SCALE
DESIGNED BY JDL
DRAWN BY AS

TYPICAL CROSS SECTIONS
STA. 38+00 - 45+00
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-27
SHEET 27 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



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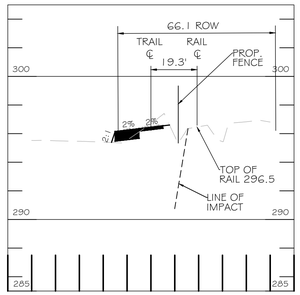

46+00
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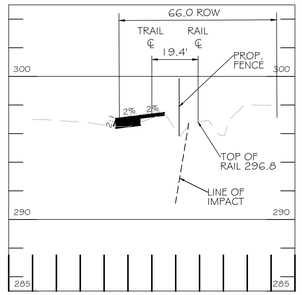

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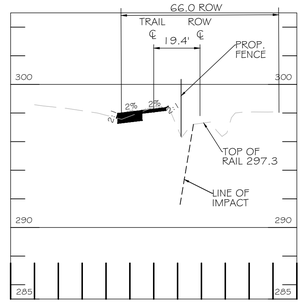

47+00
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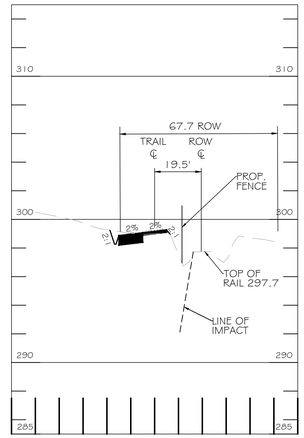

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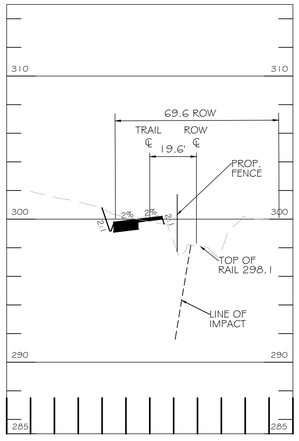

48+00
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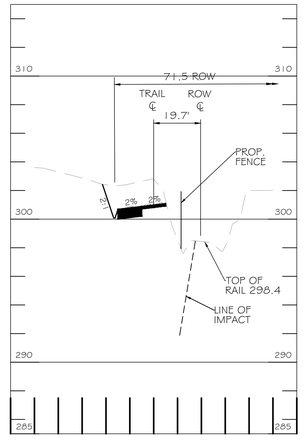

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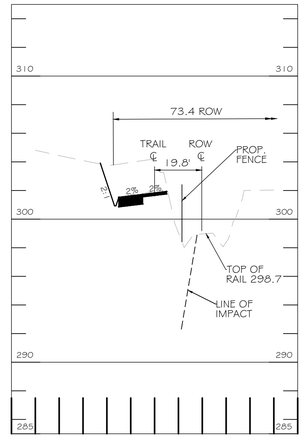

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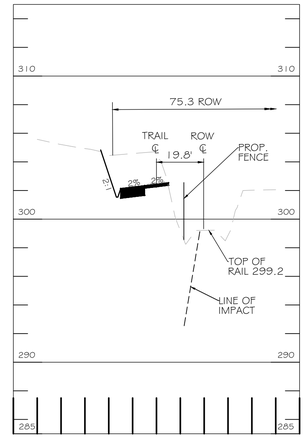

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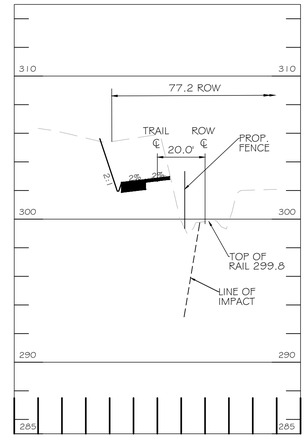

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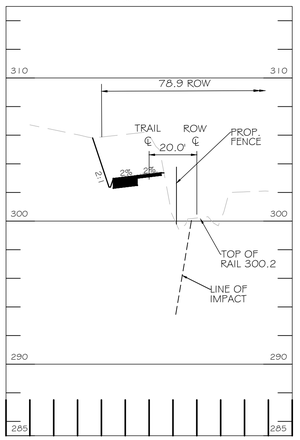

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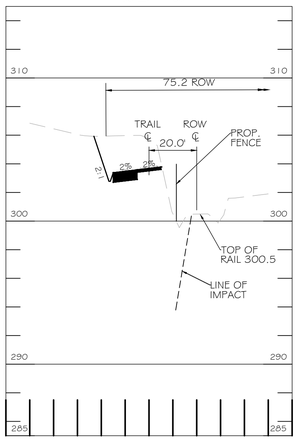

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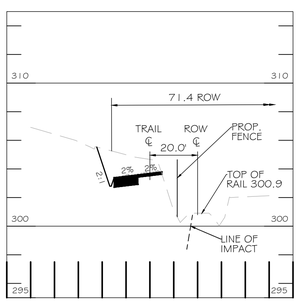

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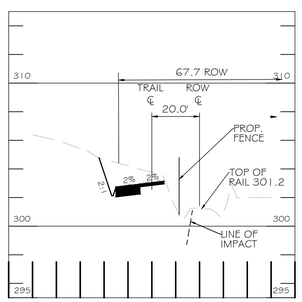

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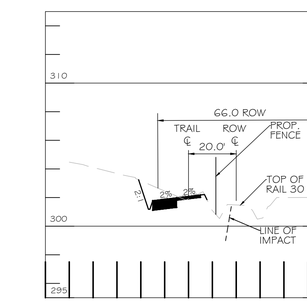

52+50
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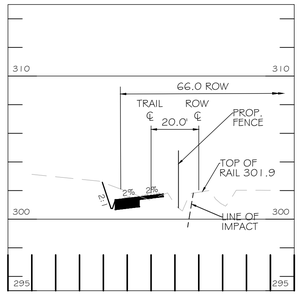
REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE 12/1/2021
SCALE
DESIGNED BY JDL
DRAWN BY AS

TYPICAL CROSS SECTIONS
STA. 45+50 - 52+50
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-28
SHEET 28 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



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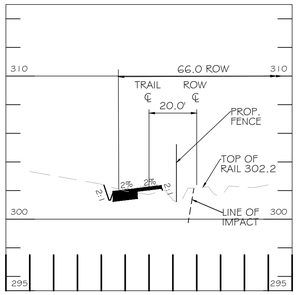

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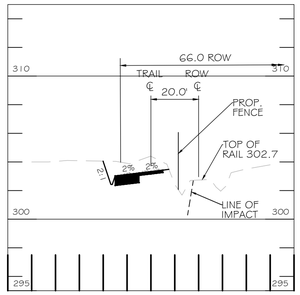

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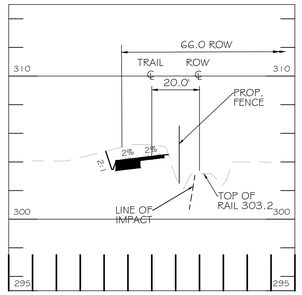

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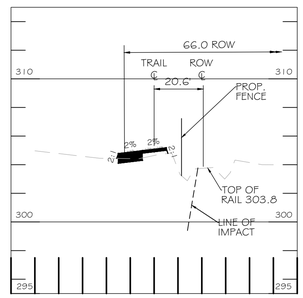

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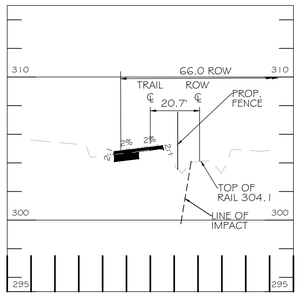

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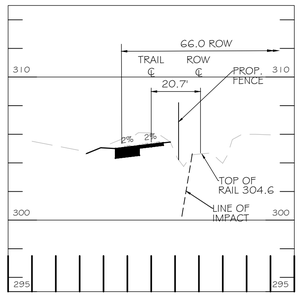

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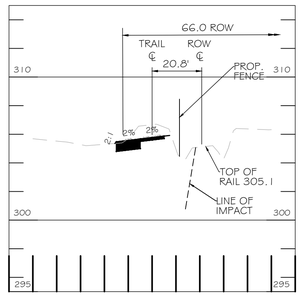

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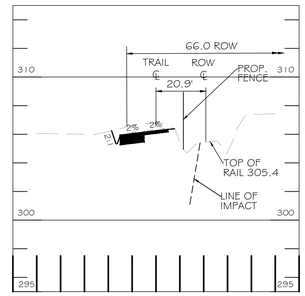

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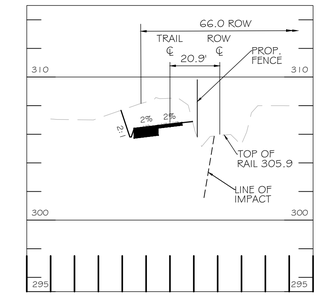

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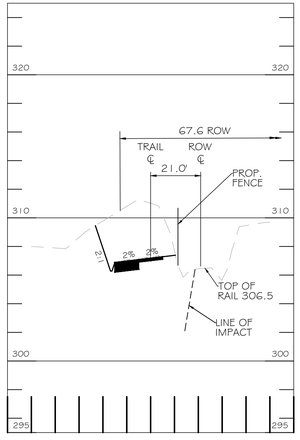

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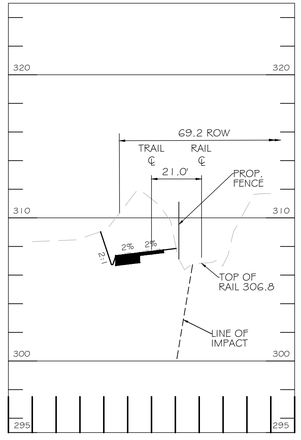

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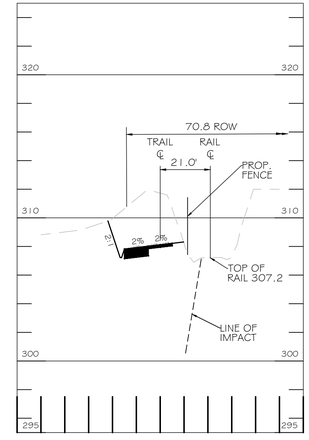

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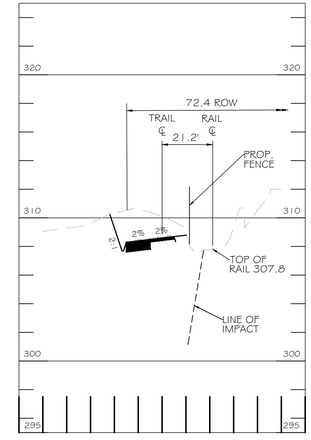

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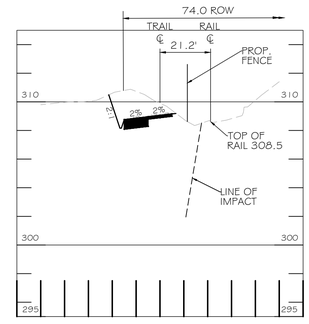

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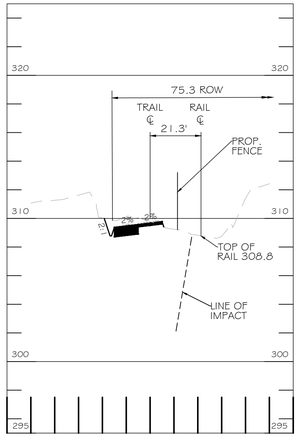
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-29
SHEET 29 OF 55
KCI JOB NUMBER 272006468



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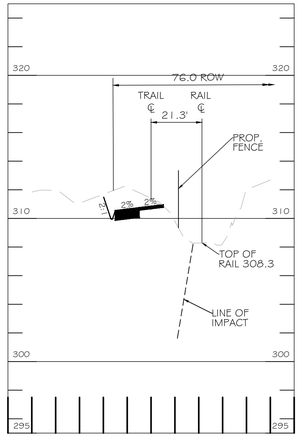

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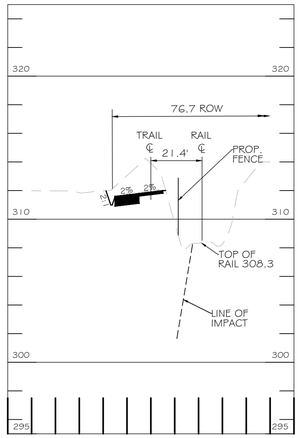

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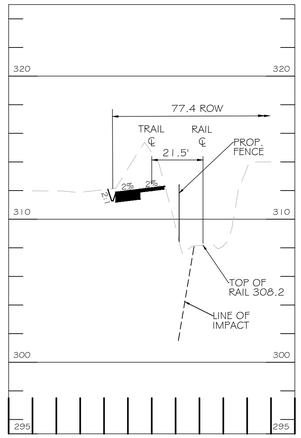

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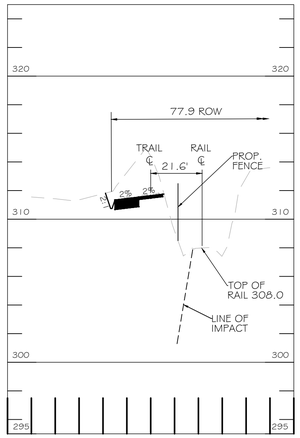

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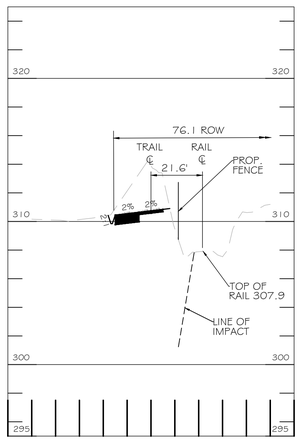

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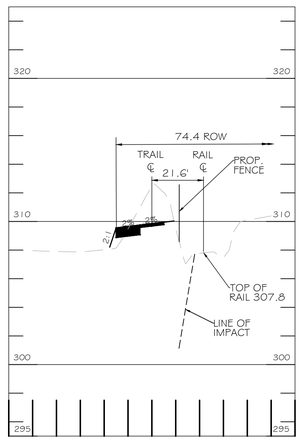

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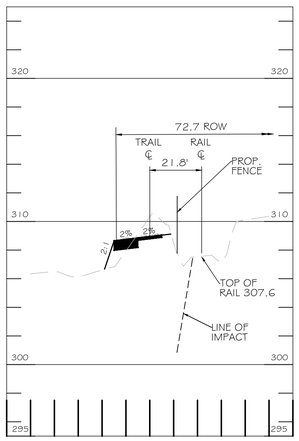

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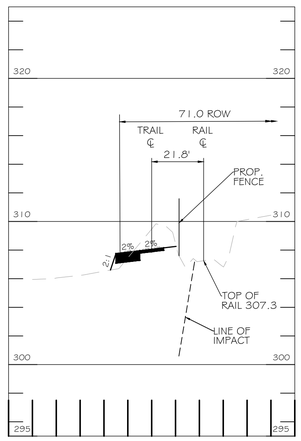

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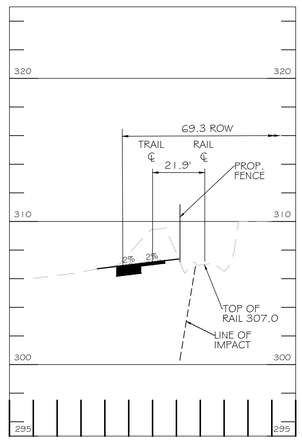

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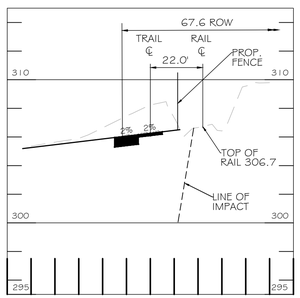

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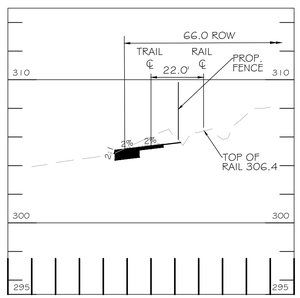

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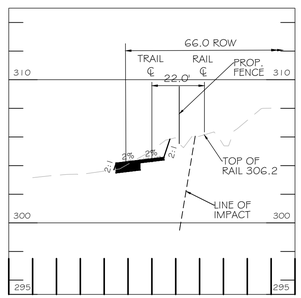

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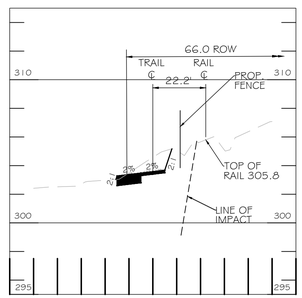

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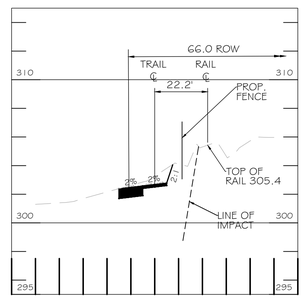

68+00
SCALE: 1" = 30'

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

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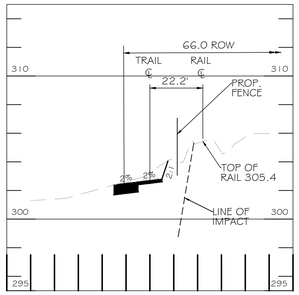
NO.	DATE	DESCRIPTION	BY

DATE: 12/1/2021
SCALE:
DESIGNED BY: JDL
DRAWN BY: AS

TYPICAL CROSS SECTIONS
STA. 61+00 - 68+00
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO.
C-30
SHEET 30 OF 55
KCI JOB NUMBER
272006468



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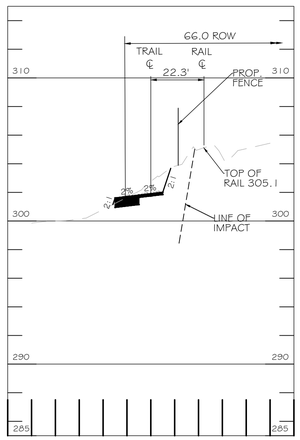

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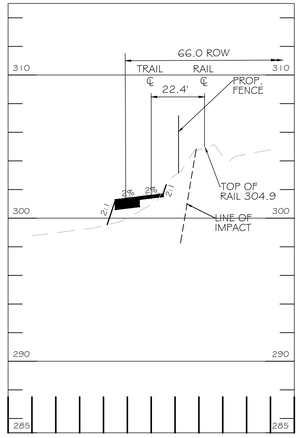

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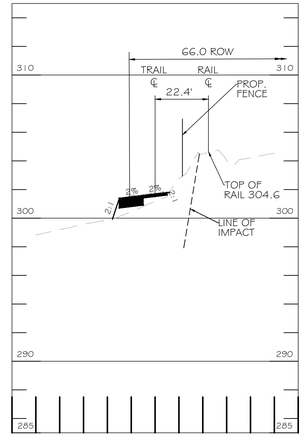

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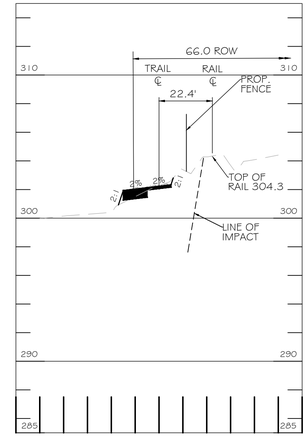

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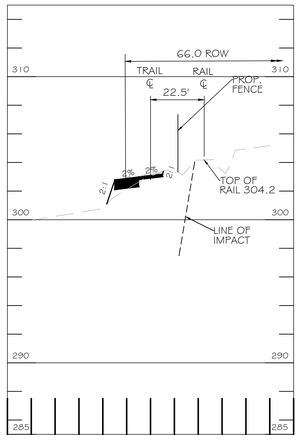

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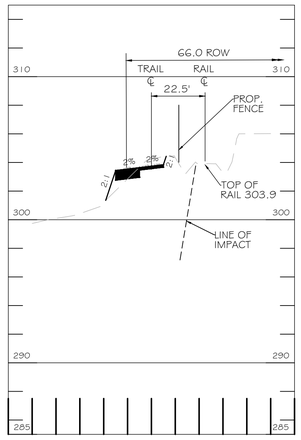

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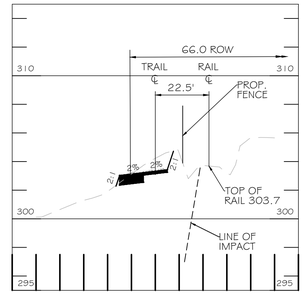

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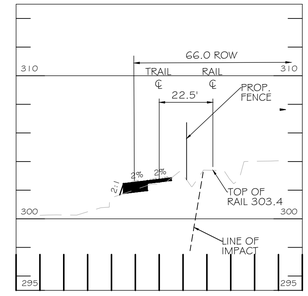

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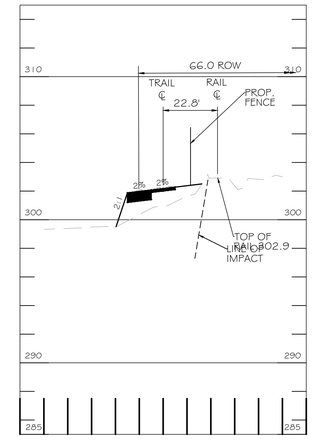

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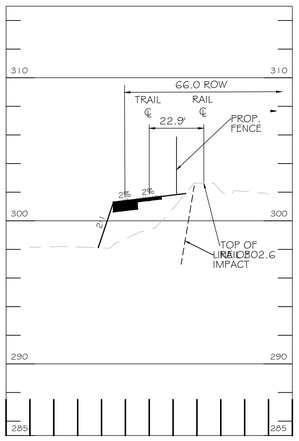

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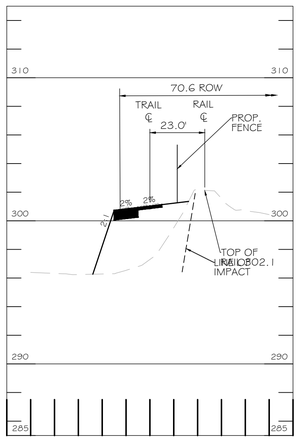

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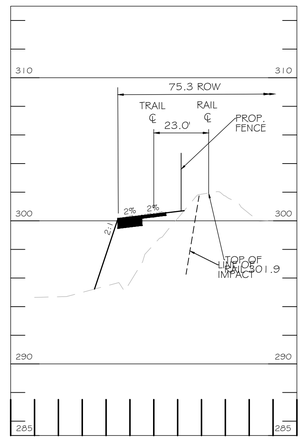

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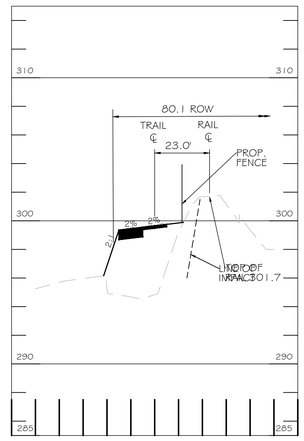

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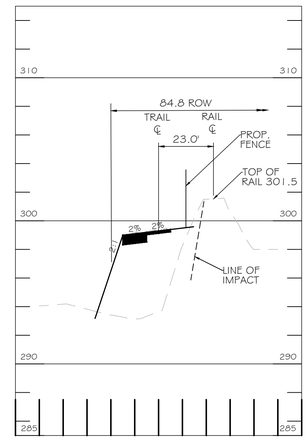

75+00
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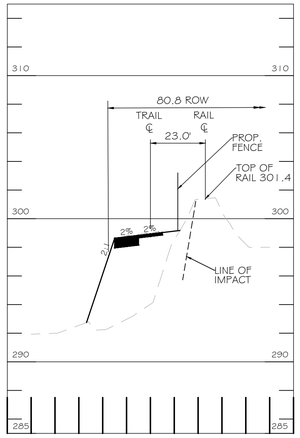
DATE 12/1/2021
SCALE
DESIGNED BY JDL
DRAWN BY AS

TYPICAL CROSS SECTIONS
STA. 68+50 - 75+00
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-31
SHEET 31 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



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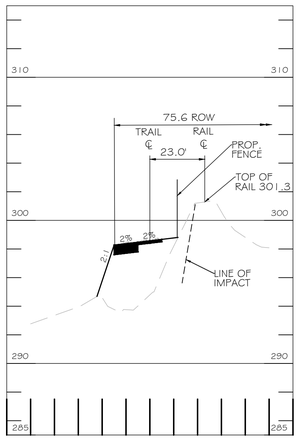

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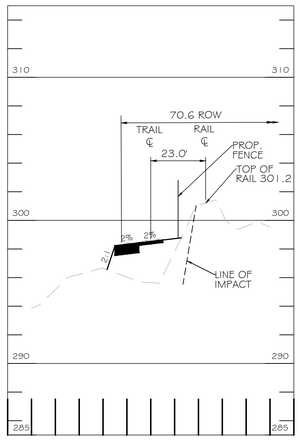

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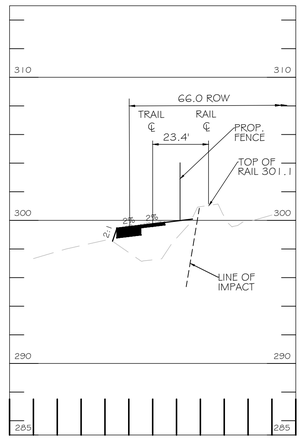

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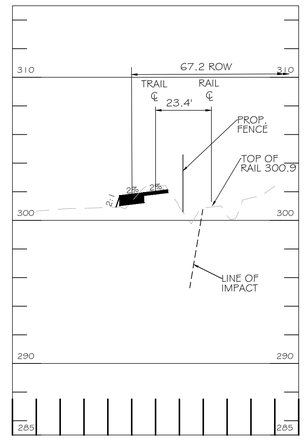

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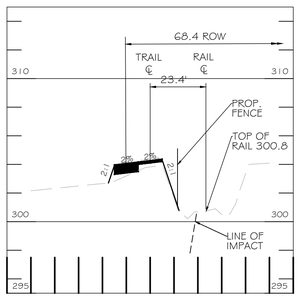

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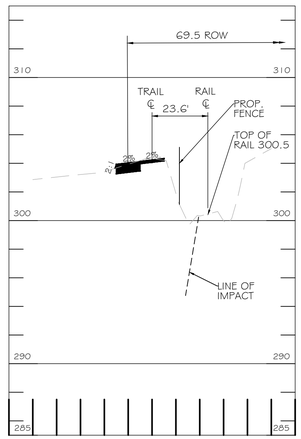

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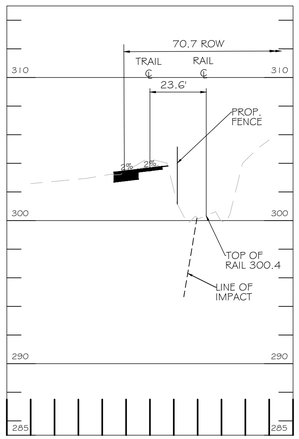

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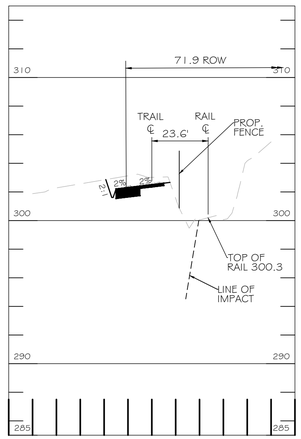

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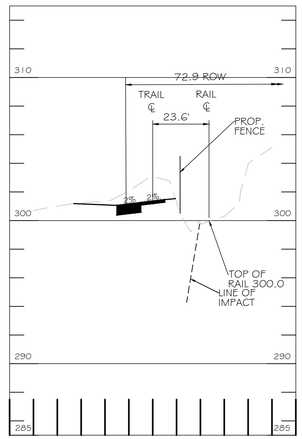

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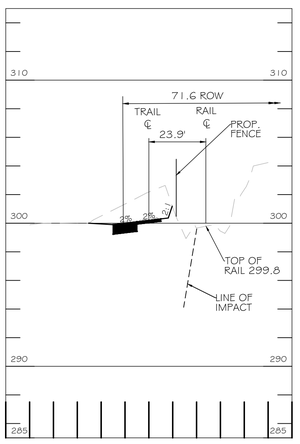

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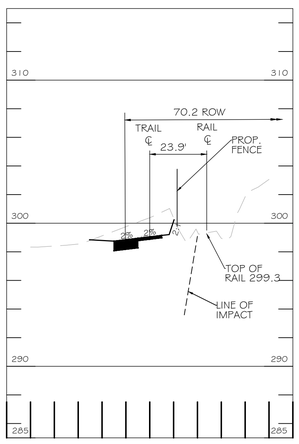

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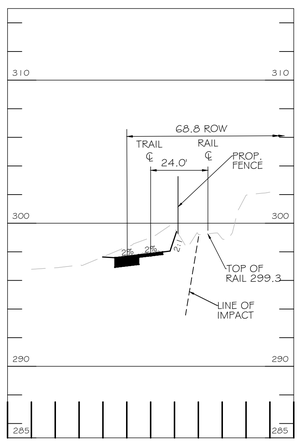

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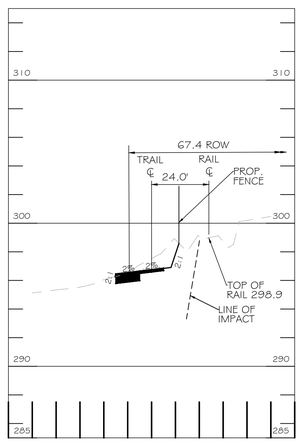

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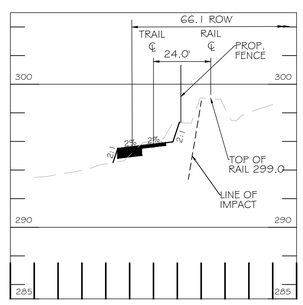

82+50
SCALE: 1" = 30'

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SPARKS, MARYLAND 21152
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FAX: (410) 316-7819

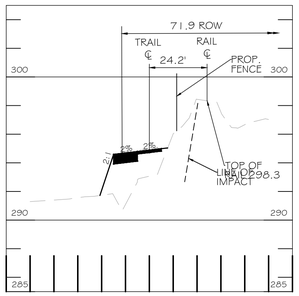
REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE 12/1/2021
SCALE
DESIGNED BY JDL
DRAWN BY AS

TYPICAL CROSS SECTIONS
STA. 75+50 - 82+50
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

DRAWING NO. C-32
SHEET 32 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



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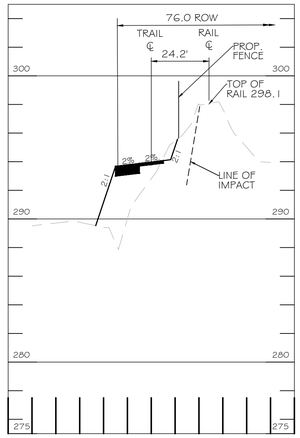

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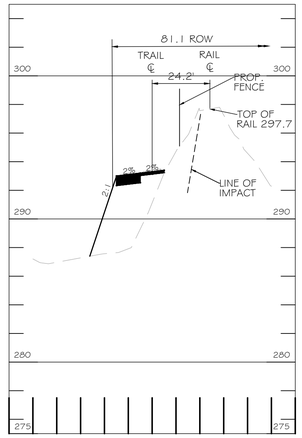

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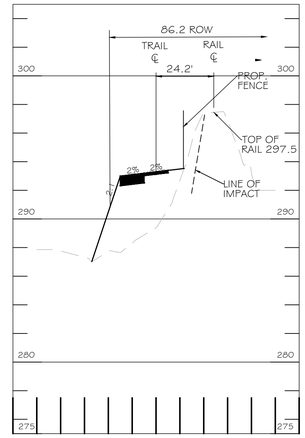

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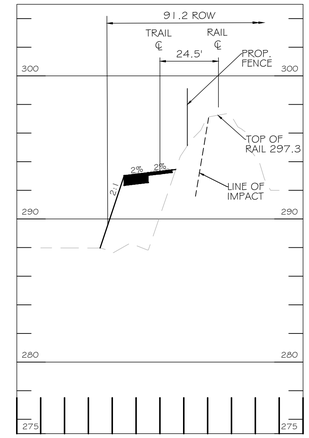

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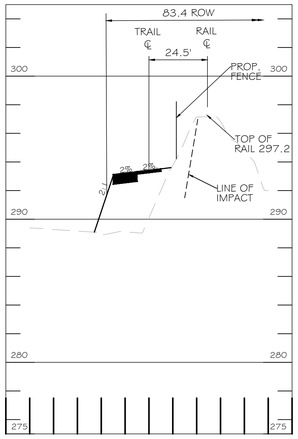

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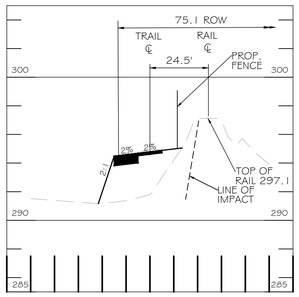

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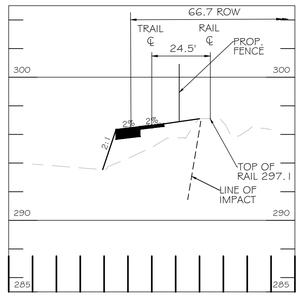

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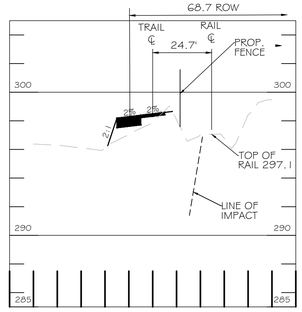

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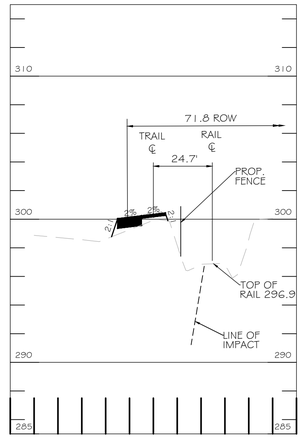

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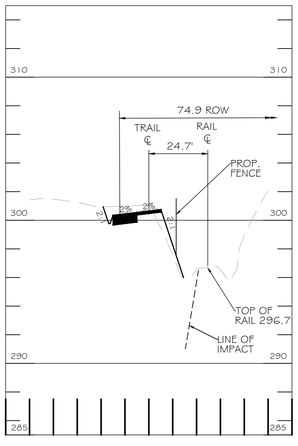

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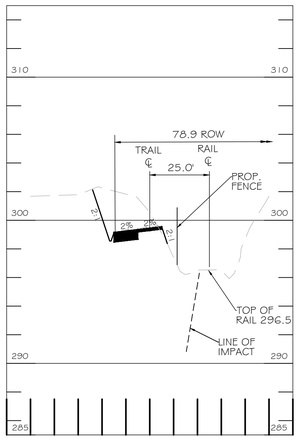

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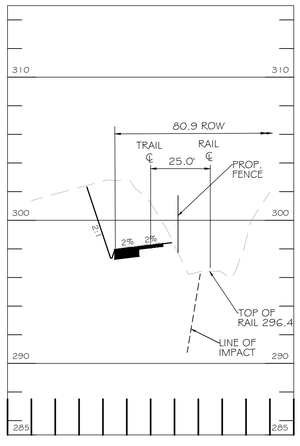

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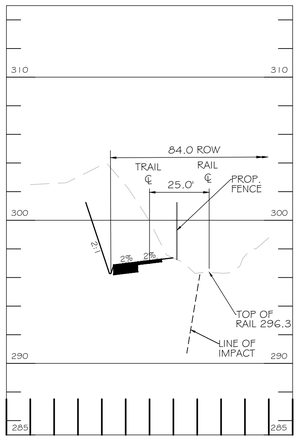

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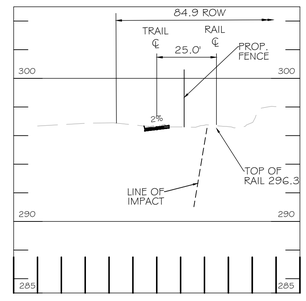

90+00
SCALE: 1" = 30'

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REVISIONS

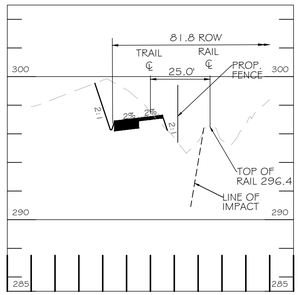
NO.	DATE	DESCRIPTION	BY

DATE 12/1/2021
SCALE
DESIGNED BY JDL
DRAWN BY AS

TYPICAL CROSS SECTIONS
STA. 83+00 - 90+00
FREDERICK AND PENNSYLVANIA
LINE RAILROAD TRAIL

DRAWING NO. C-33
SHEET 33 OF 55
KCI JOB NUMBER 27200648

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



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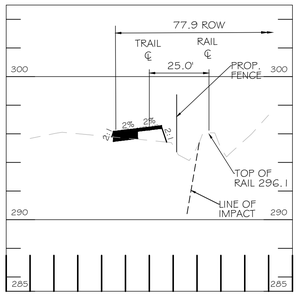

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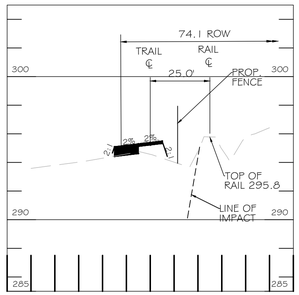

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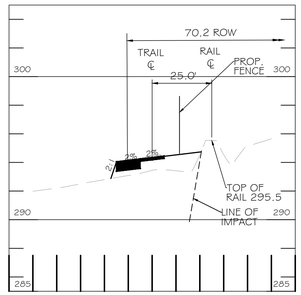

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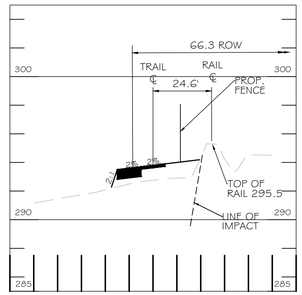

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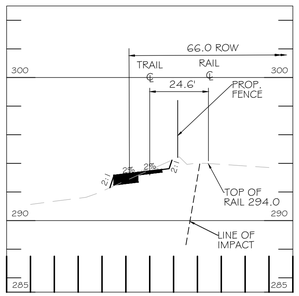

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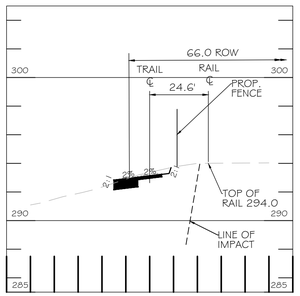

93+50
SCALE: 1" = 30'

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REVISIONS			
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DATE 12/1/2021
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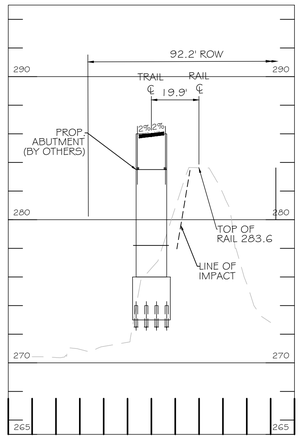
DRAWN BY AS

TYPICAL CROSS SECTIONS
STA. 90+50 - 93+50
FREDERICK AND PENNSYLVANIA
LINE RAILROAD TRAIL

DRAWING NO. C-34
SHEET 34 OF 55
KCI JOB NUMBER 272006468



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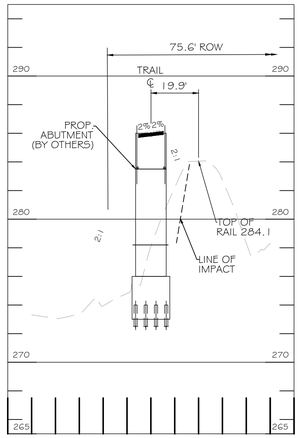

12+90.83
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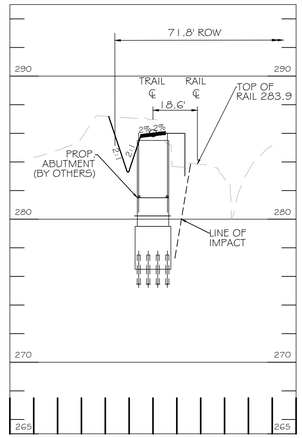
TUSCARORA CREEK ABUTMENT SECTIONS



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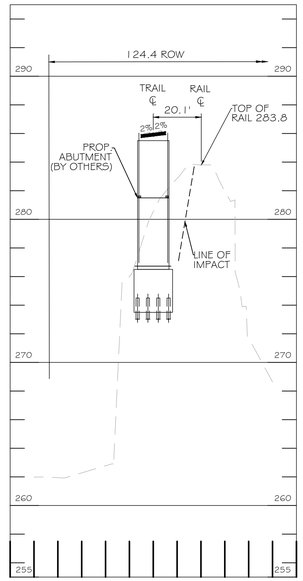

22+99.54
SCALE: 1" = 30'

MONOCACY RIVER ABUTMENT SECTIONS

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

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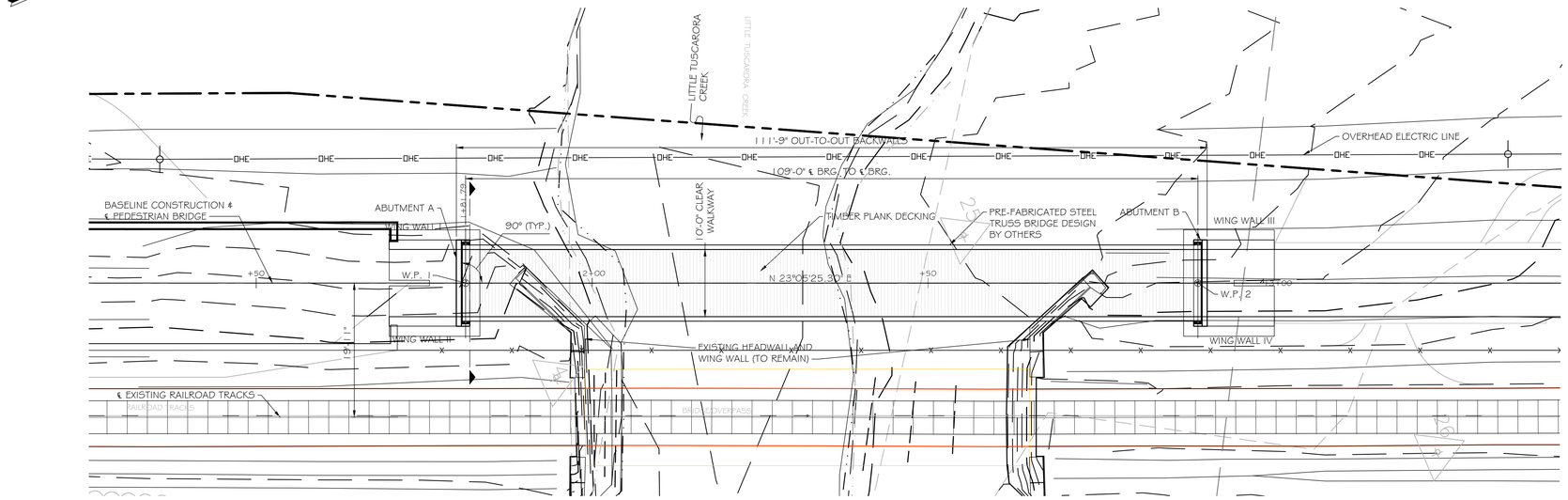
BRIDGE ABUTMENT SECTIONS

FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL

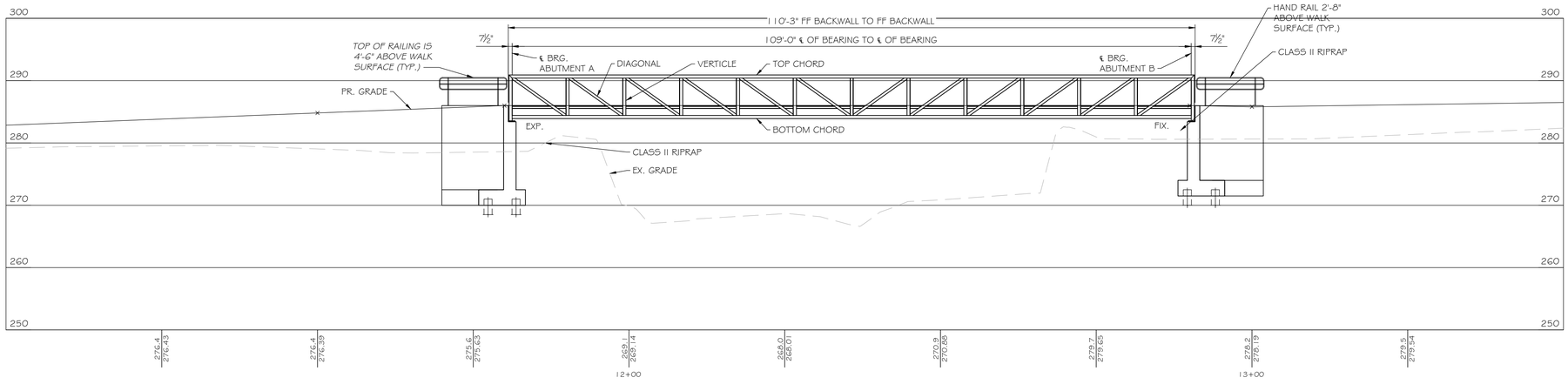
DRAWING NO. C-35
SHEET 35 OF 55
KCI JOB NUMBER 272006468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



PLAN

SCALE: 1"=10'



ELEVATION

SCALE: 1"=10'

GENERAL NOTES:

THE PEDESTRIAN BRIDGE STRUCTURE IS DESIGNED IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:

- AASHTO GUIDE SPECIFICATIONS FOR DESIGN OF PEDESTRIAN BRIDGES - 2009 WITH 2015 INTERIMS
- AASHTO GUIDE FOR THE DEVELOPMENT OF BICYCLE FACILITIES - 2010
- SHA SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS DATED JULY 2020
- AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, DATED 2017 AND 2018 INTERIMS.

CONCRETE DESIGN:

CONCRETE COMPRESSIVE STRENGTH FOR DESIGN SHALL BE:
f'c = 3,000 PSI FOR ELEMENTS USING MIX NO. 3.
f'c = 4,000 PSI FOR ELEMENTS USING MIX NO. 6.

REINFORCING STEEL DESIGN: fs = 24,000 p.s.i.

STRUCTURAL STEEL DESIGN: LRFD

THE DESIGN OF THE PEDESTRIAN BRIDGE WAS BASED ON THE FOLLOWING LOADS:

90 LBS/SQ FT PEDESTRIAN LOADING OR A 30,000 LB VEHICLE (H-15) WITH NO IMPACT. RAILING LOADS IN ACCORDANCE WITH AASHTO [2.7.2]

- DEAD LOAD = ACTUAL WEIGHT OF MEMBERS (26,200 LBS WAS USED FOR ABUTMENT DESIGN)

THE BRIDGE STRUCTURE WAS DESIGNED FOR THE MAXIMUM LIVE LOAD EFFECT.

THIS BRIDGE IS NOT INTENDED TO BE A PUBLIC HIGHWAY BRIDGE. IT WAS DESIGNED TO SUPPORT PEDESTRIANS/BICYCLES, MAINTENANCE VEHICLE, AND AMBULANCE ONLY (DEFINED ABOVE)

THIS BRIDGE PROVIDES ACCESS FOR DISABLED INDIVIDUALS.

STRUCTURAL STEEL:

- STRUCTURAL STEEL SHALL CONFORM TO ASTM A 709 GRADE 50, INCLUDING THE ADDITIONAL REQUIREMENTS FOR CHARPY V-NOTCH TESTING OF AASHTO M 270 FOR PRIMARY LOAD CARRYING MEMBERS.
- BOLTS SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATION - HIGH STRENGTH BOLTS: A 325
- ALL WELDING SHALL BE PERFORMED BY CERTIFIED WELDERS IN ACCORDANCE WITH ASWD.1.1, STRUCTURAL WELDING CODE - STEEL. ALL WELDING ELECTRODES SHALL CONFORM TO THE E-70 SERIES OF THE AWS A5.1 SPECIFICATION FOR COVERED CARBON STEEL ARC WELDING ELECTRODES.
- NO PENETRATIONS ARE PERMITTED THROUGH STRUCTURAL STEEL MEMBERS UNLESS INDICATED ON STRUCTURAL DRAWINGS OR WITH WRITTEN APPROVAL OF THE ENGINEER.
- DURING ERECTION, STRUCTURAL STEEL FRAMING SHALL BE ADEQUATELY BRACED.
- MASK FIELD WELDED AREAS IN SHOP AND FIELD WELD, WHERE INDICATED. AFTER FIELD WELDS ARE COMPLETE, SANDBLAST FIELD WELDED AREAS TO COMPLY WITH SSPC-SP6 "COMMERCIAL SANDBLAST" OR USE SSPC-SP11 "POWER TOOL CLEANING" TO BARE METAL, WITH A SURFACE PROFILE NOT LESS THAN 1.0 MILS. APPLY PAINT SYSTEM AS INDICATED.

WOOD:

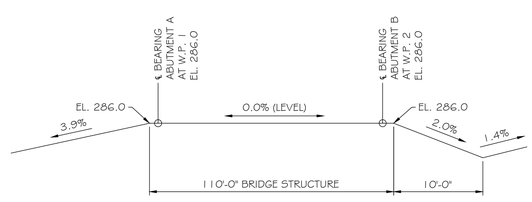
WOOD DECKING SHALL BE SELECT GRADE IPE (IRON WOOD) ALL HEART, NO SAP, WITH A MINIMUM Fb = 25,400 p.s.i. OR EQUIVALENT RECOMMENDED BY THE BRIDGE SUPERSTRUCTURE FABRICATOR. ALL WOOD SHALL BE TREATED TO AWPA STANDARDS.

REINFORCING STEEL:

FOR TIES AND STIRRUPS; STANDARD ACI BENDING TOLERANCES ARE MODIFIED TO PLUS (+) ZERO INCHES, MINUS (-) NORMAL ACI BENDING TOLERANCES.
ONLY ASTM A 615 GRADE 60 CAN BE USED ON THIS PROJECT.
ALL REINFORCING STEEL SHALL BE BLACK STEEL.

KEYS: ALL KEYS ARE NOMINAL SIZE.

ALL HARDWARE AND FASTENERS SHALL BE HOT DIPPED GALVANIZED.



VERTICAL PROFILE

NOT TO SCALE

WORKING POINT COORDINATES		
W.P.	NORTHING	EASTING
W.P. 1	654545.6754	1201122.8559
W.P. 2	654645.9432	1201165.6038

KCI TECHNOLOGIES
ENGINEERS
PLANNERS
SCIENTISTS
CONSTRUCTION MANAGERS
936 RIDGEBROOK ROAD
SPARKS, MARYLAND 21152
TELEPHONE: (410) 316-7800
FAX: (410) 316-7818

REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 7/15/2021
SCALE: AS SHOWN
DESIGNED BY: HMK
DRAWN BY: DRC

GENERAL PLAN AND ELEVATION

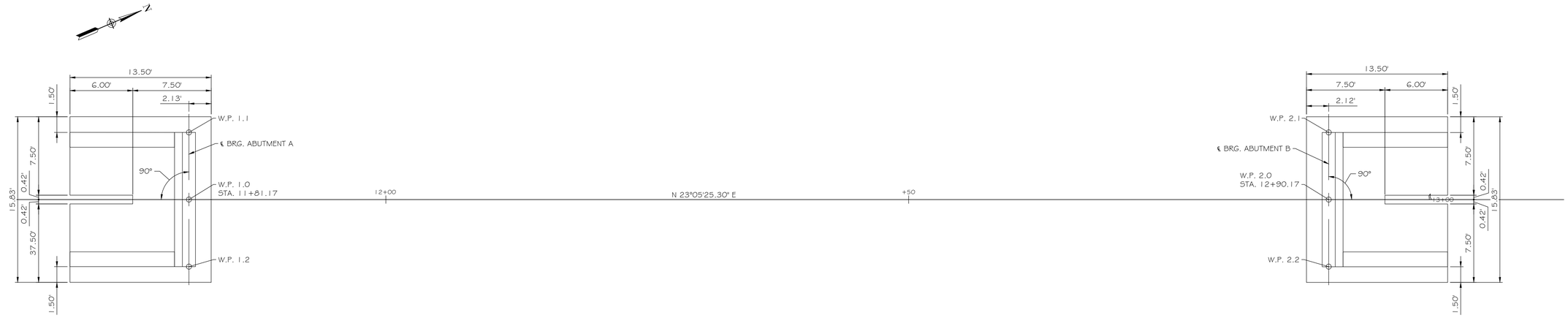
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER TUSCARORA CREEK

DRAWING NO. S1-1

SHEET 36 OF 55

KCI JOB NUMBER 27206468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



GEOMETRIC LAYOUT

SCALE: 1"=5'

WORKING POINT COORDINATES		
W.P.	NORTHING	EASTING
W.P. 1	654545.6754	1201122.8559
W.P. 1.1	654548.1919	1201116.9533
W.P. 1.2	654543.1589	1201128.7585
W.P. 2	654645.9432	1201165.6038
W.P. 2.1	654648.4597	1201159.7012
W.P. 2.2	654643.4267	1201171.5064

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE 7/15/2021
SCALE AS SHOWN
DESIGNED BY HMK
DRAWN BY DRC

GEOMETRIC LAYOUT

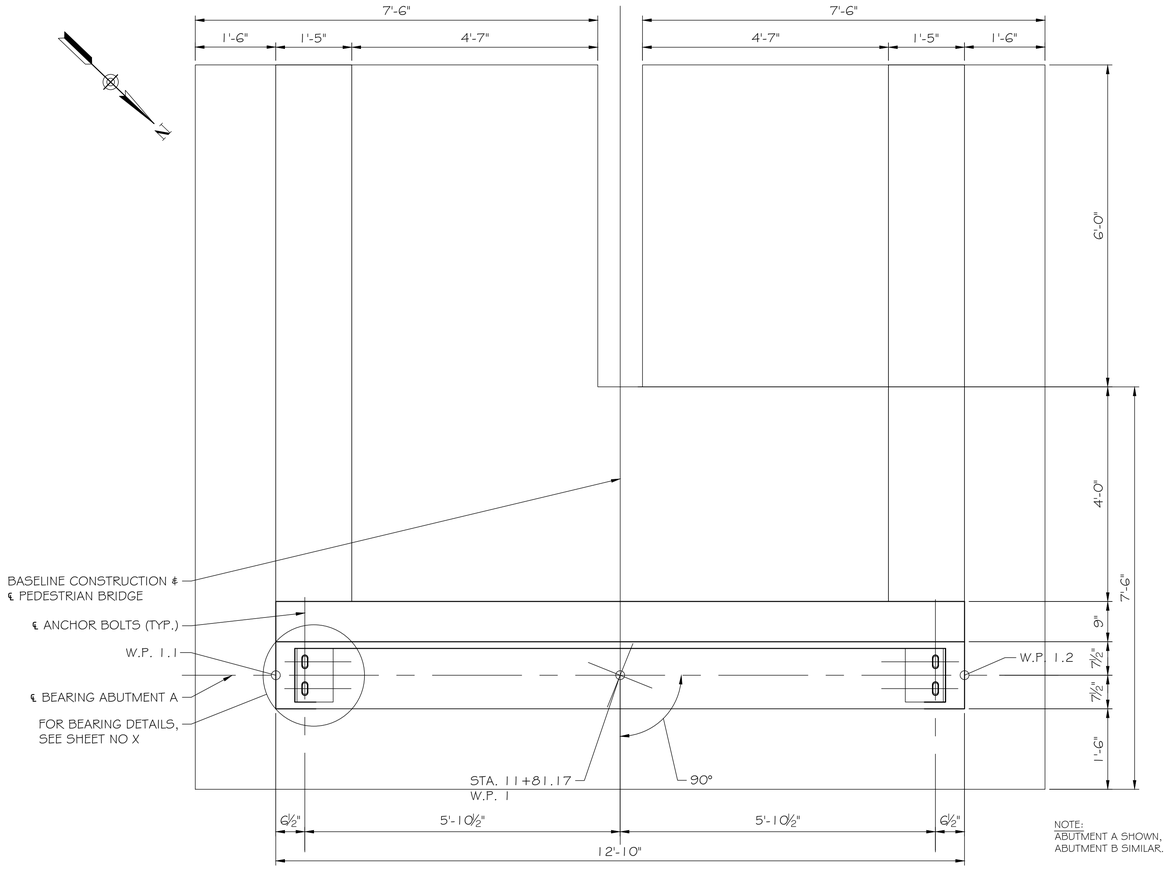
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER TUSCARORA CREEK

DRAWING NO. S1-2

SHEET 37 OF 55

KCI JOB NUMBER 27206468

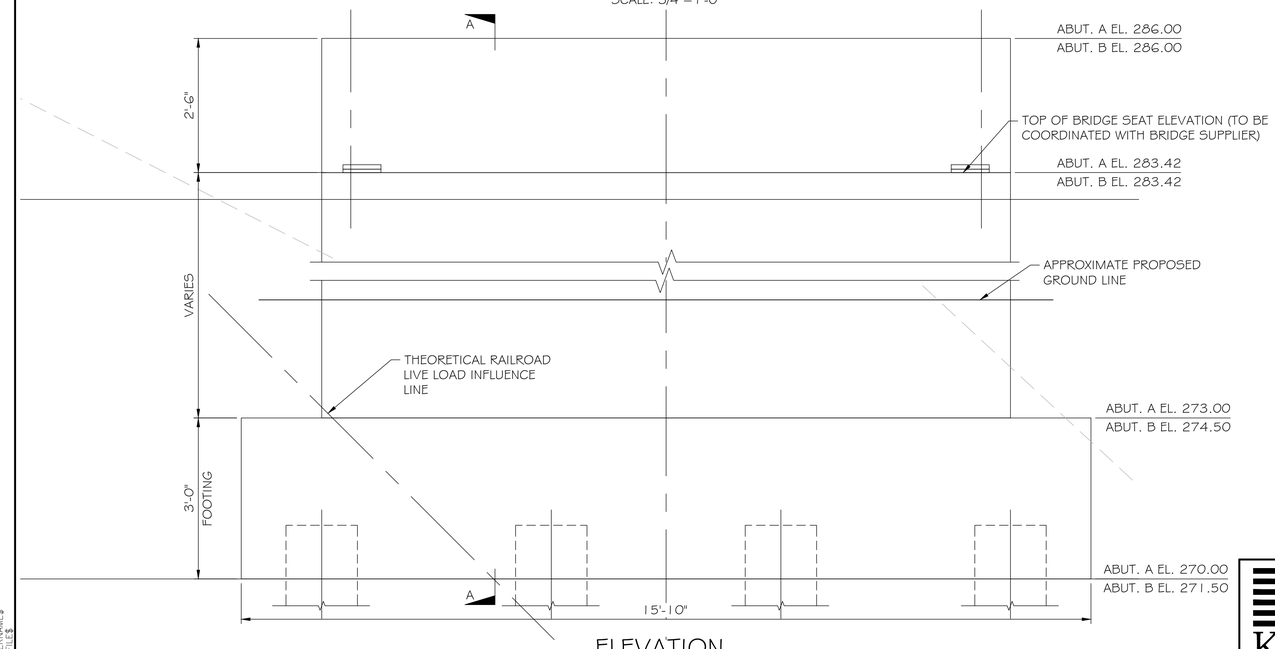
PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



NOTE:
ABUTMENT A SHOWN, ABUTMENT B SIMILAR.

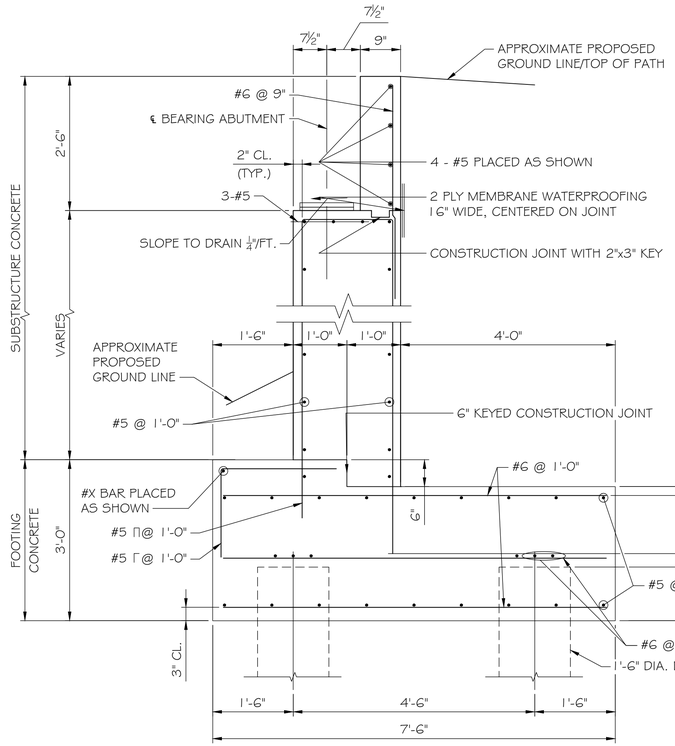
PLAN

SCALE: 3/4"=1'-0"



ELEVATION

SCALE: 1/2"=1'-0"



NOTE:
TOP PORTION OF ABUTMENT BACKWALL SHALL NOT BE PLACED UNTIL PEDESTRIAN BRIDGE IS COMPLETELY IN PLACE.

SECTION A-A

SCALE: 1/2"=1'-0"

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

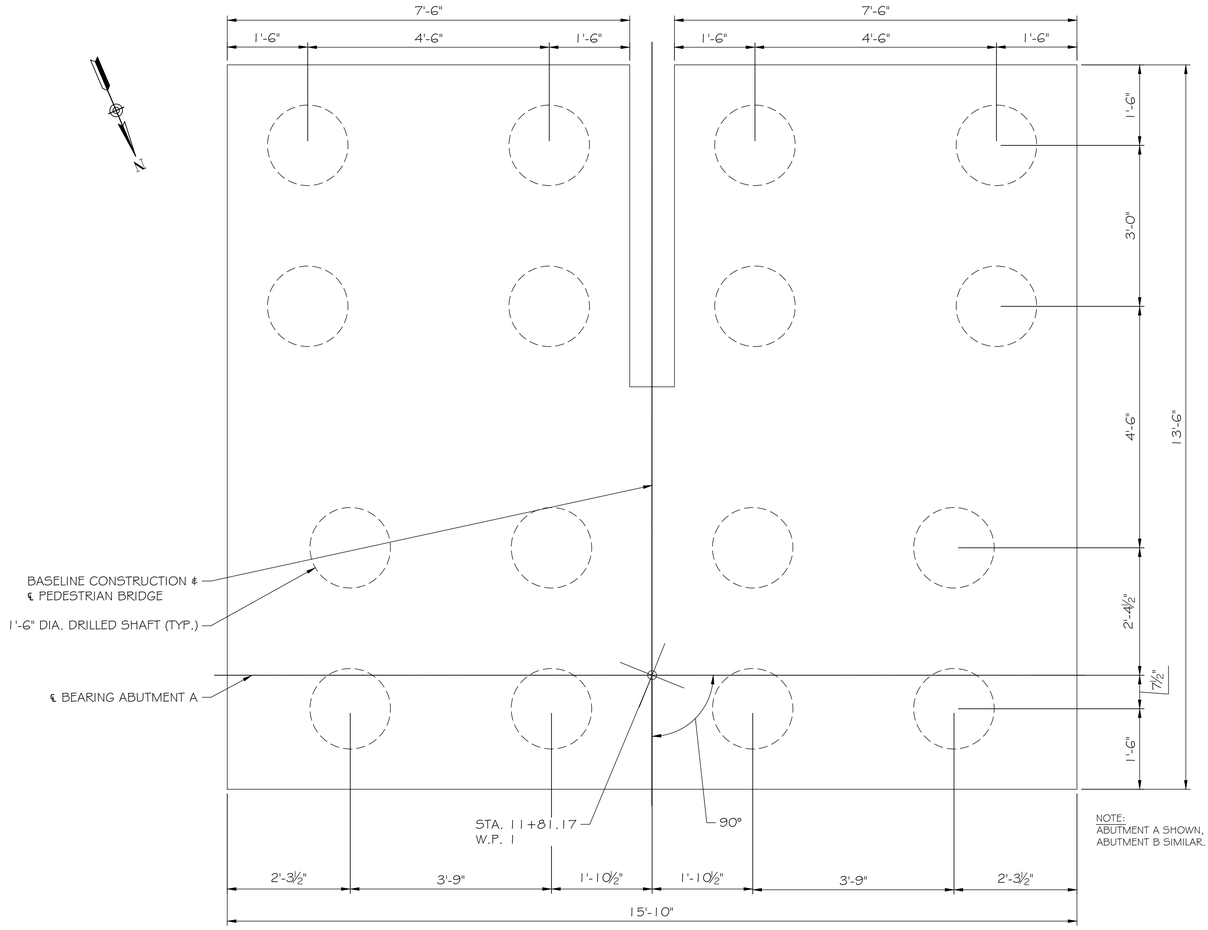
DATE: 7/15/2021
SCALE: AS SHOWN
DESIGNED BY: HMK
DRAWN BY: DRC

ABUTMENT A PLAN AND ELEVATION

FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER TUSCARORA CREEK

DRAWING NO. S1-3
SHEET 38 OF 55
KCI JOB NUMBER 27206468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



NOTE:
ABUTMENT A SHOWN,
ABUTMENT B SIMILAR.

PILE PLAN

SCALE: 3/4"=1'-0"

KCI TECHNOLOGIES

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Planners
Scientists
Construction Managers

936 Ridgebrook Road
Sparks, Maryland 21152
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Fax: (410) 316-7818

REVISIONS			
NO.	DATE	DESCRIPTION	BY

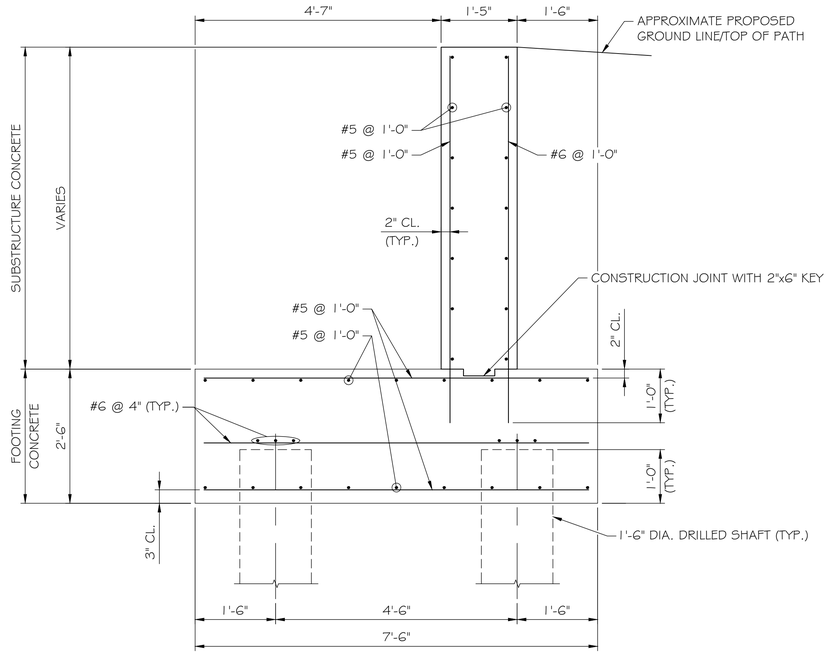
DATE: 7/15/2021
SCALE: AS SHOWN
DESIGNED BY: HMK
DRAWN BY: DRC

ABUTMENT PILE PLAN

FREDERICK AND PENNSYLVANIA
LINE RAILROAD TRAIL
OVER TUSCARORA CREEK

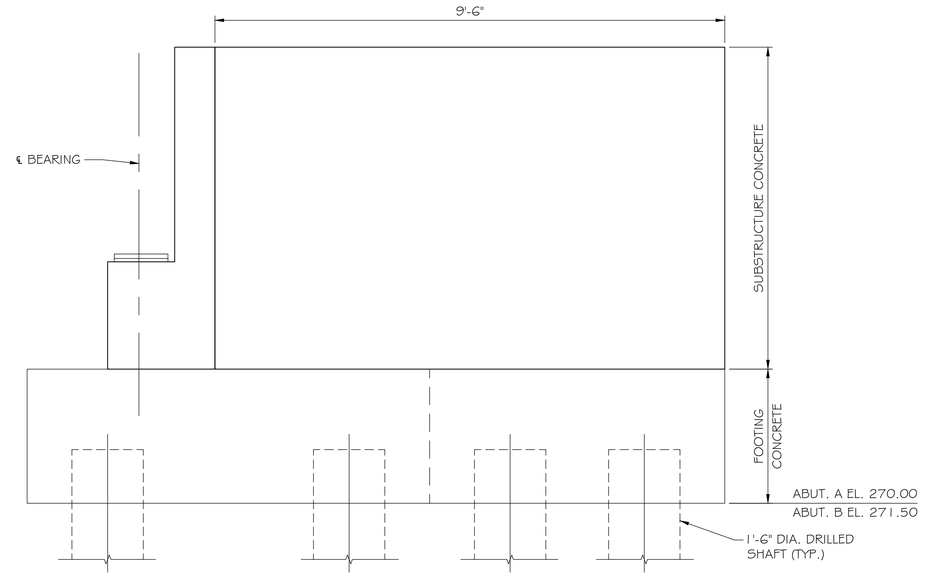
DRAWING NO. S1-3
SHEET 39 OF 55
KCI JOB NUMBER 27206468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



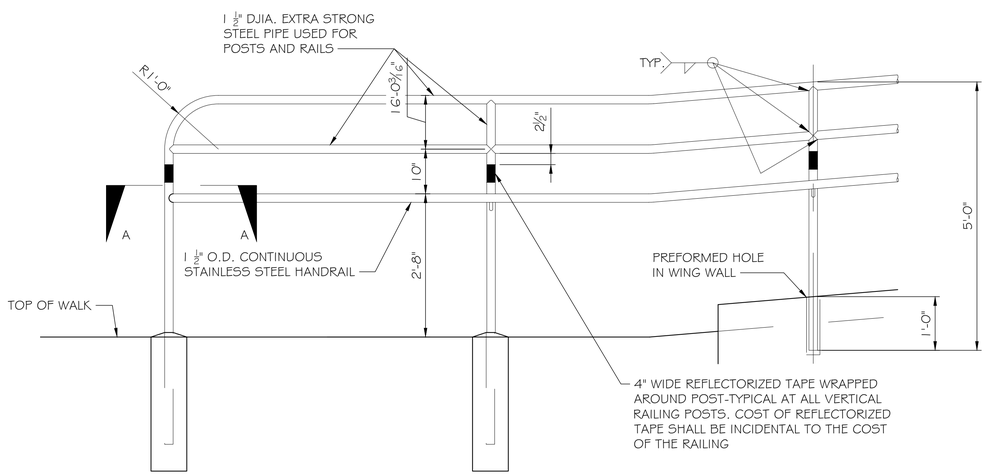
TYPICAL WING WALL SECTION

SCALE: 3/4"= 1'-0"



TYPICAL WING WALL ELEVATION

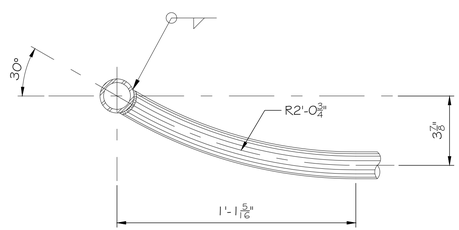
SCALE: 3/4"= 1'-0"



END POST INTERMEDIATE POST WING WALL POST

TYPICAL HAND RAIL ELEVATION

SCALE: 3/4"= 1'-0"



HANDRAIL TERMINATION

SECTION A-A

NOT TO SCALE

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

KCI TECHNOLOGIES
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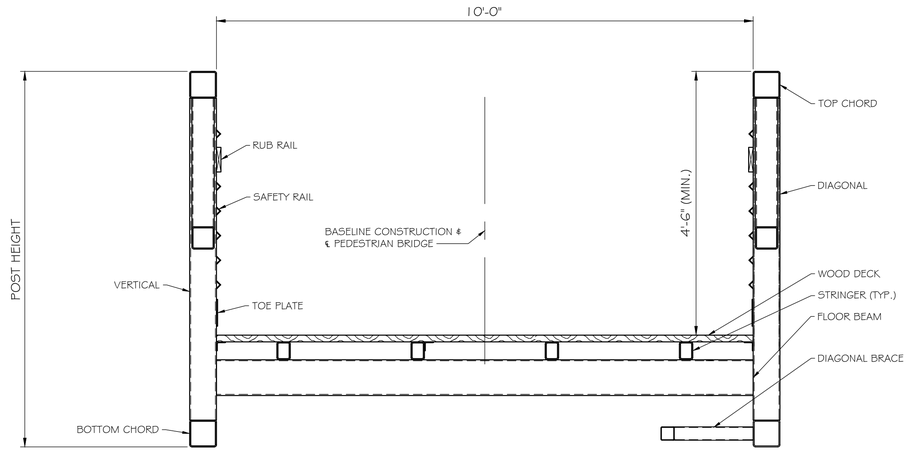
REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE 7/15/2021
SCALE AS SHOWN
DESIGNED BY HMK
DRAWN BY DRC

WING WALL SECTION

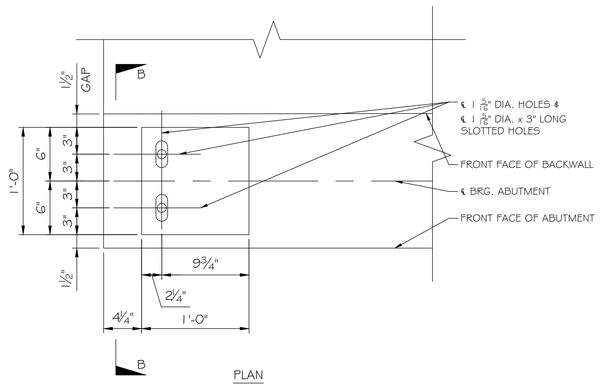
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER TUSCARORA CREEK

DRAWING NO. S1-5
SHEET 40 OF 55
KCI JOB NUMBER 27206468

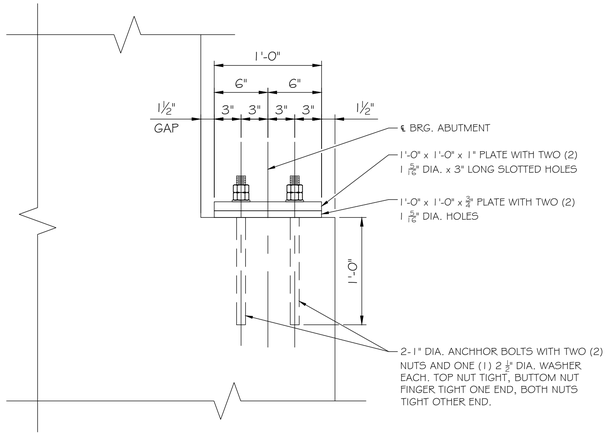


TYPICAL SECTION

SCALE: 3/4 = 1'-0"



PLAN



VIEW B-B

BEARING PLATE DETAIL

SCALE: 1 1/2"= 1'-0"

HANDRAIL NOTES:

FABRICATION: THE HAND RAIL IS TO BE FABRICATED AND ERECTED SO THAT THE LONGITUDINAL RAILS ARE PARALLEL TO EACH OTHER AND THE TOP OF THE PATH. ALL POSTS ARE TO BE PLACED VERTICAL AND SPACED AS SHOWN ON THE PLANS.

HAND RAIL ASSEMBLIES ARE TO BE SHOP POLYESTER COATED AFTER FABRICATION EXCEPT S.S. HAND RAIL ELEMENT (SEE SECTION 426 OF THE SPECIAL PROVISIONS). FINISH COLOR SHALL BE NO. 17038. (BLACK) A COLOR COATED SAMPLE MUST BE SUBMITTED FOR FINAL APPROVAL.

ERECTION: IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE FINISHED HAND RAIL MEETS ALL REQUIREMENTS OF FIT, ALIGNMENT, AND FINISH TO THE SATISFACTION OF THE ENGINEER. DETAILS OF THE RAIL FIELD SPLICES SHALL BE SUBMITTED FOR APPROVAL BY THE ENGINEER.

POSTS PLACED ALONG THE EDGE OF THE PATH MUST BE SET AT A 2'-0" MINIMUM DEPTH IN CONCRETE. POSTS PLACED IN WING WALLS SHALL BE SET 1'-0" INTO PREFORMED 3" DIA. HOLES, 13" DEEP, AND GROUTED IN PLACE.

EXPANSION JOINT: LOCATE EXPANSION JOINTS IN THE HAND RAILS AT THE BRIDGE DECK JOINT. PROVIDE A 1.0625" I.D. S.S. SLEEVE 6" LONG WELDED TO THE BRIDGE SIDE OF THE HAND RAIL. LEAVE A 2" GAP BETWEEN RAIL ENDS WITHIN THE SLEEVE TO PROVIDE FOR MOVEMENT. BREAK ALL EDGES.

PROJECT NOTES:

PEDESTRIAN STEEL BRIDGE SUPERSTRUCTURE

DESCRIPTION OF WORK:

THE ITEM SHALL CONSIST OF FURNISHING, FABRICATING AND ERECTING A PEDESTRIAN STEEL STRUCTURE IN CONFORMANCE WITH THE REQUIREMENTS AND DETAILS SHOWN ON THE PLANS AND/OR THE APPROVED SHOP DRAWINGS. IN ADDITION, THE ITEM SHALL CONSIST OF FURNISHING AND PLACING A WOOD DECKING IN ACCORDANCE WITH THESE SPECIFICATIONS AND IN REASONABLY CLOSE CONFORMITY WITH THE LINES, GRADES AND DIMENSIONS AS SHOWN ON THE PLANS AND/OR ESTABLISHED IN THE FIELD.

THE COMPLETE STEEL AND WOOD DECKING ASSEMBLY INCLUDING BEARINGS SHALL BE DESIGNED USING WORKING STRESS METHODS TO PROVIDE APPROPRIATE SAFETY FACTORS TO WITHSTAND THE COMBINED AND TOTAL EFFECTS OF THE FOLLOWING LOADS APPLIED IN COMBINATIONS AS SHOWN IN THE LATEST AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES:

(A) 85 LBS/SQ FT PEDESTRIAN LOADING OR A LOADED PICK-UP TRUCK (5,200 LB VEHICLE WITH 70% OF THE WEIGHT ON THE REAR AXLE) WITH NO IMPACT. REDUCTION OF PEDESTRIAN LIVE LOAD SHALL BE IN ACCORDANCE WITH AASHTO GUIDE SPECIFICATION FOR DESIGN OF PEDESTRIAN BRIDGES.
(B) DEAD LOAD AND SUPERIMPOSED DEAD LOADS OF THE STRUCTURE.
(C) WIND LOAD IN ACCORDANCE WITH AASHTO SECTION 3.15 FOR A DESIGN WIND SPEED OF 100 MPH.
(D) TOP CHORD LATERAL FORCE OF NOT LESS THAN 300 POUNDS PER LINEAR FOOT FOR HALF THROUGH TRUSS.

ALL DESIGN WORK OF THE COMPLETE BRIDGE SUPERSTRUCTURE ASSEMBLY SHALL CONFORM TO NORMALLY ACCEPTED BRIDGE DESIGN PRACTICES AND PROCEDURES. ALL DESIGNS SUBMITTED SHALL CONFORM TOTHE FOLLOWING CRITERIA:

(A) SPAN LENGTH AND CLEAR BRIDGE WIDTH SHALL BE AS INDICATED ON THE PLANS.
(B) HAND RAILING SHALL CONFORM TO AASHTO REQUIREMENTS.
(C) BRIDGE BEARINGS SHALL ADEQUATELY TRANSFER ALL HORIZONTAL AND VERTICAL LOADS FROM THE SUPERSTRUCTURE TO THE SUBSTRUCTURE. PROVISIONS SHALL BE MADE TO ACCOMMODATE MOVEMENTS RESULTING FROM VARIATION IN TEMPERATURE AND LIVE LOAD ROTATION AS REQUIRED FOR THE SPAN LENGTH. BRIDGE BEARINGS SHALL BE DESIGNED, FABRICATED AND SUPPLIED BY THE BRIDGE MANUFACTURER.
(D) ALL WELDING SHALL CONFORM TO THE AASHTO/AWS WELDING CODE.

MATERIALS AND CONSTRUCTION METHODS:

ALL REQUIREMENTS OF SECTIONS 462 FOR WOOD DECKING AND SECTION 909 FOR STEEL STRUCTURE SHALL BE APPLICABLE EXCEPT AS MODIFIED HEREIN AND ON THE PLANS.

STEEL:

THE STEEL MEMBERS SHALL CONFORM TO THE FOLLOWING:

(A) STEEL BRIDGES SHALL BE FABRICATED FROM AASHTO M270 (ASTM A709) GRADE 50 STEEL FOR STRUCTURAL SHAPES, PLATES AND BARS AND COLD-FORMED WELDED AND SEAMLESS HIGH STRENGTH, LOW ALLOY ASTM A500 GRADE B STEEL FOR STRUCTURAL TUBING. THE ENTIRE STEEL TRUSS SHALL RECEIVE A PROTECTIVE PAINTED FINISH, FED. STD. 595B, COLOR NO. 17038 (BLACK) A COLOR SAMPLE MUST BE SUBMITTED FOR APPROVAL BY THE OWNER.
(B) ALL STRUCTURAL SHAPES, PLATES, TUBES AND BARS SHALL HAVE A MINIMUM THICKNESS OF 5/16".
(C) MINIMUM THICKNESS OF CLOSED WATERTIGHT STRUCTURAL TUBULAR MEMBERS SHALL BE 1/4".
(D) FIELD SPLICES SHALL BE BOLTED WITH HIGH STRENGTH AASHTO M164 (ASTM A325) BOLTS; TYPE 1 BOLTS ARE REQUIRED FOR BRIDGES.
(E) ALL WELDING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF AASHTO/AWS D1.5 BRIDGE WELDING CODE.
(F) ALL WELDING OF STRUCTURAL STEEL TUBULAR MEMBERS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF ANSI/AWS D1.1 STRUCTURAL WELDING CODE.

WOOD DECKING:

SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION OF MATERIALS.
DESIGN CALCULATIONS AND DRAWINGS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF MARYLAND.

PEDESTRIAN BRIDGE SHALL BE A LOW PROFILE DESIGN CAMBERED TO OFFSET FULL DEAD LOAD DEFLECTIONS. BRIDGE RAILING SHALL BE A CONTINUOUS LIFE SAFETY RAIL WITH A MAXIMUM CLEAR OPENING OF 6 INCHES AND ONE DIAGONAL PER TRUSS PANEL. RAILING HEIGHT SHALL BE A MINIMUM OF 54 INCHES. BEARINGS SHALL PROVIDE ADEQUATE ATTACHMENT OF THE SUPERSTRUCTURE TO THE SUBSTRUCTURE TO RESIST UPLIFT. PROVISIONS SHALL BE MADE TO ACCOMMODATE MOVEMENT RESULTING FROM VARIATION IN TEMPERATURE AS REQUIRED FOR SPAN LENGTH. BEARINGS SHALL BE DESIGNED, FABRICATED AND SUPPLIED BY THE BRIDGE MANUFACTURER.

RAILING AND HANDRAIL:

(A) BRIDGE HANDRAIL SHALL BE 1 1/2 INCH DIAMETER SOLID STAINLESS STEEL BAR COMFORMING TO ASTM A 167, ALLOY 316 FABRICATE AS SHOWN ON THE PLANS.
(B) APPROACH RAILING SHALL BE EXTRA STRONG COLD FORMED STEEL PIPE COMFORMING TO ASTM A 500 GRADE B, 42000 P.S.I. MIN. YIELD.
(C) ALL STEEL RAILING SHALL BE HOT DIP GALVANIZED WITH POLYESTER RESIN POWER COATED FINISH OR APPROVED BY THE OWNER.

CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF SECTION 420, 421 AND 430 OF THE STANDARD SPECIFICATIONS AND THE CONSTRUCTION PLANS AND/OR SHOP DRAWINGS EXCEPT AS NOTED HEREIN.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT:THE PAYMENT FOR THE ITEM SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER LUMP SUM BID FOR ACOMPLETED AND ACCEPTED "PEDESTRIAN STEEL BRIDGE," WHICH PRICE AND PAYMENT SHALL CONSTITUTEFULL COMPENSATION FOR FURNISHING AND PLACING ALL MATERIALS REQUIRED, FABRICATING AND ERECTING THEBRIDGE, INCLUDING WOOD DECKING FURNISHING AND INSTALLING ANCHOR BOLTS AND BEARINGS AND APPROACH RAILING SECTIONS, BOLLARDS AND DRAWINGS AND ERECTION PLAN, PAINTING, AND FOR ALL LABOR, TOOLS EQUIPMENT AND NECESSARY INCIDENTALS TO COMPLETE THE WORK.

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE 7/15/2021
SCALE AS SHOWN
DESIGNED BY HMK
DRAWN BY DRC

TYPICAL SECTION

FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER TUSCARORA CREEK

DRAWING NO. S1-6
SHEET 41 OF 55
KCI JOB NUMBER 27206468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

BORING 5004
STATION: 12+42.55
OFFSET: 2.652' LEFT
TOP OF GROUND EL. 270.68

BORING 5005
STATION: 11+83.58
OFFSET: 10.464' LEFT
TOP OF GROUND EL. 270.90'

EL. 280.00
EL. 270.00
EL. 260.00
EL. 250.00
EL. 240.00
EL. 230.00
DATUM EL. 220.00

CKG CENKEN GROUP, LLC
Geotechnical Engineering Consultants
Odenton, MD 21113

Page 1 of 1

RECORD OF SOIL / ROCK EXPLORATION

Contracted With: KCI Technologies, Inc. - Fulton Office
Project Name: Main Street Connector Trail
Location: Frederick, MD
Boring #: 5004
Job #: 20-095

SAMPLER

Datum: ---
Surf. Elev.: ---
Date Started: 1/28/21
Hammer Wt.: 140 lb
Hammer Drop: 30 in
Spoon Size: 2 in
Hole Diameter: 8 in
Rock Core Dia.: 2 in
Boring Method: HSA/RC
Foreman: L. Ramos
Inspector: C. Garcia
Date Completed: 1/28/21

ELEV. (ft)	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH (ft)	SOIL SYMBOL	DEPTH SCALE	SAMPLE Cond	Blows/6" RQD/REC	No.	Type	Rec (in)	BORING & SAMPLE NOTES
	12 inches of **TOPSOIL**				D	2-2-2-3	1	DS	10	1. Water encountered at 6.0 ft.
	Dark brown, moist, soft to stiff, lean **CLAY**, **(FILL)**	1.0			D	4-5-5-6	2	DS	8	
	(CL)	4.0			D	4-15-50/5"	3	DS	17	
	Grayish brown, moist, very dense, silty **SAND**, with some gravel, **(SM)**	7.0		5	D	48-50/1"	4	DS	7	
	Grayish brown, moist, very dense, silty **GRAVEL**, with sand, **(GM)**				D	8-50/3"	5	DS	9	
				10	D	50/2"	6	DS	2	
					D	50/1"	7	DS	1	
	Frederick **LIMESTONE**	14.0		15		RQD=0% REC=23%	8	RC	14	
	Frederick **LIMESTONE**	19.0		20		RQD=18% REC=30%	9	RC	18	
	Bottom of Boring at 24.0 ft	24.0		25						
				30						

SAMPLER TYPE
DS - DRIVEN SPLIT SPOON
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

GROUNDWATER DEPTH
AT COMPLETION _____ ft
AFTER _____ HRS. _____ ft
AFTER 24 HRS. _____ ft
CAVED AT _____ ft

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION LOGS.GPJ CKG 2012.GDT 1/28/21

CKG CENKEN GROUP, LLC
Geotechnical Engineering Consultants
Odenton, MD 21113

Page 1 of 1

RECORD OF SOIL / ROCK EXPLORATION

Contracted With: KCI Technologies, Inc. - Fulton Office
Project Name: Main Street Connector Trail
Location: Frederick, MD
Boring #: 5005
Job #: 20-095

SAMPLER

Datum: ---
Surf. Elev.: ---
Date Started: 1/6/21
Hammer Wt.: 140 lb
Hammer Drop: 30 in
Spoon Size: 2 in
Hole Diameter: 8 in
Rock Core Dia.: 2 in
Boring Method: HSA/RC
Foreman: L. Ramos
Inspector: C. Garcia
Date Completed: 1/6/21

ELEV. (ft)	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH (ft)	SOIL SYMBOL	DEPTH SCALE	SAMPLE Cond	Blows/6" RQD/REC	No.	Type	Rec (in)	BORING & SAMPLE NOTES
	6 inches of **TOPSOIL**	0.5			I/D	2-2-3-3	1	DS	24	1. Water encountered at 6.0 ft.
	Brown, moist, medium stiff, sandy silty **CLAY**, **(FILL)**				I/D	2-2-3-4	2	DS	16	
	(CL-ML)	4.0			D	5-4-7-6	3	DS	12	
	Brown, moist, loose to medium dense, silty **SAND**, with gravel, **(SM)**			5	I/D	4-4-4-5	4	DS	14	
	(SM)	8.0			D	17-17-50/3"	5	DS	8	
	Grayish brown, moist, very dense, silty **SAND**, with some gravel, **(SM)**			10	D	5-50/2"	6	DS	6	
	Gray, dry, Frederick **LIMESTONE**	12.0				RQD=8% REC=25%	7	RC	15	
	Gray, dry, Frederick **LIMESTONE**	17.0		15		RQD=52% REC=73%	8	RC	44	
	Bottom of Boring at 22.0 ft	22.0		20						
				25						
				30						

SAMPLER TYPE
DS - DRIVEN SPLIT SPOON
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

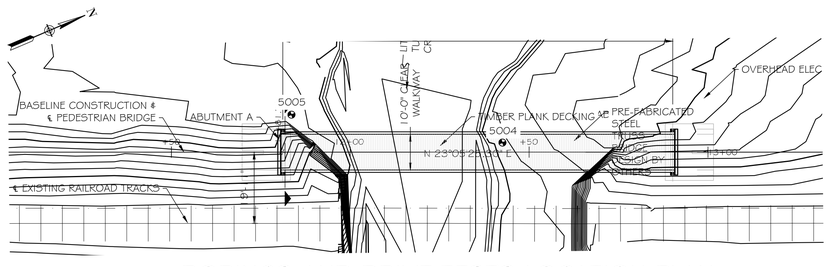
SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

GROUNDWATER DEPTH
AT COMPLETION _____ ft
AFTER _____ HRS. _____ ft
AFTER 24 HRS. _____ ft
CAVED AT _____ ft

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION LOGS.GPJ CKG 2012.GDT 1/28/21



BORINGS AND DRIVE TESTS LOCATION PLAN

SCALE: 1" = 20'

BORINGS AND DRIVE TESTS

SCALE: 1" = 50'

NOTES:

1. THE BORINGS AND DRIVE TESTS WERE TAKEN IN JANUARY AND MARCH, 2021 BY CENKEN GROUP, LLC.
2. N = BLOWS ON A 2 INCH OD SAMPLING SPOON BY 140 LB. DRIVE-WEIGHT FALLING 30 INCHES INDICATING SUCCESSIVE 6 INCH INCREMENTS OF PENETRATION IN LIEU OF BLOWS PER FOOT. PENETRATIONS GREATER THAN 6 INCHES OR LESS THAN 6 INCHES ARE INDICATED BY WOH, WOR, OR THE DEPTH OF THE PENETRATION OVER 50 (OR NUMBER OF BLOWS IF OTHER THAN 50) OVER THE NEAREST INCH.

   WOR = STATIC WEIGHT OF DRILL ROD AND SAMPLING SPOON.

   WOH = STATIC WEIGHT OF SAMPLING SPOON DRIVE-WEIGHT ASSEMBLY, DRIVE-WEIGHT, ANVIL, (WHEN AN AUTOMATIC HAMMER IS USED), DRILL ROD(S) AND SAMPLING SPOONS.
3. C = DEPTH OF HOLLOW-STEM CONTINUOUS FLIGHT AUGER WITH A 3 1/4 INCH ID.
4. W.L. = WATER LEVEL READING, THE FIGURE IN PARENTHESIS INDICATES THE READING IN HOURS AFTER COMPLETION OF BORING.
5. BORINGS AND SAMPLINGS CONFORM TO AASHTO DESIGNATIONS T-206 AND T-306.
6. THE SOIL SYMBOLS REFLECT ONLY THE MAJOR SOIL CONSTITUENT, FOR MORE COMPLETE SOIL CHARACTERISTICS REFER TO THE SOIL DESCRIPTIVE TEXT.
7. THE SOIL HAS BEEN VISUALLY CLASSIFIED BY THE DRILLER.

KCI TECHNOLOGIES
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REVISIONS NO.	DATE	DESCRIPTION	BY

DATE: 7/15/2021
SCALE: AS SHOWN
DESIGNED BY: HMK
DRAWN BY: DRC

BORING LOGS AND DRIVE TESTS

FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER TUSCARORA CREEK

DRAWING NO. S1-7
SHEET 42 OF 55
KCI JOB NUMBER 27206468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

LOCATION CATEGORY A								
BAR SIZE	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	2'-5''	3'-1''	2'-5''	2'-10''	2'-5''	2'-10''	2'-5''	2'-10''
#5	3'-1''	4'-0''	3'-0''	3'-10''	3'-0''	3'-7''	3'-0''	3'-7''
#6	4'-5''	5'-9''	3'-7''	4'-8''	3'-7''	4'-8''	3'-7''	4'-8''
#7	6'-0''	7'-10''	4'-6''	5'-11''	4'-2''	5'-5''	4'-2''	5'-5''
#8	7'-10''	10'-3''	5'-11''	7'-8''	4'-9''	6'-2''	4'-9''	6'-2''
#9	10'-0''	13'-0''	7'-6''	9'-9''	6'-0''	7'-10''	5'-10''	7'-8''
#10	-	-	9'-6''	12'-5''	7'-7''	9'-11''	7'-2''	9'-5''
#11	-	-	11'-8''	15'-3''	9'-4''	12'-3''	8'-8''	11'-4''

Location Category A - Bars in horizontal layers in top of pour with 12'' or more of concrete below them such as in: footings, pier caps, etc.

LOCATION CATEGORY B								
BAR SIZE	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	1'-10''	2'-9''	1'-10''	2'-2''	1'-10''	2'-2''	1'-10''	2'-2''
#5	2'-5''	3'-7''	2'-4''	3'-5''	2'-4''	2'-9''	2'-4''	2'-9''
#6	3'-5''	5'-1''	2'-9''	4'-1''	2'-9''	4'-1''	2'-9''	4'-1''
#7	4'-8''	6'-11''	3'-6''	5'-3''	3'-2''	4'-9''	3'-2''	4'-9''
#8	6'-1''	9'-1''	4'-7''	6'-10''	3'-8''	5'-5''	3'-8''	5'-5''
#9	7'-8''	11'-6''	5'-9''	8'-8''	4'-8''	6'-11''	4'-6''	6'-9''
#10	-	-	7'-4''	10'-11''	5'-10''	8'-9''	5'-7''	8'-4''
#11	-	-	9'-0''	13'-6''	7'-2''	10'-9''	6'-8''	10'-0''

Location Category B - All bars not in Location Category A.

= Non-epoxy coated = Epoxy coated

Note:
1. When bar lap is not specified on the Plans, the above dimensions shall be used.
2. These bar laps do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These bar laps only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f'c = 3000 psi.
4. These bar laps assume cover of 2''. Greater lap lengths will be required for cover less than 2''.
5. These bar laps are Class B splices based on the development lengths in Det. No. REBAR-DL-101. Class B splices are 1.3 times the development length.
6. Class A splices may be used when (a) the area of reinforcement provided is at least twice that required by analysis over the entire length of the lap splice and (b) one-half or less of the total reinforcement is spliced within the required lap splice length. Class A splices are 1.0 times the development length.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES	
DIRECTOR OFFICE OF STRUCTURES DATE: 03/21/2017	BAR LAP DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.3 (3500 P.S.I.) CONCRETE	
VERSION 1.0	DETAIL NO. REBAR-BL-101	SHEET 1 OF 1

LOCATION CATEGORY A								
BAR SIZE	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	2'-1''	2'-8''	2'-1''	2'-6''	2'-1''	2'-6''	2'-1''	2'-6''
#5	2'-8''	3'-6''	2'-7''	3'-4''	2'-7''	3'-1''	2'-7''	3'-1''
#6	3'-10''	5'-0''	3'-1''	4'-0''	3'-1''	4'-0''	3'-1''	4'-0''
#7	5'-3''	6'-10''	3'-11''	5'-1''	3'-7''	4'-8''	3'-7''	4'-8''
#8	6'-10''	8'-11''	5'-1''	6'-8''	4'-1''	5'-4''	4'-1''	5'-4''
#9	8'-8''	11'-3''	6'-6''	8'-6''	5'-2''	6'-9''	5'-1''	6'-7''
#10	-	-	8'-3''	10'-9''	6'-7''	8'-7''	6'-3''	8'-2''
#11	-	-	10'-1''	13'-3''	8'-1''	10'-7''	7'-6''	9'-9''

Location Category A - Bars in horizontal layers in top of pour with 12'' or more of concrete below them such as in: footings, pier caps, etc.

LOCATION CATEGORY B								
BAR SIZE	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	1'-7''	2'-5''	1'-7''	1'-11''	1'-7''	1'-11''	1'-7''	1'-11''
#5	2'-1''	3'-1''	2'-0''	3'-0''	2'-0''	2'-5''	2'-0''	2'-5''
#6	3'-0''	4'-5''	2'-5''	3'-7''	2'-5''	3'-7''	2'-5''	3'-7''
#7	4'-0''	6'-0''	3'-0''	4'-6''	2'-9''	4'-2''	2'-9''	4'-2''
#8	5'-3''	7'-10''	3'-11''	5'-11''	3'-2''	4'-9''	3'-2''	4'-9''
#9	6'-8''	10'-0''	5'-0''	7'-6''	4'-0''	6'-0''	3'-11''	5'-10''
#10	-	-	6'-4''	9'-6''	5'-1''	7'-7''	4'-10''	7'-2''
#11	-	-	7'-10''	11'-8''	6'-3''	9'-4''	5'-9''	8'-8''

Location Category B - All bars not in Location Category A.

= Non-epoxy coated = Epoxy coated

Note:
1. When bar lap is not specified on the Plans, the above dimensions shall be used.
2. These bar laps do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These bar laps only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f'c = 4000 psi.
4. These bar laps assume cover of 2''. Greater lap lengths will be required for cover less than 2''.
5. These bar laps are Class B splices based on the development lengths in Det. No. REBAR-DL-103. Class B splices are 1.3 times the development length.
6. Class A splices may be used when (a) the area of reinforcement provided is at least twice that required by analysis over the entire length of the lap splice and (b) one-half or less of the total reinforcement is spliced within the required lap splice length. Class A splices are 1.0 times the development length.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES	
DIRECTOR OFFICE OF STRUCTURES DATE: 03/21/2017	BAR LAP DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.6 (4500 P.S.I.) CONCRETE	
VERSION 1.0	DETAIL NO. REBAR-BL-103	SHEET 1 OF 1

LOCATION CATEGORY A								
BAR SIZE	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	1'-10''	2'-5''	1'-10''	2'-2''	1'-10''	2'-2''	1'-10''	2'-2''
#5	2'-5''	3'-1''	2'-4''	3'-0''	2'-4''	2'-9''	2'-4''	2'-9''
#6	3'-5''	4'-5''	2'-9''	3'-7''	2'-9''	3'-7''	2'-9''	3'-7''
#7	4'-8''	6'-1''	3'-6''	4'-7''	3'-2''	4'-2''	3'-2''	4'-2''
#8	6'-1''	7'-11''	4'-7''	5'-11''	3'-8''	4'-9''	3'-8''	4'-9''
#9	7'-8''	10'-0''	5'-9''	7'-6''	4'-8''	6'-0''	4'-6''	5'-11''
#10	-	-	7'-4''	9'-6''	5'-10''	7'-8''	5'-7''	7'-3''
#11	-	-	9'-0''	11'-9''	7'-2''	9'-5''	6'-8''	8'-8''

Location Category A - Bars in horizontal layers in top of pour with 12'' or more of concrete below them such as in: footings, pier caps, etc.

LOCATION CATEGORY B								
BAR SIZE	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	1'-5''	2'-1''	1'-5''	1'-8''	1'-5''	1'-8''	1'-5''	1'-8''
#5	1'-10''	2'-9''	1'-9''	2'-8''	1'-9''	2'-1''	1'-9''	2'-1''
#6	2'-8''	3'-11''	2'-1''	3'-2''	2'-1''	3'-2''	2'-1''	3'-2''
#7	3'-7''	5'-4''	2'-8''	4'-0''	2'-6''	3'-8''	2'-6''	3'-8''
#8	4'-8''	7'-0''	3'-6''	5'-3''	2'-10''	4'-2''	2'-10''	4'-2''
#9	5'-11''	8'-10''	4'-5''	6'-8''	3'-7''	5'-4''	3'-6''	5'-2''
#10	-	-	5'-8''	8'-5''	4'-6''	6'-9''	4'-3''	6'-5''
#11	-	-	6'-11''	10'-4''	5'-7''	8'-4''	5'-2''	7'-8''

Location Category B - All bars not in Location Category A.

= Non-epoxy coated = Epoxy coated

Note:
1. When development length is not specified on the Plans, the above dimensions shall be used.
2. These development lengths do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These development lengths only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f'c = 3000 psi.
4. These development lengths assume cover of 2''. Greater development lengths will be required for cover less than 2''.
5. The Excess Reinforcement Factor was assumed to be 1.0 when calculating these dimensions.
6. Atr was assumed to be 0 when calculating the Reinforcement Confinement Factor.
7. If depth of member does not allow bar development length indicated in Location Categories A and B; then hooks shall be added to all bars not conforming, as per D, E, and F per Det. No. REBAR-DL-201.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES	
DIRECTOR OFFICE OF STRUCTURES DATE: 03/21/2017	DEVELOPMENT LENGTH DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.3 (3500 P.S.I.) CONCRETE	
VERSION 1.0	DETAIL NO. REBAR-DL-101	SHEET 1 OF X

LOCATION CATEGORY A								
BAR SIZE	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	1'-7''	2'-1''	1'-7''	1'-11''	1'-7''	1'-11''	1'-7''	1'-11''
#5	2'-1''	2'-8''	2'-0''	2'-7''	2'-0''	2'-5''	2'-0''	2'-5''
#6	3'-0''	3'-10''	2'-5''	3'-1''	2'-5''	3'-1''	2'-5''	3'-1''
#7	4'-0''	5'-3''	3'-0''	3'-11''	2'-9''	3'-7''	2'-9''	3'-7''
#8	5'-3''	6'-10''	3'-11''	5'-2''	3'-2''	4'-1''	3'-2''	4'-1''
#9	6'-8''	8'-8''	5'-0''	6'-6''	4'-0''	5'-3''	3'-11''	5'-1''
#10	-	-	6'-4''	8'-3''	5'-1''	6'-7''	4'-10''	6'-3''
#11	-	-	7'-10''	10'-2''	6'-3''	8'-2''	5'-9''	7'-6''

Location Category A - Bars in horizontal layers in top of pour with 12'' or more of concrete below them such as in: footings, pier caps, etc.

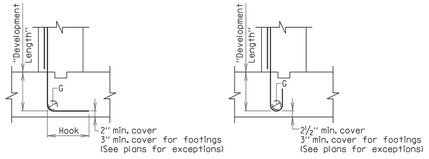
LOCATION CATEGORY B								
BAR SIZE	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	1'-3''	1'-10''	1'-3''	1'-6''	1'-3''	1'-6''	1'-3''	1'-6''
#5	1'-7''	2'-5''	1'-6''	2'-3''	1'-6''	1'-10''	1'-6''	1'-10''
#6	2'-3''	3'-5''	1'-10''	2'-9''	1'-10''	2'-9''	1'-10''	2'-9''
#7	3'-1''	4'-8''	2'-4''	3'-6''	2'-2''	3'-2''	2'-2''	3'-2''
#8	4'-0''	6'-0''	3'-0''	4'-6''	2'-5''	3'-8''	2'-5''	3'-8''
#9	5'-2''	7'-8''	3'-10''	5'-9''	3'-1''	4'-7''	3'-0''	4'-6''
#10	-	-	4'-11''	7'-4''	3'-11''	5'-10''	3'-9''	5'-7''
#11	-	-	6'-0''	9'-0''	4'-10''	7'-2''	4'-5''	6'-8''

Location Category B - All bars not in Location Category A.

= Non-epoxy coated = Epoxy coated

Note:
1. When development length is not specified on the Plans, the above dimensions shall be used.
2. These development lengths do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These development lengths only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f'c = 4000 psi.
4. These development lengths assume cover of 2''. Greater development lengths will be required for cover less than 2''.
5. The Excess Reinforcement Factor was assumed to be 1.0 when calculating these dimensions.
6. Atr was assumed to be 0 when calculating the Reinforcement Confinement Factor.
7. If depth of member does not allow bar development length indicated in Location Categories A and B; then hooks shall be added to all bars not conforming, as per D, E, and F per Det. No. REBAR-DL-203.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES	
DIRECTOR OFFICE OF STRUCTURES DATE: 03/21/2017	DEVELOPMENT LENGTH DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.6 (4500 P.S.I.) CONCRETE	
VERSION 1.0	DETAIL NO. REBAR-DL-103	SHEET 1 OF 1



STANDARD 90° HOOK STANDARD 180° HOOK

BAR SIZE	* LOCATION CATEGORY		
	D	E	F
#4	7''	10''	8''
#5	9''	1'-0''	10''
#6	10''	1'-3''	1'-0''
#7	1'-0''	1'-5''	1'-2''
#8	1'-2''	1'-7''	1'-4''
#9	1'-4''	1'-10''	1'-6''
#10	1'-5''	2'-1''	1'-8''
#11	1'-7''	2'-3''	1'-10''

Note:
For Hook Dimensions and Bends, see Detail No. REBAR-BB-102.

* LOCATION CATEGORY:

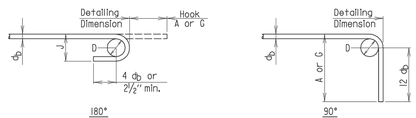
D- All bars terminating with a standard 180° hook with side cover (normal to plane of hook) not less than 2½'', and for 90° deg. hook, cover on bar extension beyond hook not less than 2''.
E- All bars not in Category D.
F- All bars with hook enclosed vertically or horizontally within ties or stirrup-ties spaced along the full development length not greater than 3d where d is the diameter of the hooked bar.

Note:
1. When development length is not specified on the Plans, the above dimensions shall be used.
2. These development lengths do not apply when bar is in lightweight concrete or any other strength of concrete.
3. These development lengths only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f'c = 4000 psi.
4. If depth of member does not allow bar development length indicated in Categories A, B, and C; Detail No. REBAR-DL-103; then hook shall be added to all bars not conforming, as per D, E & F.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES	
DIRECTOR OFFICE OF STRUCTURES DATE: 05/10/2011	DEVELOPMENT LENGTH DIMENSIONS OF HOOKED BARS FOR GRADE 60 REINFORCING STEEL IN MIX NO.6 (4500 P.S.I.) CONCRETE NON-EPOXY COATED REINFORCING	
VERSION 1.0	DETAIL NO. REBAR-DL-203	SHEET 1 OF 1

HOOKS
TABLE I
REFERENCES

1. ACI Types 1 thru 26
2. SHA Standard Pin Bending
3. SHA Radius Bending



RECOMMENDED END HOOKS, ALL GRADES				
BAR SIZE	Finished bend diameter D, in.	180 - deg hook A or G in	180 - deg hook J, in.	90 - deg hook A or G in
#3	2¼	5	3	6
#4	3	6	4	8
#5	3¾	7	5	10
#6	4½	8	6	1-0
#7	5¼	10	7	1-2
#8	6	11	8	1-4
#9	9½	1-3	11¾	1-7
#10	10¾	1-5	1-1¼	1-10
#11	12	1-7	1-2¾	2-0
#14	18¼	2-3	1-9¾	2-7
#18	24	3-0	2-4½	3-5

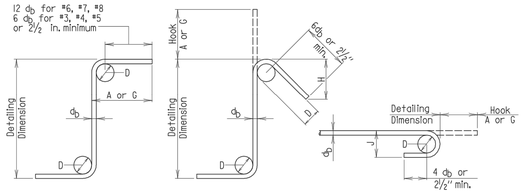
APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES	
DIRECTOR OFFICE OF STRUCTURES DATE: 11/17/1997	REINFORCING STEEL HOOK TABLES AND DIAGRAMS	
VERSION 1.0	DETAIL NO. REBAR-BB-102	SHEET 1 OF 2

HOOKS
TABLE II
REFERENCES

1. ACI Types S1 thru S11
2. ACI Types T1 thru T8
3. SHA Ties and Stirrups

(Note: Tie and stirrup types supplied in sizes #3-#8)

STIRRUP AND TIE HOOKS



STIRRUP AND TIE HOOK DIMENSIONS, in.				
BAR SIZE	D, in.	90 - deg hook	135 - deg hook	
		A or G	A or G	H, approx
#3	1½	4	4	2½
#4	2	4½	4½	3
#5	2½	6	5½	3¾
#6	4½	1-0	7¾	4½
#7	5¼	1-2	9	5¼
#8	6	1-4	10¼	6

RECOMMENDED END HOOKS, ALL GRADES			
BAR SIZE	Finished bend diameter D, in.	180 - deg hook A or G in	180 - deg hook J, in.
#3	2¼	5	3
#4	3	6	4
#5	3¾	7	5
#6	4½	8	6
#7	5¼	10	7
#8	6	11	8

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES	
DIRECTOR OFFICE OF STRUCTURES DATE: 11/17/1997	REINFORCING STEEL HOOK TABLES AND DIAGRAMS	
VERSION 1.0	DETAIL NO. REBAR-BB-102	SHEET 2 OF 2

KCI TECHNOLOGIES
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REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE 7/15/2021
SCALE AS SHOWN
DESIGNED BY HMK
DRAWN BY DRC

STANDARDS

FREDERICK AND PENNSYLVANIA
LINE RAILROAD TRAIL
OVER TUSCARORA CREEK

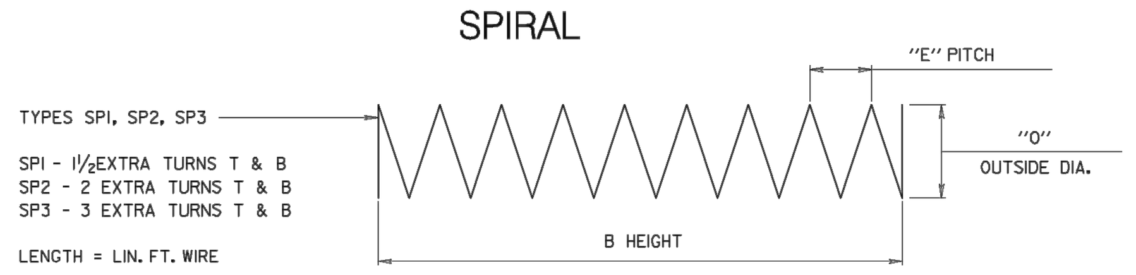
DRAWING NO. S1-8
SHEET 43 OF 55
KCI JOB NUMBER 27206468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

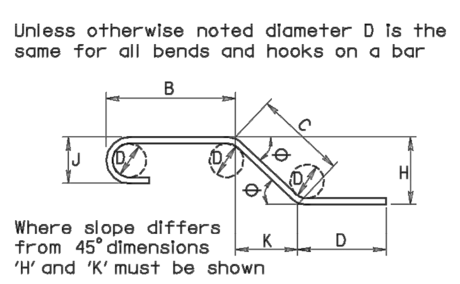
TYPICAL BAR BENDS

DETAILS AND NOTES

SPIRAL



Unless otherwise noted diameter D is the same for all bends and hooks on a bar



ENLARGED VIEW SHOWING BAR BENDING DETAILS

Notes:
1. All dimensions are out-to-out of bar or to tangent points for 135° and 180° hooks.
2. 'J' dimensions on 180° hooks to be shown only where necessary to restrict hook size. Otherwise standard hooks are to be used.
3. Where 'J' is not shown, "J' will be kept equal to or less than 'H' on truss bars. Where 'J' can exceed 'H' it should be shown.
4. 'H' dimension on stirrups to be shown where necessary to fit within concrete.
5. Where bars are to be bent more accurately than standard bending tolerances, bending dimensions which require closer fabrication should have limits indicated.

NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

APPROVAL: E.S. Friedman DIRECTOR, OFFICE OF STRUCTURES — DATE: 02/10/1994 — VERSION 1.0

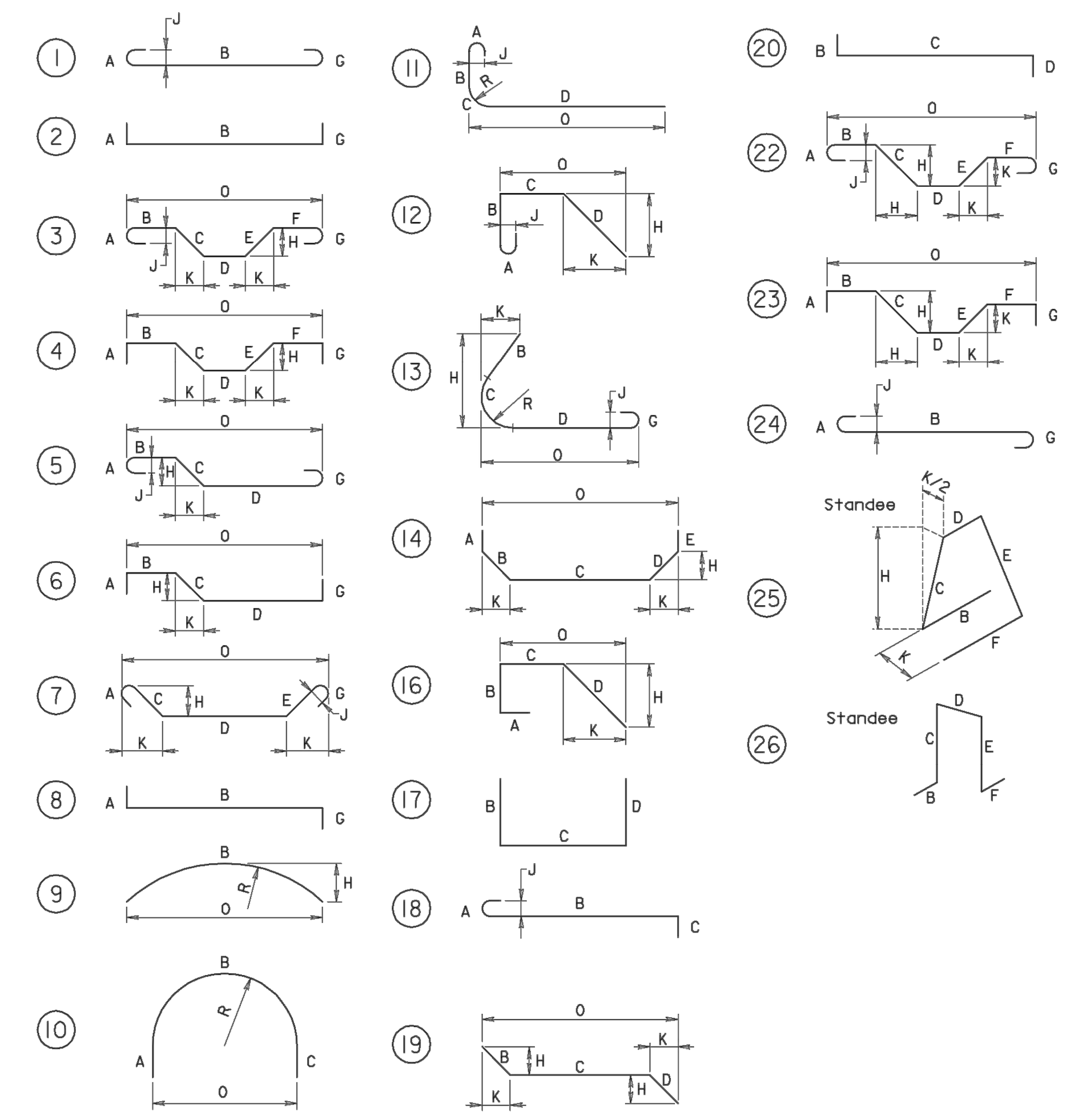
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

BAR BEND TYPES
GENERAL NOTES

DETAIL NO. REBAR-BB-101 — SHEET 1 OF 8

ACI TYPICAL BAR BENDS

STANDARD PIN BENDING



NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

APPROVAL: E.S. Friedman DIRECTOR, OFFICE OF STRUCTURES — DATE: 02/10/1994 — VERSION 1.0

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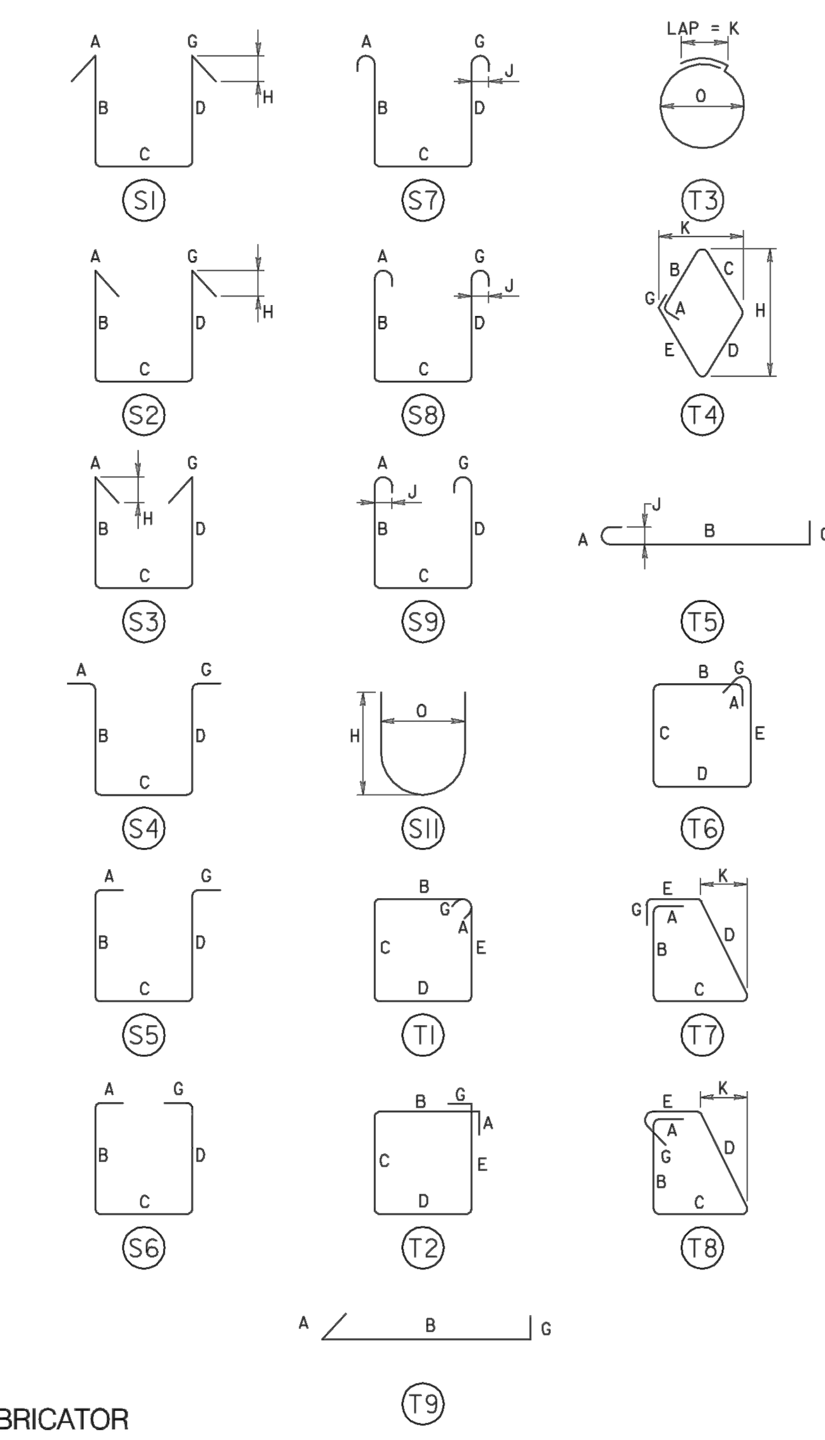
BAR BEND TYPES
ACI - STANDARD PIN BENDING

DETAIL NO. REBAR-BB-101 — SHEET 2 OF 8

ACI TYPICAL BAR BENDS

TIES AND STIRRUPS



NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

APPROVAL: E.S. Friedman DIRECTOR, OFFICE OF STRUCTURES — DATE: 02/10/1994 — VERSION 1.0

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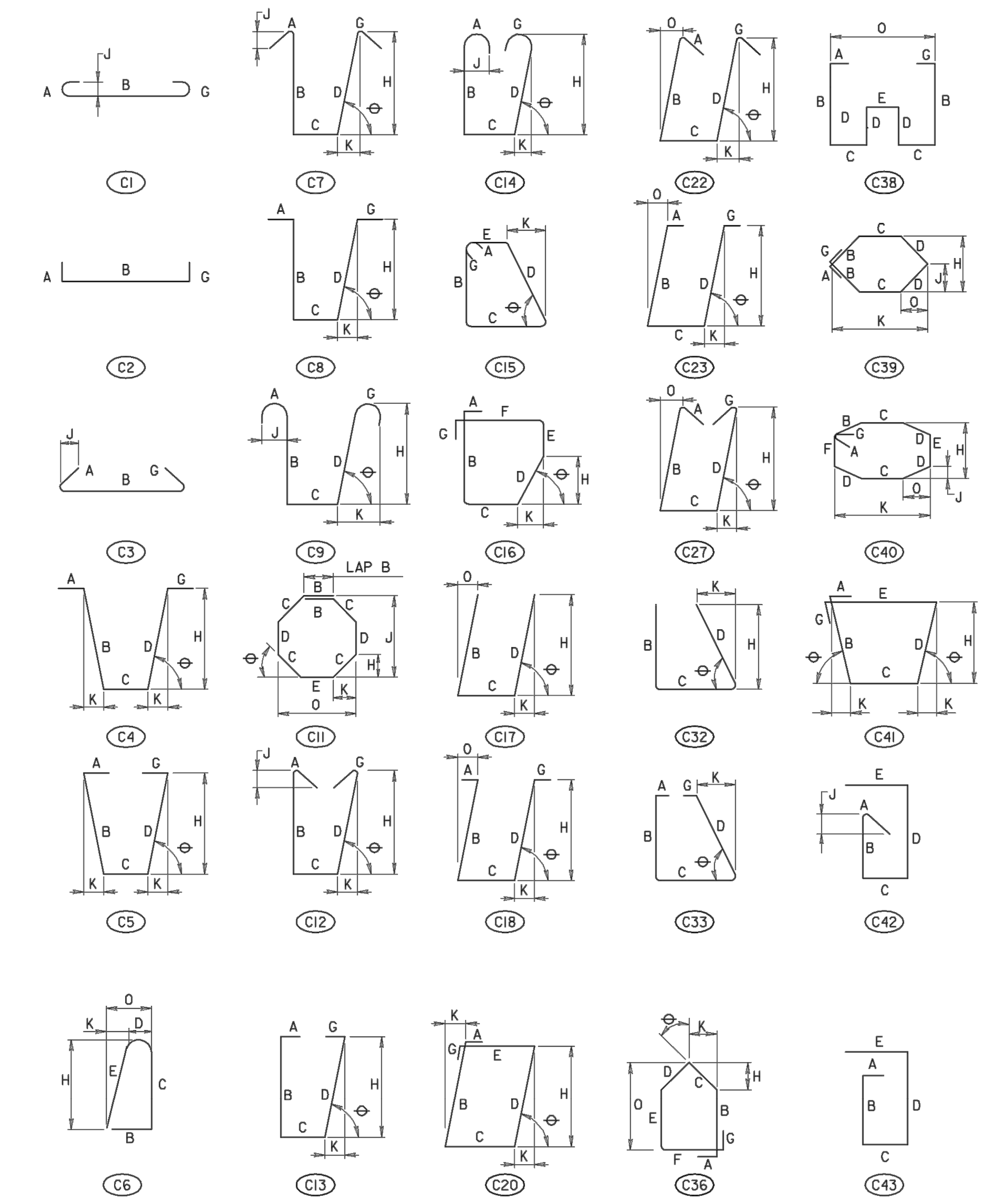
BAR BEND TYPES
ACI - TIES A

DETAIL NO. REBAR-BB-101 — SHEET 3 OF 8

SHA TYPICAL BAR BENDS

TIES AND STIRRUPS



NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

APPROVAL: E.S. Friedman DIRECTOR, OFFICE OF STRUCTURES — DATE: 02/10/1994 — VERSION 1.0

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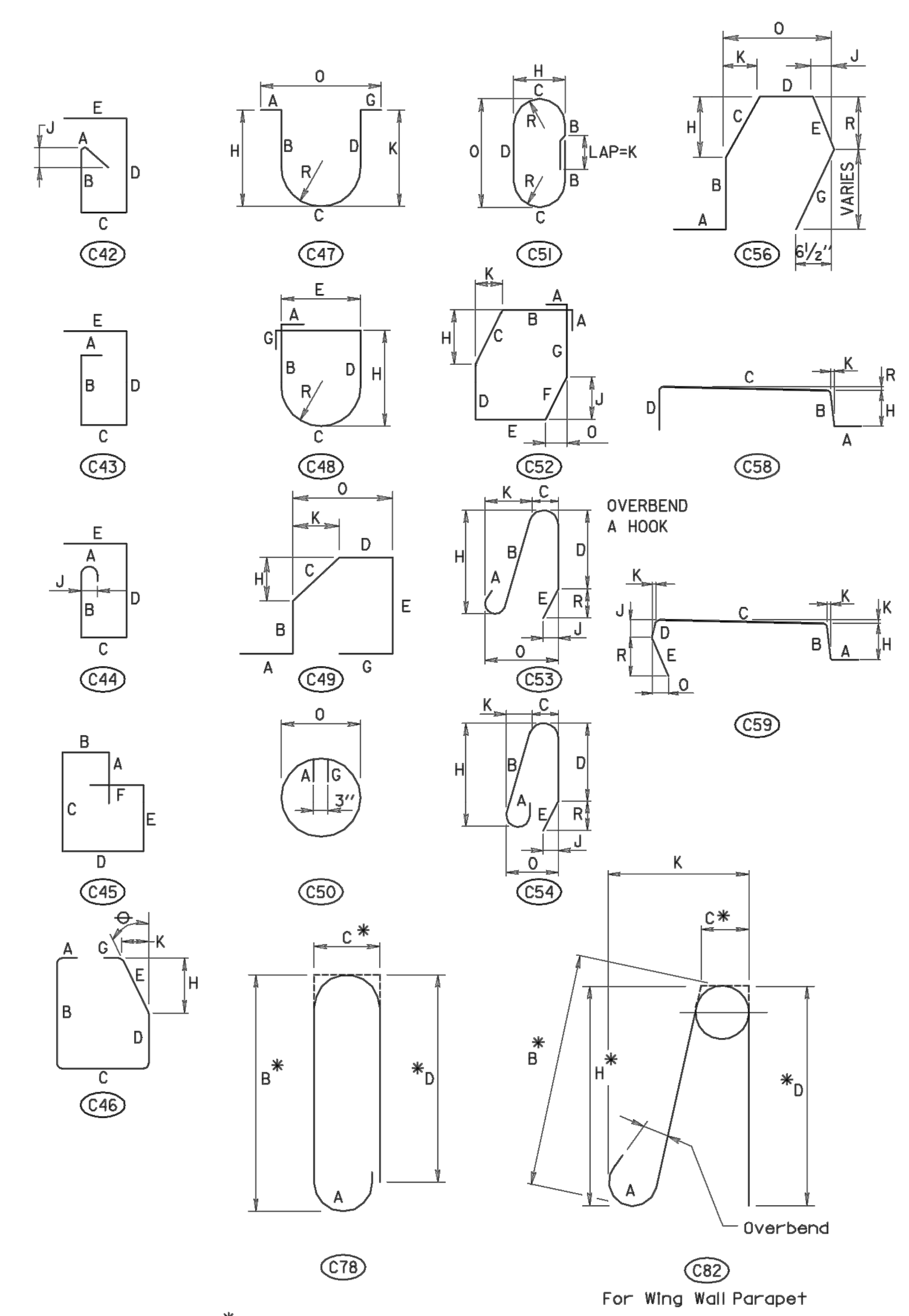
BAR BEND TYPES
SHA - TIES AND STIRRUPS

DETAIL NO. REBAR-BB-101 — SHEET 4 OF 8

SHA TYPICAL BAR BENDS

TIES AND STIRRUPS



* Measured to Tangents of Curves.

NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

APPROVAL: E.S. Friedman DIRECTOR, OFFICE OF STRUCTURES — DATE: 02/10/1994 — VERSION 1.0

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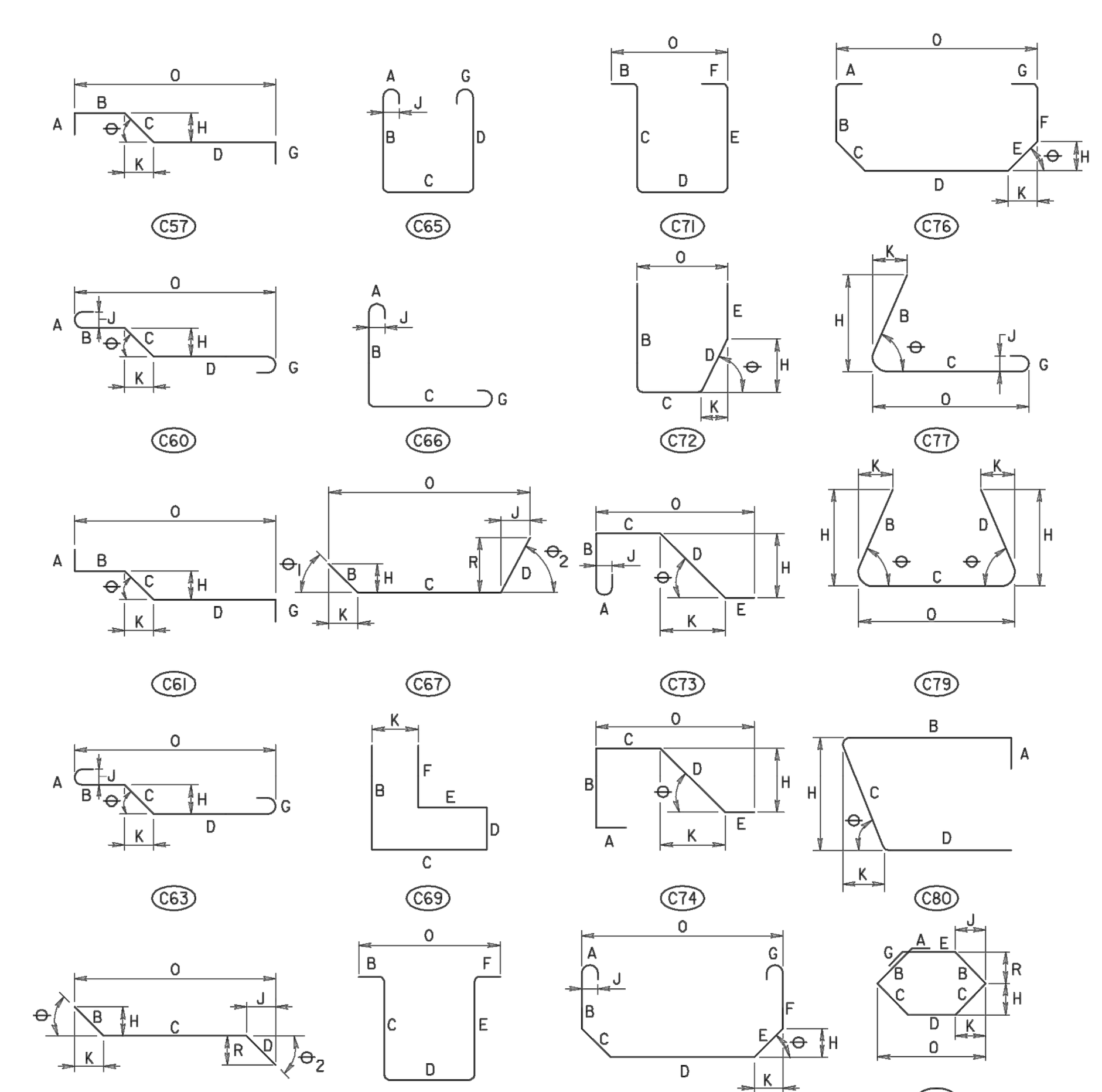
BAR BEND TYPES
SHA - TIES AND STIRRUPS

DETAIL NO. REBAR-BB-101 — SHEET 5 OF 8

SHA TYPICAL BAR BENDS

STANDARD PIN BENDING



NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

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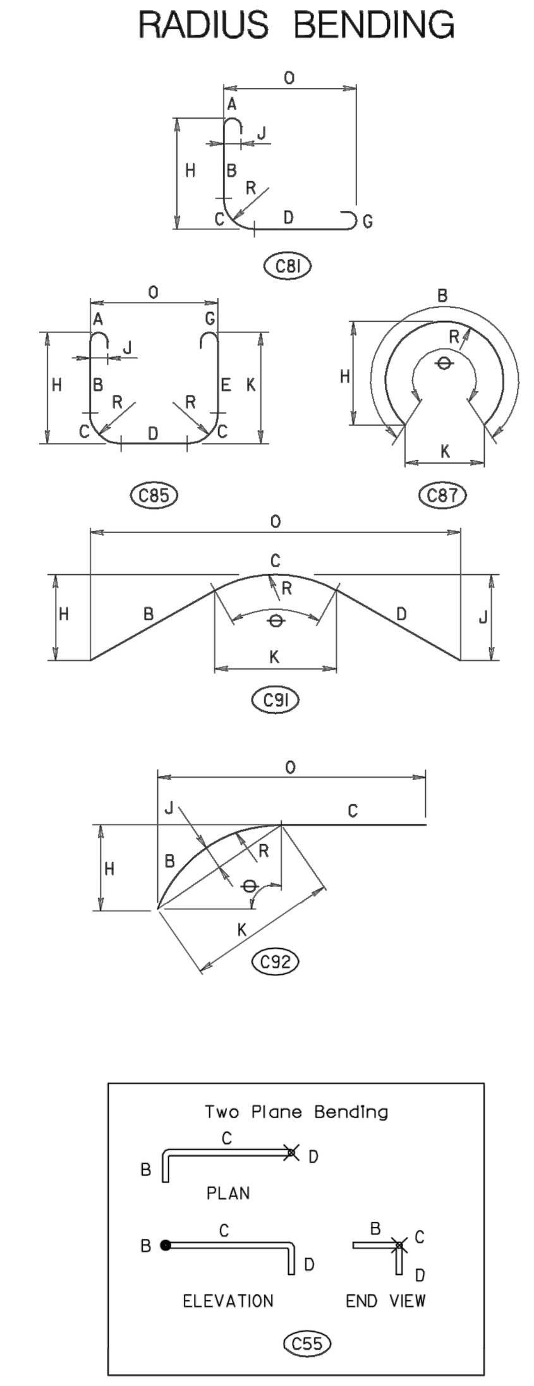
BAR BEND TYPES
SHA - STANDARD PIN BENDING

DETAIL NO. REBAR-BB-101 — SHEET 6 OF 8

SHA TYPICAL BAR BENDS

RADIUS BENDING



NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

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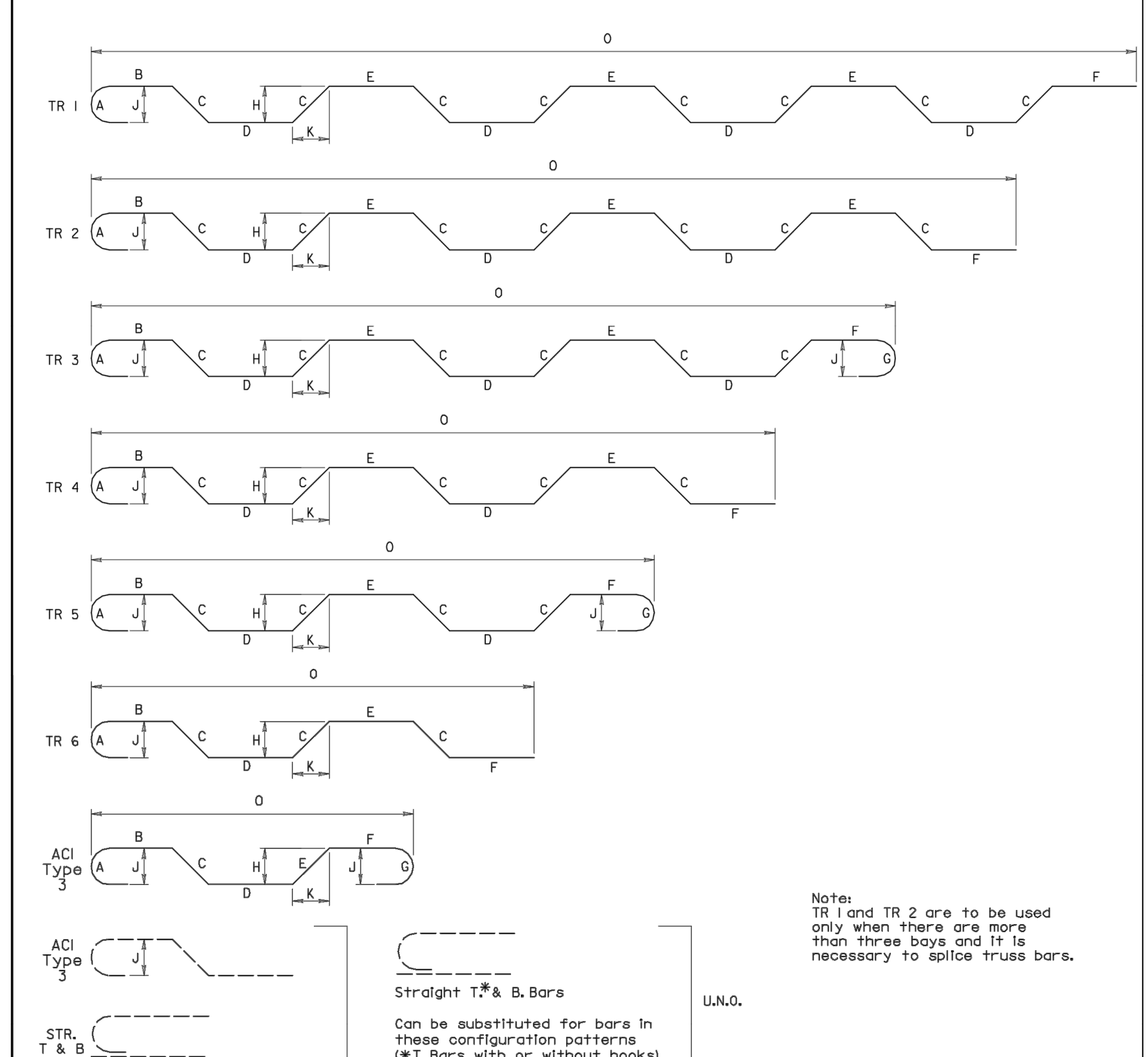
BAR BEND TYPES
SHA - RADIUS BENDING

DETAIL NO. REBAR-BB-101 — SHEET 7 OF 8

SHA TYPICAL BAR BENDS

TRUSS BAR CONFIGURATIONS



Note:
TR 1 and TR 2 are to be used only when there are more than three bays and it is necessary to splice truss bars.

Hooks for truss bars optional.

NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

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BAR BEND TYPES
TRUSS BAR CONFIGURATIONS

DETAIL NO. REBAR-BB-101 — SHEET 8 OF 8

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REVISIONS			
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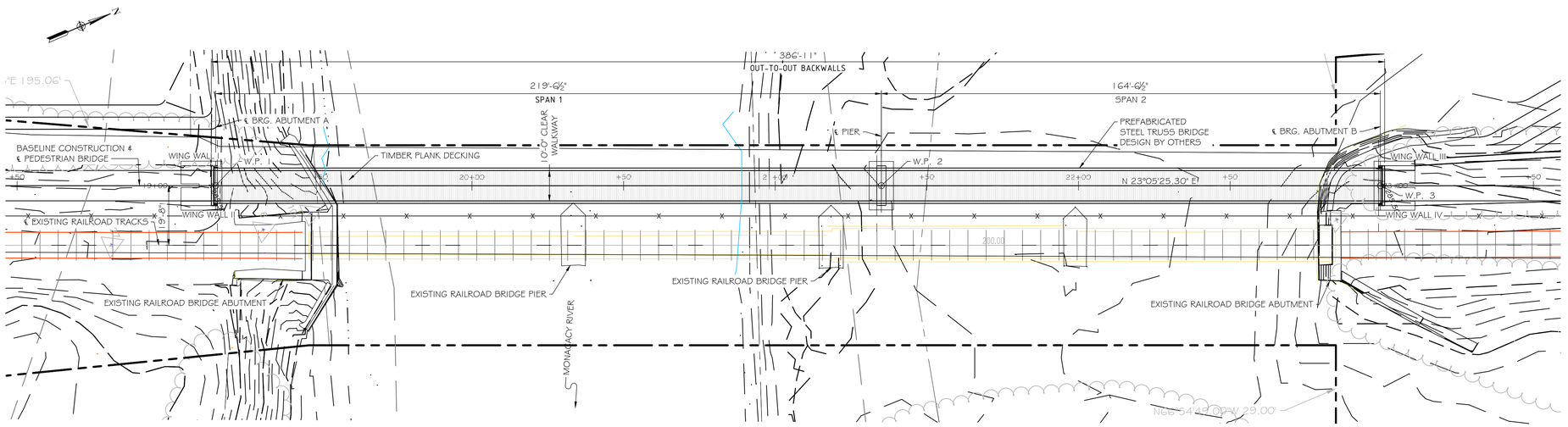
DATE: 7/15/2021
SCALE: AS SHOWN
DESIGNED BY: HMK
DRAWN BY: DRC

STANDARDS

FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER TUSCARORA CREEK

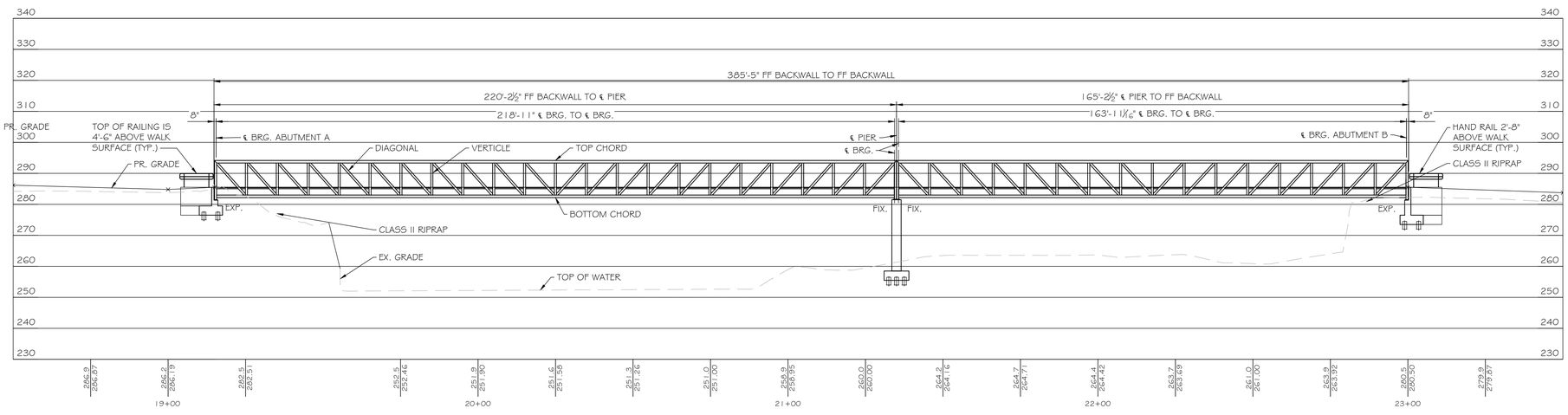
DRAWING NO. S1-9

KCI JOB NUMBER 27206468



PLAN

SCALE: 1"=20'



ELEVATION

SCALE: 1"=20'

GENERAL NOTES:

THE PEDESTRIAN BRIDGE STRUCTURE IS DESIGNED IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:

- AASHTO GUIDE SPECIFICATIONS FOR DESIGN OF PEDESTRIAN BRIDGES - 2009 WITH 2015 INTERIMS
- AASHTO GUIDE FOR THE DEVELOPMENT OF BICYCLE FACILITIES - 2010
- SHA SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS DATED JULY 2020
- AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, DATED 2017 AND 2018 INTERIMS.

CONCRETE DESIGN:

CONCRETE COMPRESSIVE STRENGTH FOR DESIGN SHALL BE:
f'c = 3,000 PSI FOR ELEMENTS USING MIX NO. 3.
f'c = 4,000 PSI FOR ELEMENTS USING MIX NO. 6.

REINFORCING STEEL DESIGN: fs = 24,000 p.s.i.

STRUCTURAL STEEL DESIGN: LRFD

THE DESIGN OF THE PEDESTRIAN BRIDGE WAS BASED ON THE FOLLOWING LOADS:

- 90 LBS/SQ FT PEDESTRIAN LOADING OR A LOADED PICK-UP TRUCK (10,000 LB VEHICLE WITH 70% OF THE WEIGHT ON THE REAR AXLE) WITH NO IMPACT. RAILING LOADS IN ACCORDANCE WITH AASHTO [2.7.2]
- DEAD LOAD = ACTUAL WEIGHT OF MEMBERS (74,000 LBS WAS USED FOR ABUTMENT DESIGN AND 124,200 LBS WAS USED FOR THE PIER DESIGN)

THE BRIDGE STRUCTURE WAS DESIGNED FOR THE MAXIMUM LIVE LOAD EFFECT.

THIS BRIDGE IS NOT INTENDED TO BE A PUBLIC HIGHWAY BRIDGE. IT WAS DESIGNED TO SUPPORT PEDESTRIANS/BICYCLES AND A MAINTENANCE VEHICLE ONLY (DEFINED ABOVE)

THIS BRIDGE PROVIDES ACCESS FOR DISABLED INDIVIDUALS.

STRUCTURAL STEEL:

- STRUCTURAL STEEL SHALL CONFORM TO ASTM A 709 GRADE 50, INCLUDING THE ADDITIONAL REQUIREMENTS FOR CHARPY V-NOTCH TESTING OF AASHTO M 270 FOR PRIMARY LOAD CARRYING MEMBERS.
- BOLTS SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATION - HIGH STRENGTH BOLTS: A 325
- ALL WELDING SHALL BE PERFORMED BY CERTIFIED WELDERS IN ACCORDANCE WITH ASWD.1.1. STRUCTURAL WELDING CODE - STEEL. ALL WELDING ELECTRODES SHALL CONFORM TO THE E-70 SERIES OF THE AWS A5.1 SPECIFICATION FOR COVERED CARBON STEEL ARC WELDING ELECTRODES.
- NO PENETRATIONS ARE PERMITTED THROUGH STRUCTURAL STEEL MEMBERS UNLESS INDICATED ON STRUCTURAL DRAWINGS OR WITH WRITTEN APPROVAL OF THE ENGINEER.
- DURING ERECTION, STRUCTURAL STEEL FRAMING SHALL BE ADEQUATELY BRACED.
- MASK FIELD WELDED AREAS IN SHOP AND FIELD WELD, WHERE INDICATED. AFTER FIELD WELDS ARE COMPLETE, SANDBLAST FIELD WELDED AREAS TO COMPLY WITH SSPC-SP6 "COMMERCIAL SANDBLAST" OR USE SSPC-SP11 "POWER TOOL CLEANING" TO BARE METAL, WITH A SURFACE PROFILE NOT LESS THAN 1.0 MILS. APPLY PAINT SYSTEM AS INDICATED.

WOOD:

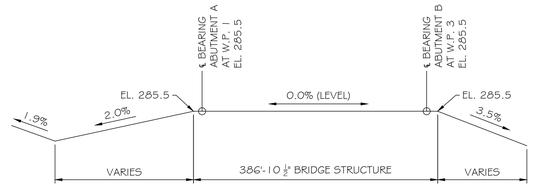
WOOD DECKING SHALL BE SELECT GRADE IPE (IRON WOOD) ALL HEART, NO SAP, WITH A MINIMUM Fb = 25,400 p.s.i. OR EQUIVALENT RECOMMENDED BY THE BRIDGE SUPERSTRUCTURE FABRICATOR. ALL WOOD SHALL BE TREATED TO AWPA STANDARDS.

REINFORCING STEEL:

FOR TIES AND STIRRUPS; STANDARD ACI BENDING TOLERANCES ARE MODIFIED TO PLUS (+) ZERO INCHES, MINUS (-) NORMAL ACI BENDING TOLERANCES.
ONLY ASTM A 615 GRADE 60 CAN BE USED ON THIS PROJECT.
ALL REINFORCING STEEL SHALL BE BLACK STEEL.

KEYS: ALL KEYS ARE NOMINAL SIZE.

ALL HARDWARE AND FASTENERS SHALL BE HOT DIPPED GALVANIZED.



VERTICAL PROFILE

NOT TO SCALE

WORKING POINT COORDINATES

W.P.	NORTHING	EASTING
W.P. 1	655221.1421	1201410.8325
W.P. 2	655423.0957	1201496.9330
W.P. 3	655574.4555	1201561.4633

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NO.	DATE	DESCRIPTION	BY

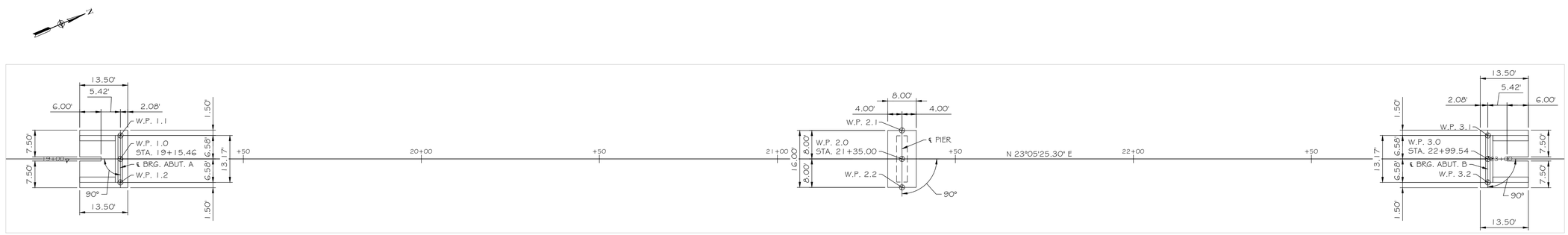
DATE 7/15/2021
SCALE AS SHOWN
DESIGNED BY HMK
DRAWN BY DRC

GENERAL PLAN AND ELEVATION

FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER MONOCACY RIVER

DRAWING NO. S2-1
SHEET 45 OF 55
KCI JOB NUMBER 27206468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



GEOMETRIC LAYOUT

SCALE: 1"=15'

WORKING POINT COORDINATES

W.P.	NORTHING	EASTING
W.P. 1	655221.1421	1201410.8325
W.P. 1.1	655223.7240	1201404.7765
W.P. 1.2	655218.5602	1201416.8884
W.P. 2	655423.0957	1201496.9330
W.P. 2.1	655426.2331	1201489.5739
W.P. 2.2	655419.9582	1201504.2921
W.P. 3	655574.4555	1201561.4633
W.P. 3.1	655577.0374	1201555.4073
W.P. 3.2	655571.8737	1201567.5191

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

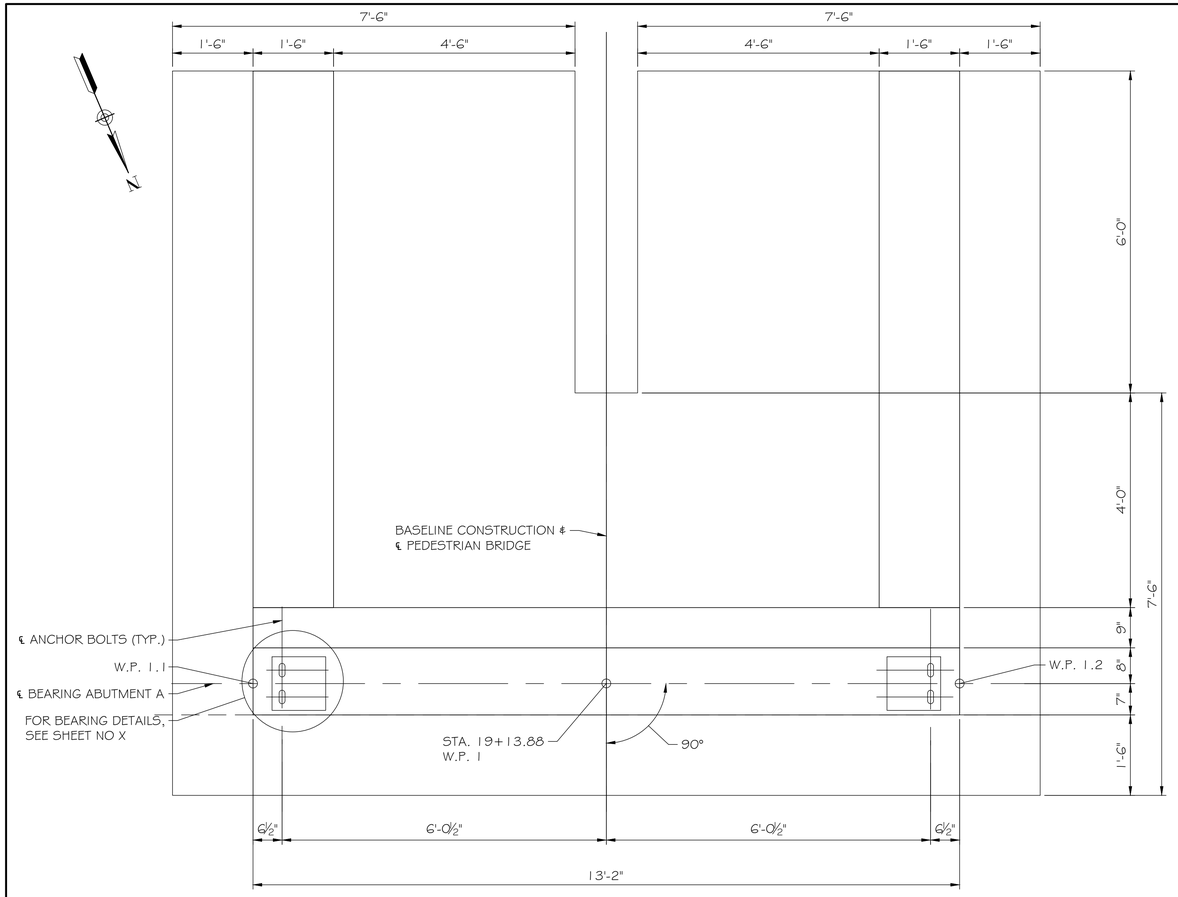
DATE: 7/15/2021
SCALE: AS SHOWN
DESIGNED BY: HMK
DRAWN BY: DRC

GEOMETRIC LAYOUT & FOOTING PLAN

FREDERICK AND PENNSYLVANIA
LINE RAILROAD TRAIL
OVER MONOCACY RIVER

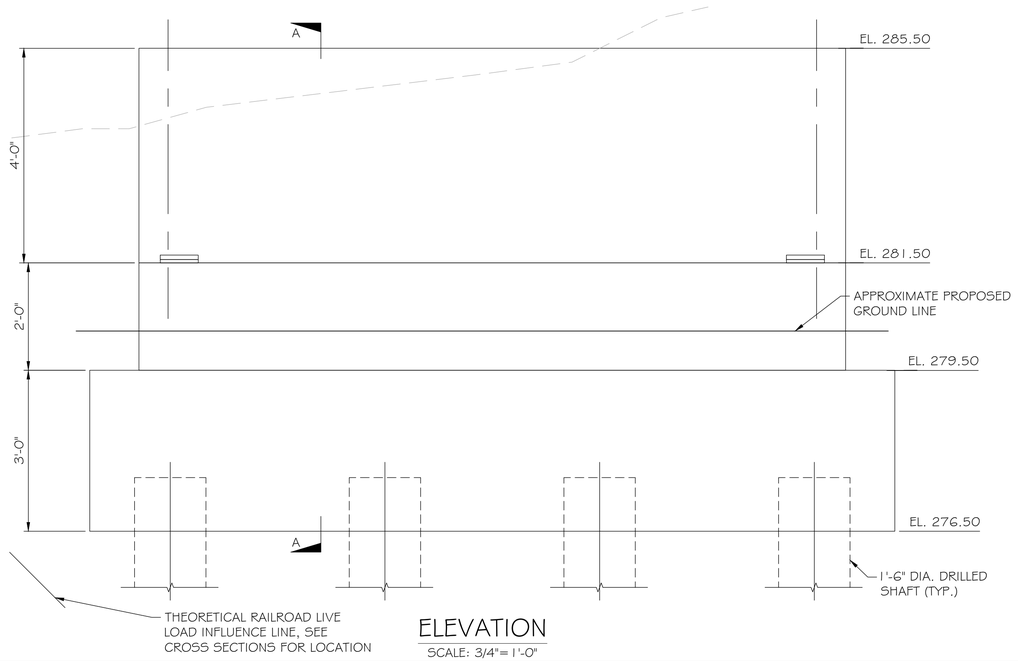
DRAWING NO. S2-2
SHEET 46 OF 55
KCI JOB NUMBER 27206468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$



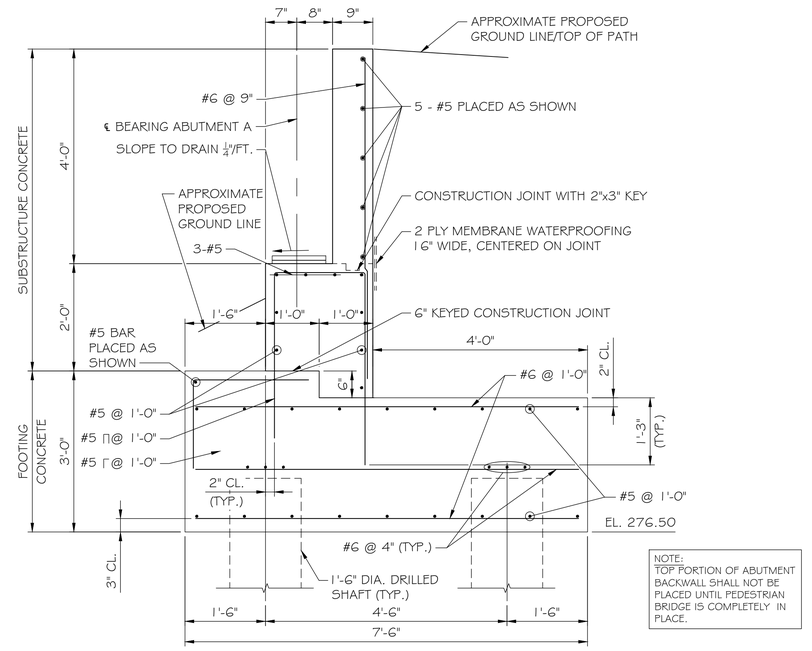
PLAN

SCALE: 3/4"= 1'-0"



ELEVATION

SCALE: 3/4"= 1'-0"



NOTE:
TOP PORTION OF ABUTMENT BACKWALL SHALL NOT BE PLACED UNTIL PEDESTRIAN BRIDGE IS COMPLETELY IN PLACE.

SECTION A-A

SCALE: 3/4"= 1'-0"

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

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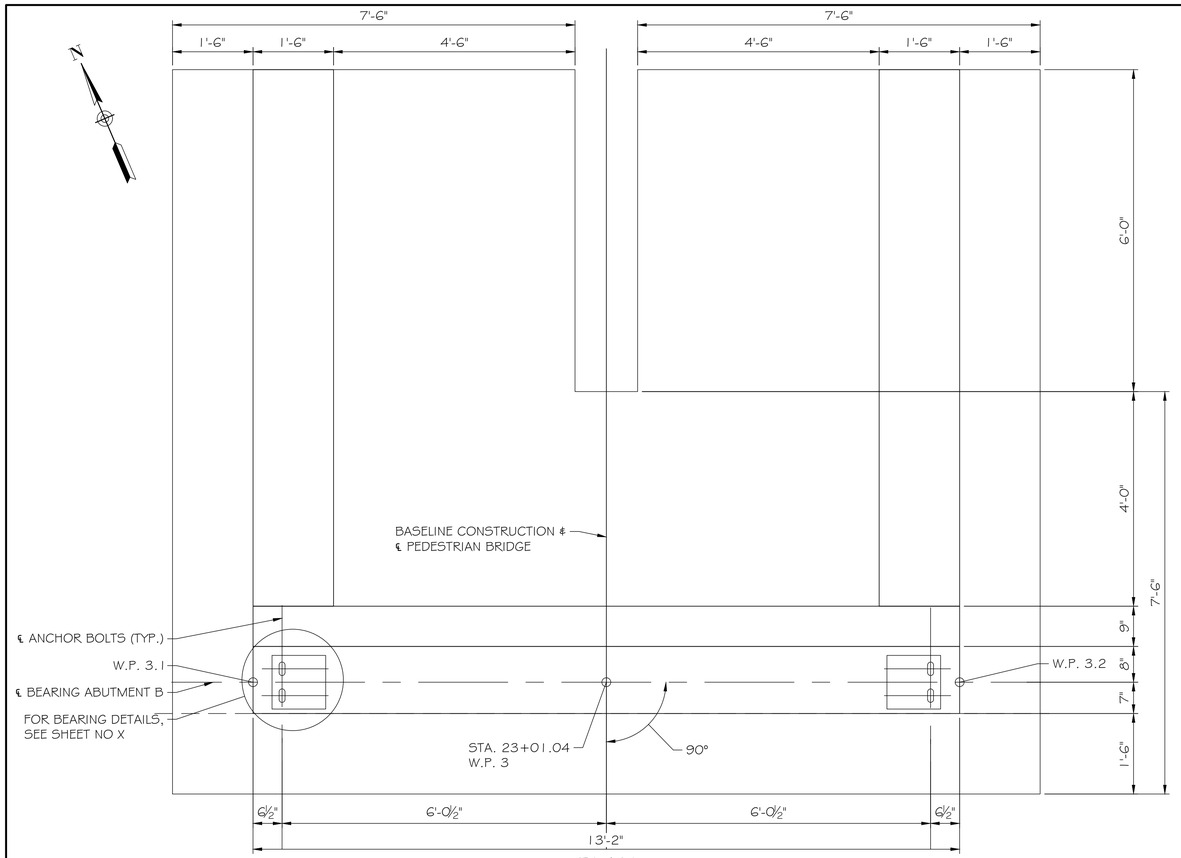
ABUTMENT A PLAN AND ELEVATION

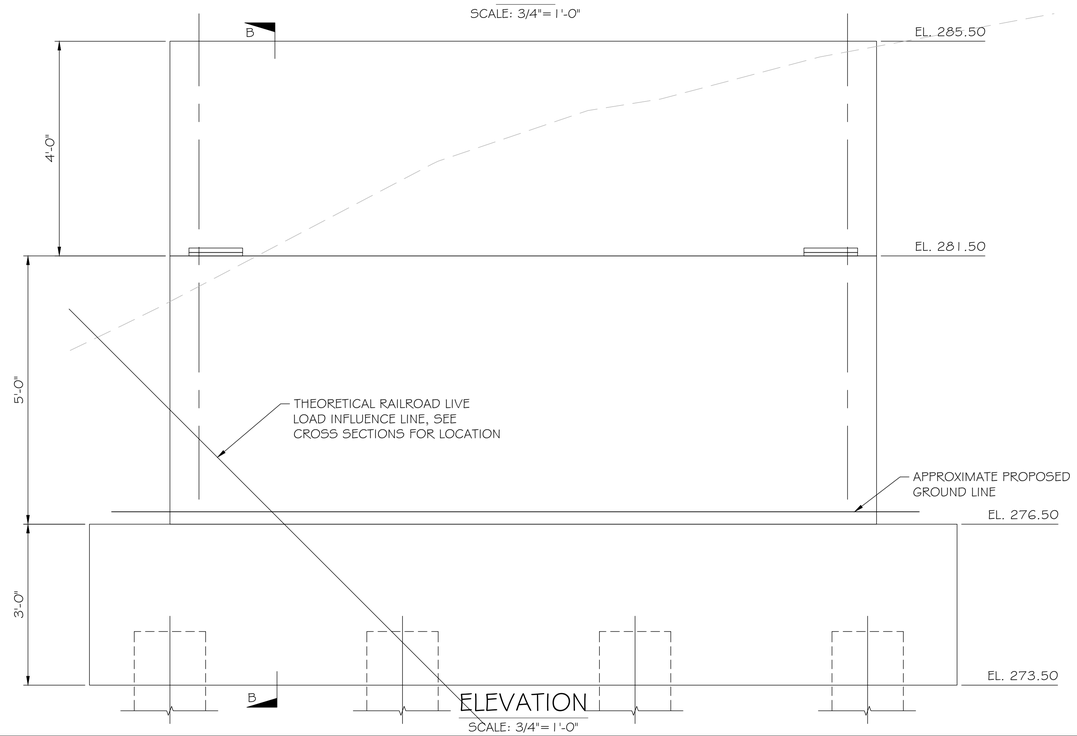
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER MONOCACY RIVER

DRAWING NO. S2-3
SHEET 47 OF 55
KCI JOB NUMBER 27206468



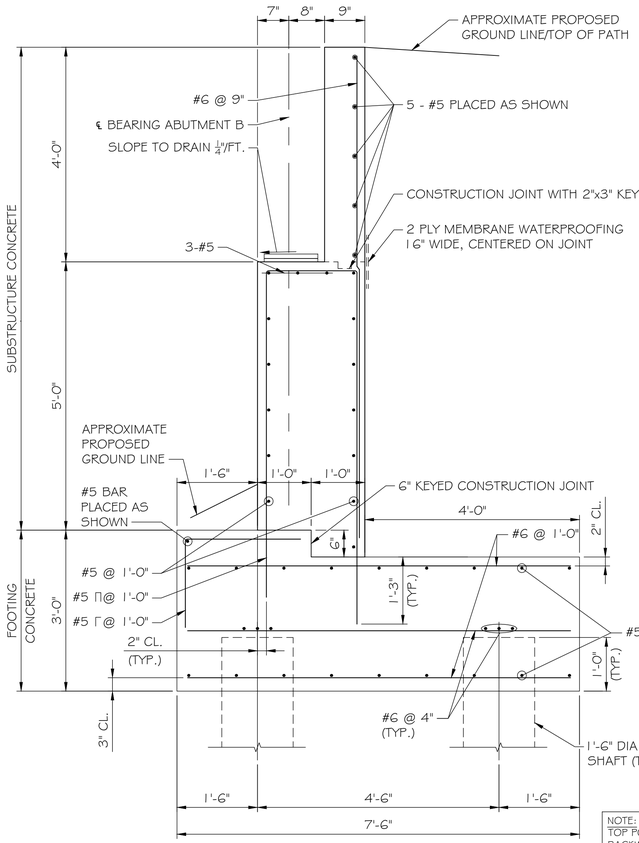
PLAN

SCALE: 3/4"= 1'-0"



ELEVATION

SCALE: 3/4"= 1'-0"



SECTION B-B

SCALE: 3/4"= 1'-0"

NOTE:
TOP PORTION OF ABUTMENT BACKWALL SHALL NOT BE PLACED UNTIL PEDESTRIAN BRIDGE IS COMPLETELY IN PLACE.

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

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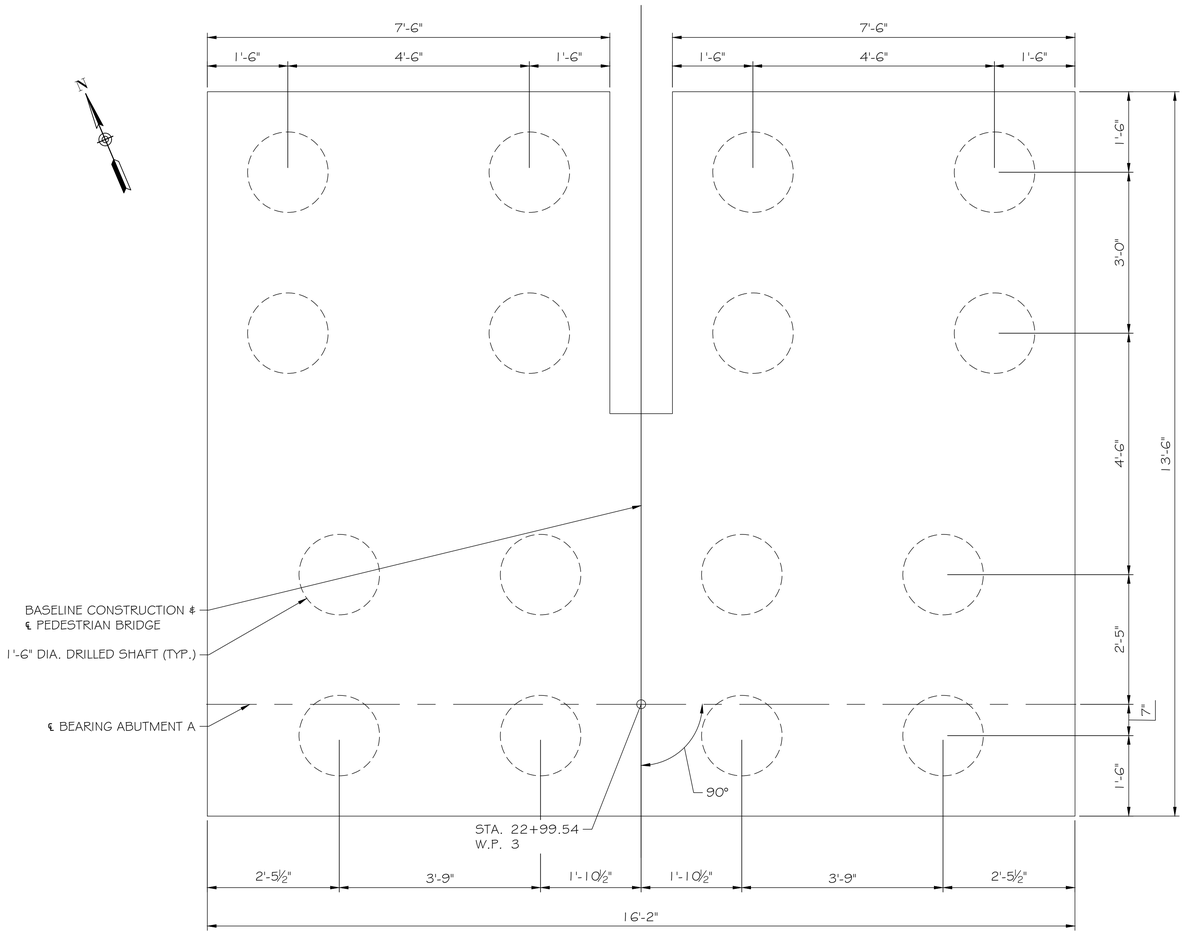
NO.	DATE	DESCRIPTION	BY

DATE 7/15/2021
SCALE AS SHOWN
DESIGNED BY HMK
DRAWN BY DRC

ABUTMENT B PLAN AND ELEVATION

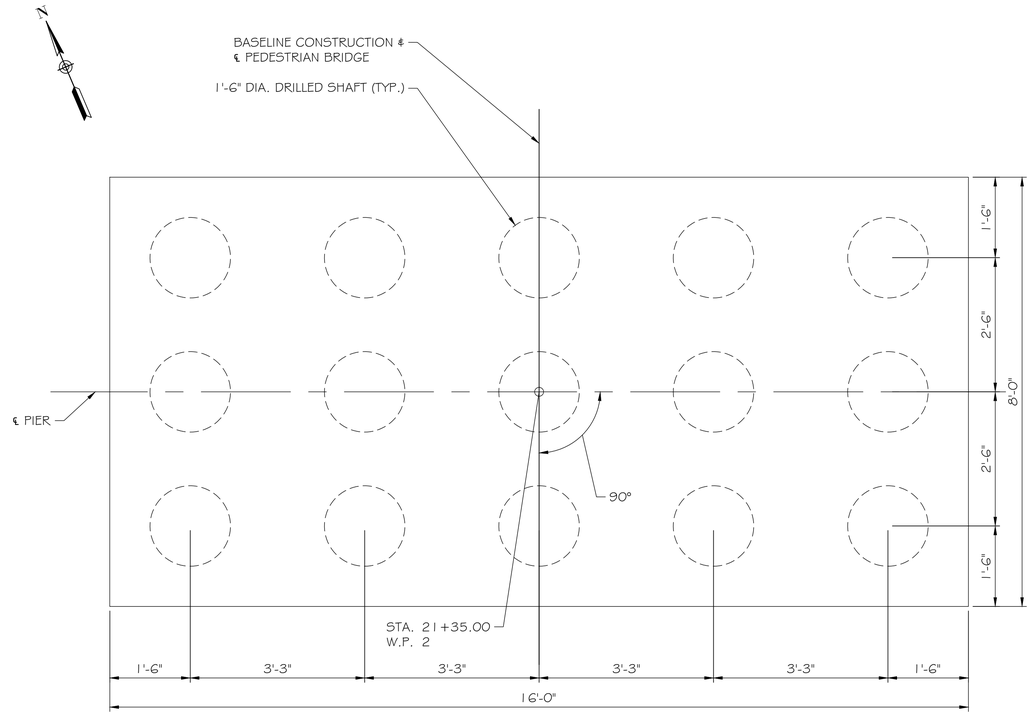
FREDERICK AND PENNSYLVANIA
LINE RAILROAD TRAIL
OVER MONOCACY RIVER

DRAWING NO. S2-4
SHEET 48 OF 55
KCI JOB NUMBER 27206468



ABUTMENT B PILE PLAN

SCALE: 3/4"= 1'-0"



PIER PILE PLAN

SCALE: 3/4"= 1'-0"

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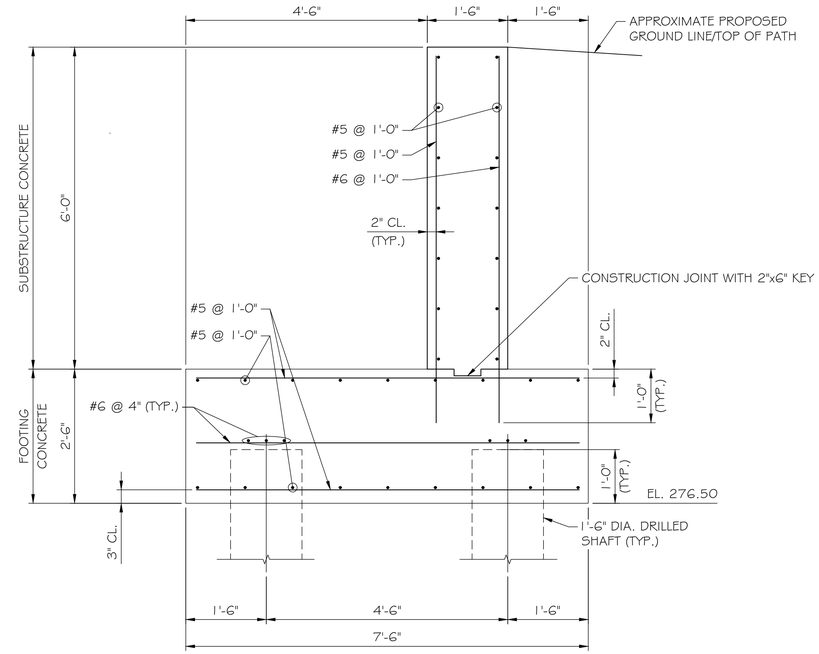
PILE PLANS

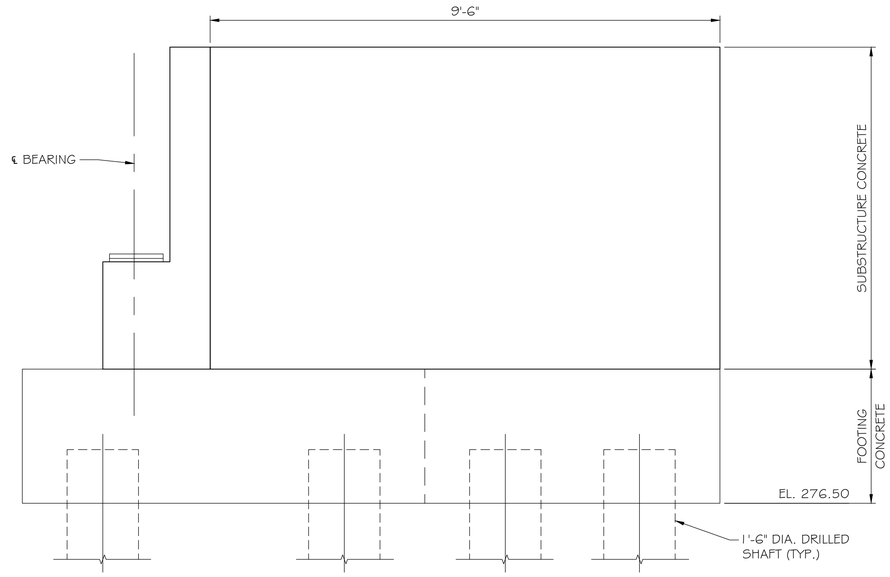
FREDERICK AND PENNSYLVANIA
LINE RAILROAD TRAIL
OVER MONOCACY RIVER

DRAWING NO. S2-5
SHEET 49 OF 55
KCI JOB NUMBER 27206468



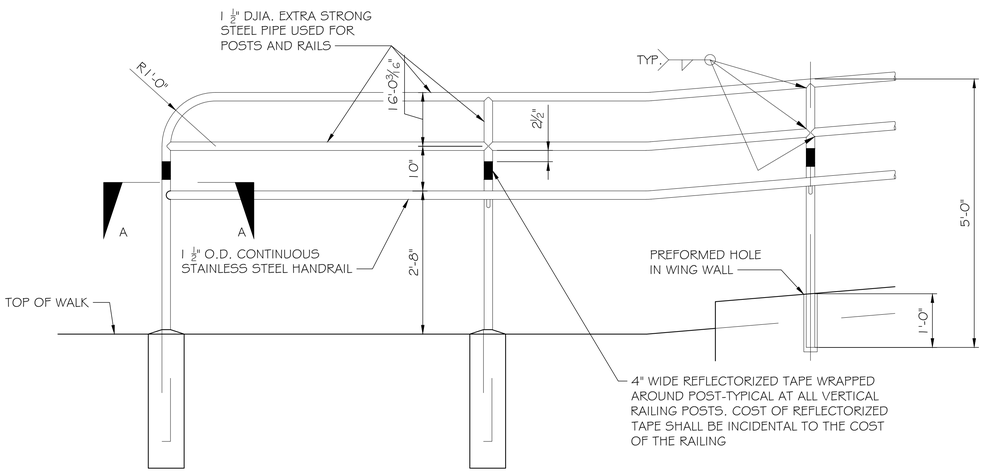
TYPICAL WING WALL SECTION

SCALE: 3/4"= 1'-0"



TYPICAL WING WALL ELEVATION

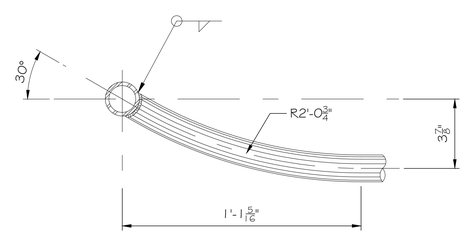
SCALE: 3/4"= 1'-0"



END POST INTERMEDIATE POST WING WALL POST

TYPICAL HAND RAIL ELEVATION

SCALE: 3/4"= 1'-0"



HANDRAIL TERMINATION

SECTION A-A

NOT TO SCALE

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

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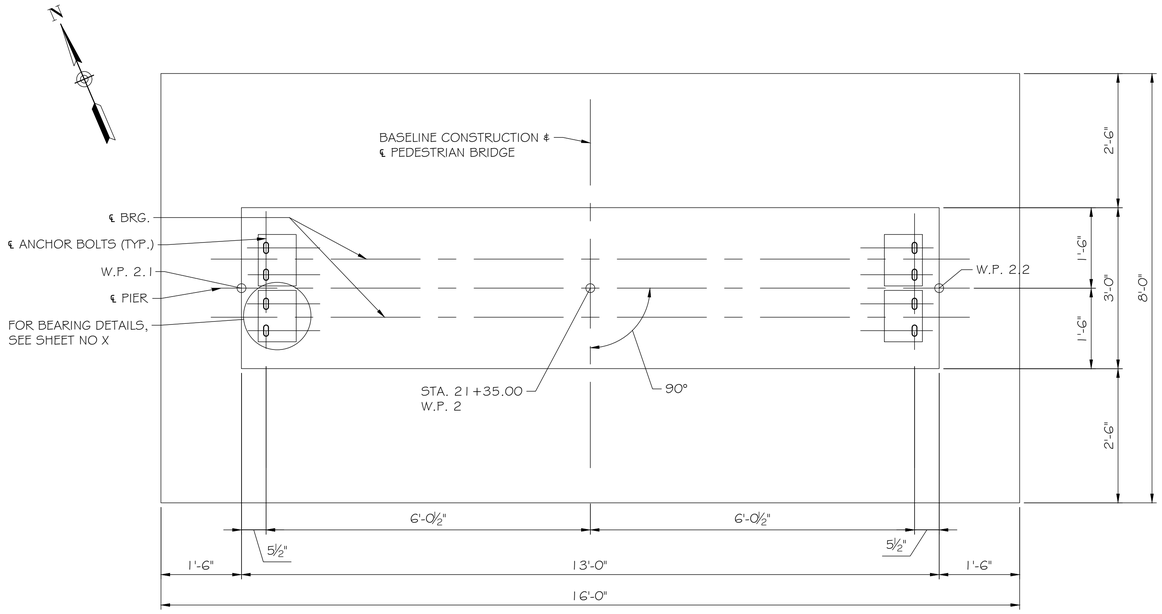
WING WALL SECTIONS

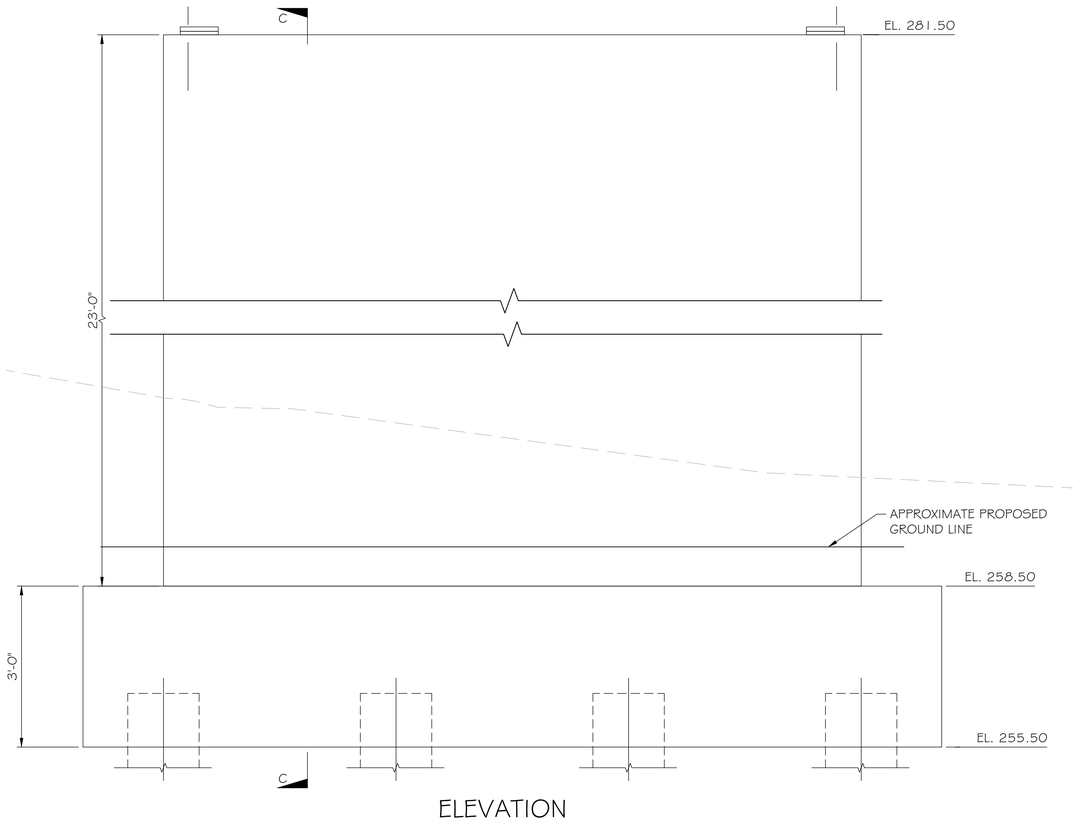
FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER MONOCACY RIVER

DRAWING NO. S2-6
SHEET 50 OF 55
KCI JOB NUMBER 27206468



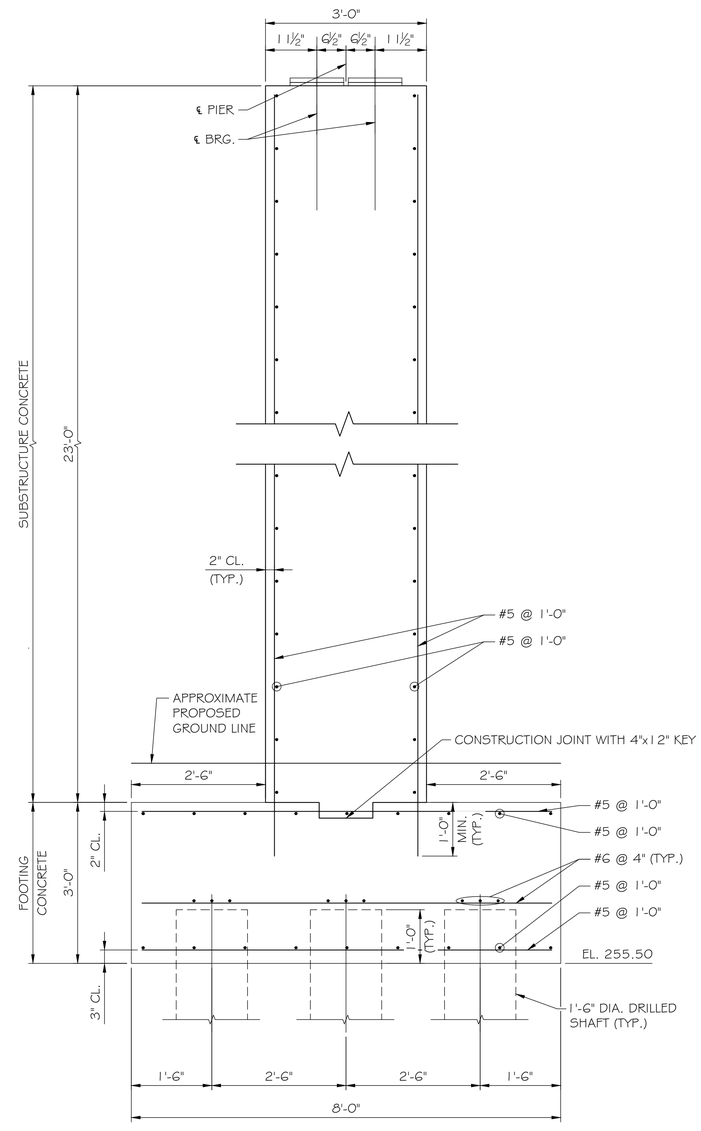
PLAN

SCALE: 3/4"= 1'-0"



ELEVATION

SCALE: 3/4"= 1'-0"



SECTION C-C

SCALE: 3/4"= 1'-0"

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

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FAX: (410) 316-7818

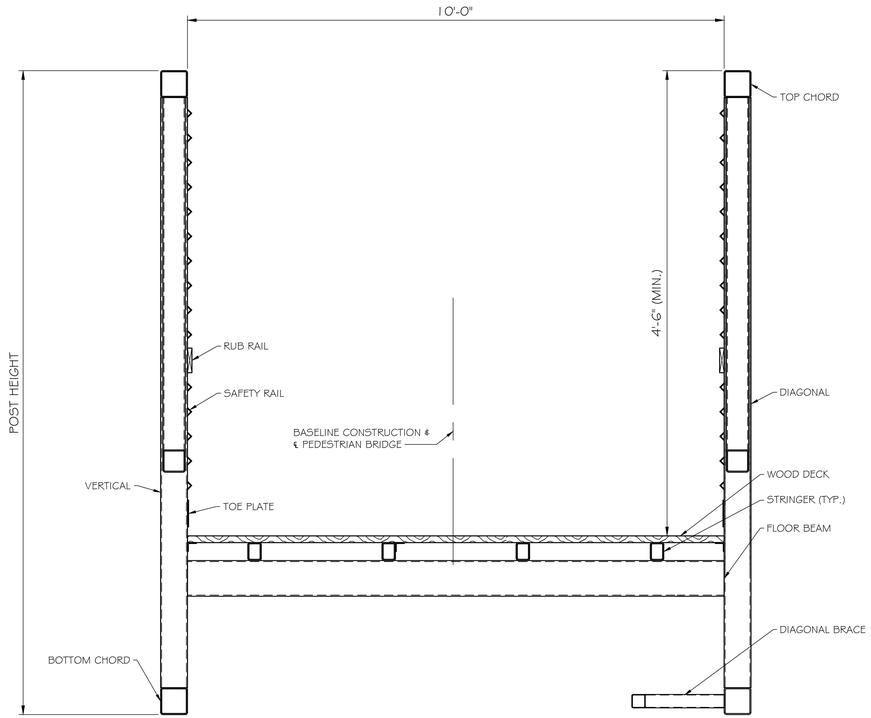
REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 7/15/2021
SCALE: AS SHOWN
DESIGNED BY: HMK
DRAWN BY: DRC

PIER PLAN AND ELEVATION

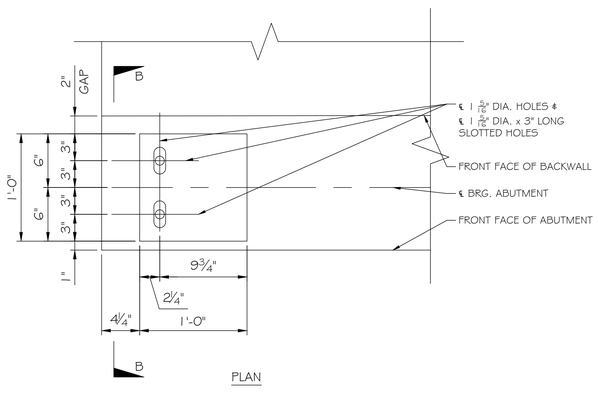
FREDERICK AND PENNSYLVANIA
LINE RAILROAD TRAIL
OVER MONOCACY RIVER

DRAWING NO. S2-7
SHEET 51 OF 55
KCI JOB NUMBER 27206468

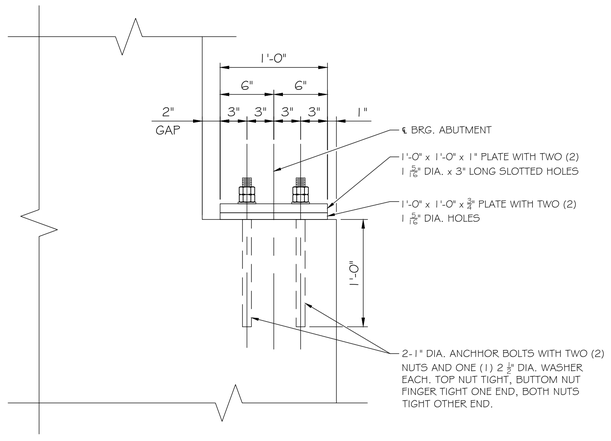


TYPICAL SECTION

SCALE: 3/4" = 1'-0"



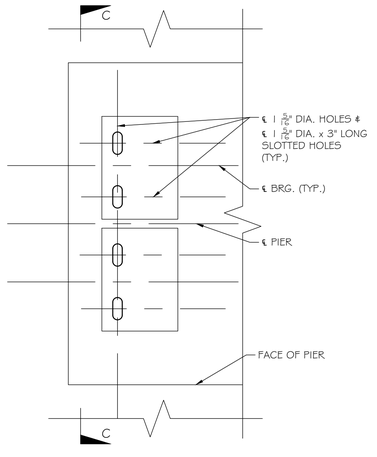
PLAN



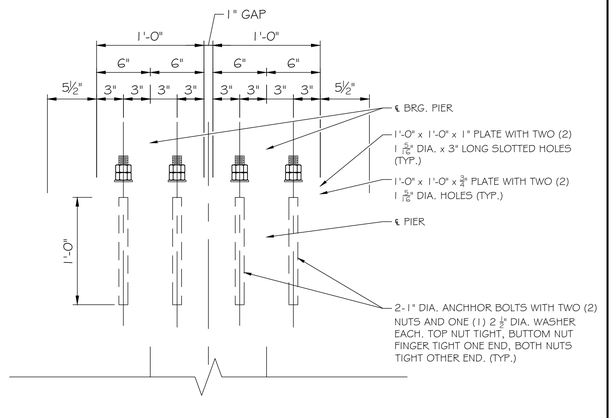
VIEW B-B

ABUTMENT BEARING PLATE DETAIL

SCALE: 1 1/2"= 1'-0"



PLAN



VIEW C-C

PPIER BEARING PLATE DETAIL

SCALE: 1 1/2"= 1'-0"

KCI TECHNOLOGIES
ENGINEERS
PLANNERS
SCIENTISTS
CONSTRUCTION MANAGERS
936 RIDGEBROOK ROAD
SPARKS, MARYLAND 21152
TELEPHONE: (410) 316-7800
FAX: (410) 316-7818

REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 7/15/2021
SCALE: AS SHOWN
DESIGNED BY: HMK
DRAWN BY: DRC

TYPICAL SECTION

FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER MONOCACY RIVER

DRAWING NO. S2-8
SHEET 52 OF 55
KCI JOB NUMBER 27206468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

BORING 5001
STA. 19+39.52
OFFSET 25.788' LEFT
TOP OF GROUND EL. 275.01'

CKG CENKEN GROUP, LLC
Geotechnical Engineering Consultants
Odenton, MD 21113

Page 1 of 1

RECORD OF SOIL / ROCK EXPLORATION

Contracted With: KCI Technologies, Inc. - Fulton Office — Boring #: 5001
Project Name: Main Street Connector Trail — Job #: 20-095
Location: Frederick, MD

SAMPLER

Datum: — Hammer Wt.: 140 lb — Hole Diameter: 8 in — Foreman: L. Ramos
Surf. Elev.: --- — Hammer Drop: 30 in — Rock Core Dia.: N/A — Inspector: C. Garcia
Date Started: 1/30/21 — Spoon Size: 2 in — Boring Method: HSA — Date Completed: 1/30/21

ELEV. (ft)	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH (ft)	SOIL SYMBOL	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec (in)	BORING & SAMPLE NOTES
	6 inhes of **TOPSOIL**	0.5			D	3-11-12	1	DS	10	1. Water encountered at 12.0 ft.
	Brown, moist, medium dense, silty **SAND**, **(FILL)**	1.5								2. Bulk sample collected form 1.0 to 5.0 feet.
	Grayish brown, moist, very dense, silty **GRAVEL**, with sand, **(FILL)**				D	28-40-44	2	DS	8	3. Boring backfilled and restored in kind.
	(GM)	4.0								
	Brown, moist, medium dense, clayey **SAND**, **(SC)**			5	D	5-7-6	3	DS	14	
		7.0								
	Grayish brown, moist, very dense, silty **GRAVEL**, with some sand, **(GM)**				D	16-25-27	4	DS	12	
		10.0		10						
	Brown, wet to moist, medium dense to very dense, silty **GRAVEL**, with sand, **(GM)**			15	D	5-7-18	5	DS	8	
		20.0		20		50/4"	6		4	
	Bottom of Boring at 20.0 ft									
				25						
				30						

SAMPLER TYPE
DS - DRIVEN SPLIT SPOON
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

GROUNDWATER DEPTH
AT COMPLETION 12.0 ft
AFTER ____ HRS. ____ ft
AFTER 24 HRS. 7.0 ft
CAVED AT 12.0 ft

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION, LOGS.GPJ CKG 2012.GDT 3/26/21

BORING 5002
STA. 21+17.42
OFFSET 18.342' LEFT
TOP OF GROUND EL. 260.14'

CKG CENKEN GROUP, LLC
Geotechnical Engineering Consultants
Odenton, MD 21113

Page 1 of 1

RECORD OF SOIL / ROCK EXPLORATION

Contracted With: KCI Technologies, Inc. - Fulton Office — Boring #: 5002
Project Name: Main Street Connector Trail — Job #: 20-095
Location: Frederick, MD

SAMPLER

Datum: — Hammer Wt.: 140 lb — Hole Diameter: 8 in — Foreman: L. Ramos
Surf. Elev.: --- — Hammer Drop: 30 in — Rock Core Dia.: N/A — Inspector: C. Gracia
Date Started: 1/30/21 — Spoon Size: 2 in — Boring Method: HSA — Date Completed: 1/30/21

ELEV. (ft)	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH (ft)	SOIL SYMBOL	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec (in)	BORING & SAMPLE NOTES
	6 inches of **TOPSOIL**	0.5			D	30-44-18	1		10	1. Water encountered at 13.0 ft.
	Brown, moist, very dense, gravelly **SAND**, **(FILL)**	1.5								2. Bulk sample collected from 1.0 feet to 5.0 feet.
	Dark brown, moist, loose, silty **GRAVEL**, with sand, **(FILL)**				D	6-4-3	2		9	3. Boring backfilled and restored in kind.
	(GM)	4.0								
	Brown, moist, soft, **SILT**, with sand, **(ML)**			5	D	4-2-2	3		10	
		7.0								
	Brown, moist, very loose, silty **SAND**, with gravel, **(SM)**				D	1-2-2	4		6	
		10.0		10						
	Brown, wet, very dense, **GRAVEL**, with silt				D	6-50/1"	5		7	
		15.0		15						
	Bottom of Boring at 15.0 ft									
				20						
				25						
				30						

SAMPLER TYPE
DS - DRIVEN SPLIT SPOON
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

GROUNDWATER DEPTH
AT COMPLETION 13.0 ft
AFTER ____ HRS. ____ ft
AFTER 24 HRS. 8.0 ft
CAVED AT 8.0 ft

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION, LOGS.GPJ CKG 2012.GDT 3/26/21

BORING 5003C
STA. 19+39.52
OFFSET -25.788'
TOP OF GROUND EL. 258.68'

CKG CENKEN GROUP, LLC
Geotechnical Engineering Consultants
Odenton, MD 21113

Page 1 of 1

RECORD OF SOIL / ROCK EXPLORATION

Contracted With: KCI Technologies, Inc. - Fulton Office — Boring #: 5003C
Project Name: Main Street Connector Trail — Job #: 20-095
Location: Frederick, MD

SAMPLER

Datum: — Hammer Wt.: 140 lb — Hole Diameter: 8 in — Foreman: L. Ramos
Surf. Elev.: --- — Hammer Drop: 30 in — Rock Core Dia.: N/A — Inspector: C. Garcia
Date Started: 3/26/21 — Spoon Size: 2 in — Boring Method: HSA — Date Completed: 3/26/21

ELEV. (ft)	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH (ft)	SOIL SYMBOL	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec (in)	BORING & SAMPLE NOTES
	Brown, moist, loose, clayey **SAND**, **(FILL)**				I/D	1-2-3	1	DS	17	1. No water encountered.
										2. Auger refusal at 10 feet
					I/D	3-4-3	2	DS	18	3. Boring offset for the 8th time but encountered auger refusal at 10 feet
		4.5								4. Boring backfilled and restored in kind.
	Dark brown, moist, very dense, gravelly **SAND**, **(FILL)**			5	D	11-27-50/3"	3	DS	12	
		7.5								
	Light gray, moist, very dense, sandy **GRAVEL**, **(FILL)**				D	25-50/3"	4	DS	6	
		10.0		10						
	Bottom of Boring at 10.0 ft									
				15						
				20						
				25						
				30						

SAMPLER TYPE
DS - DRIVEN SPLIT SPOON
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

GROUNDWATER DEPTH
AT COMPLETION ____ ft
AFTER ____ HRS. ____ ft
AFTER 24 HRS. ____ ft
CAVED AT ____ ft

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

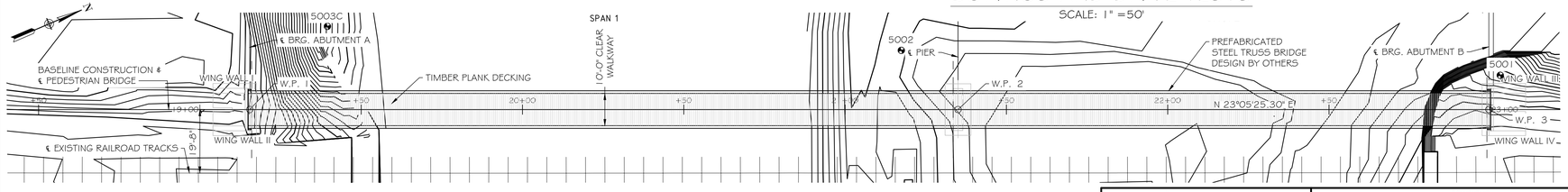
STANDARD PENETRATION TEST DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION, LOGS.GPJ CKG 2012.GDT 3/26/21

EL. 280.00
EL. 270.00
EL. 260.00
EL. 250.00
EL. 240.00
EL. 230.00
DATUM EL. 220.00

BORINGS AND DRIVE TESTS

SCALE: 1" = 50'



BORINGS AND DRIVE TESTS LOCATION PLAN

SCALE: 1" = 20'

NOTES:

1. THE BORINGS AND DRIVE TESTS WERE TAKEN IN JANUARY AND MARCH, 2021 BY CENKEN GROUP, LLC.
2. N = BLOWS ON A 2 INCH OD SAMPLING SPOON BY 140 LB. DRIVE-WEIGHT FALLING 30 INCHES INDICATING SUCCESSIVE 6 INCH INCREMENTS OF PENETRATION IN LIEU OF BLOWS PER FOOT. PENETRATIONS GREATER THAN 6 INCHES OR LESS THAN 6 INCHES ARE INDICATED BY WOH, WOR, OR THE DEPTH OF THE PENETRATION OVER 50 (OR NUMBER OF BLOWS IF OTHER THAN 50) OVER THE NEAREST INCH.

   WOR = STATIC WEIGHT OF DRILL ROD AND SAMPLING SPOON.

   WOH = STATIC WEIGHT OF SAMPLING SPOON DRIVE-WEIGHT ASSEMBLY, DRIVE-WEIGHT, ANVIL, (WHEN AN AUTOMATIC HAMMER IS USED), DRILL ROD(S) AND SAMPLING SPOONS.
3. C = DEPTH OF HOLLOW-STEM CONTINUOUS FLIGHT AUGER WITH A 3 ¼ INCH ID.
4. W.L. = WATER LEVEL READING, THE FIGURE IN PARENTHESIS INDICATES THE READING IN HOURS AFTER COMPLETION OF BORING.
5. BORINGS AND SAMPLINGS CONFORM TO AASHTO DESIGNATIONS T-206 AND T-306.
6. THE SOIL SYMBOLS REFLECT ONLY THE MAJOR SOIL CONSTITUENT, FOR MORE COMPLETE SOIL CHARACTERISTICS REFER TO THE SOIL DESCRIPTIVE TEXT.
7. THE SOIL HAS BEEN VISUALLY CLASSIFIED BY THE DRILLER.

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE: 7/15/2021
SCALE: AS SHOWN
DESIGNED BY: HMK
DRAWN BY: DRC

BORING LOGS AND DRIVE TESTS

FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER MONOCACY RIVER

DRAWING NO. S2-9
SHEET 53 OF 55
KCI JOB NUMBER 27206468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

BAR SIZE	LOCATION CATEGORY A							
	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	2'-5''	3'-1''	2'-5''	2'-10''	2'-5''	2'-10''	2'-5''	2'-10''
#5	3'-1''	4'-0''	3'-0''	3'-10''	3'-0''	3'-7''	3'-0''	3'-7''
#6	4'-5''	5'-9''	3'-7''	4'-8''	3'-7''	4'-8''	3'-7''	4'-8''
#7	6'-0''	7'-10''	4'-6''	5'-11''	4'-2''	5'-5''	4'-2''	5'-5''
#8	7'-10''	10'-3''	5'-11''	7'-8''	4'-9''	6'-2''	4'-9''	6'-2''
#9	10'-0''	13'-0''	7'-6''	9'-9''	6'-0''	7'-10''	5'-10''	7'-8''
#10	-	-	9'-6''	12'-5''	7'-7''	9'-11''	7'-2''	9'-5''
#11	-	-	11'-8''	15'-3''	9'-4''	12'-3''	8'-8''	11'-4''

Location Category A - Bars in horizontal layers in top of pour with 12'' or more of concrete below them such as in: footings, pier caps, etc.

BAR SIZE	LOCATION CATEGORY B							
	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	1'-10''	2'-9''	1'-10''	2'-2''	1'-10''	2'-2''	1'-10''	2'-2''
#5	2'-5''	3'-7''	2'-4''	3'-5''	2'-4''	2'-9''	2'-4''	2'-9''
#6	3'-5''	5'-1''	2'-9''	4'-1''	2'-9''	4'-1''	2'-9''	4'-1''
#7	4'-8''	6'-11''	3'-6''	5'-3''	3'-2''	4'-9''	3'-2''	4'-9''
#8	6'-1''	9'-1''	4'-7''	6'-10''	3'-8''	5'-5''	3'-8''	5'-5''
#9	7'-8''	11'-6''	5'-9''	8'-8''	4'-8''	6'-11''	4'-6''	6'-9''
#10	-	-	7'-4''	10'-11''	5'-10''	8'-9''	5'-7''	8'-4''
#11	-	-	9'-0''	13'-6''	7'-2''	10'-9''	6'-8''	10'-0''

Location Category B - All bars not in Location Category A.

= Non-epoxy coated = Epoxy coated

Note:
1. When bar lap is not specified on the Plans, the above dimensions shall be used.
2. These bar laps do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These bar laps only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f'c = 3000 psi.
4. These bar laps assume cover of 2''. Greater lap lengths will be required for cover less than 2''.
5. These bar laps are Class B splices based on the development lengths in Det. No. REBAR-DL-101. Class B splices are 1.3 times the development length.
6. Class A splices may be used when (a) the area of reinforcement provided is at least twice that required by analysis over the entire length of the lap splice and (b) one-half or less of the total reinforcement is spliced within the required lap splice length. Class A splices are 1.0 times the development length.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR OFFICE OF STRUCTURES DATE: 03/21/2017	BAR LAP DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.3 (3500 P.S.I.) CONCRETE
VERSION 1.0	DETAIL NO. REBAR-BL-101 SHEET 1 OF 1

BAR SIZE	LOCATION CATEGORY A							
	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	2'-1''	2'-8''	2'-1''	2'-6''	2'-1''	2'-6''	2'-1''	2'-6''
#5	2'-8''	3'-6''	2'-7''	3'-4''	2'-7''	3'-1''	2'-7''	3'-1''
#6	3'-10''	5'-0''	3'-1''	4'-0''	3'-1''	4'-0''	3'-1''	4'-0''
#7	5'-3''	6'-10''	3'-11''	5'-1''	3'-7''	4'-8''	3'-7''	4'-8''
#8	6'-10''	8'-11''	5'-1''	6'-8''	4'-1''	5'-4''	4'-1''	5'-4''
#9	8'-8''	11'-3''	6'-6''	8'-6''	5'-2''	6'-9''	5'-1''	6'-7''
#10	-	-	8'-3''	10'-9''	6'-7''	8'-7''	6'-3''	8'-2''
#11	-	-	10'-1''	13'-3''	8'-1''	10'-7''	7'-6''	9'-9''

Location Category A - Bars in horizontal layers in top of pour with 12'' or more of concrete below them such as in: footings, pier caps, etc.

BAR SIZE	LOCATION CATEGORY B							
	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	1'-7''	2'-5''	1'-7''	1'-11''	1'-7''	1'-11''	1'-7''	1'-11''
#5	2'-1''	3'-1''	2'-0''	3'-0''	2'-0''	2'-5''	2'-0''	2'-5''
#6	3'-0''	4'-5''	2'-5''	3'-7''	2'-5''	3'-7''	2'-5''	3'-7''
#7	4'-0''	6'-0''	3'-0''	4'-6''	2'-9''	4'-2''	2'-9''	4'-2''
#8	5'-3''	7'-10''	3'-11''	5'-11''	3'-2''	4'-9''	3'-2''	4'-9''
#9	6'-8''	10'-0''	5'-0''	7'-6''	4'-0''	6'-0''	3'-11''	5'-10''
#10	-	-	6'-4''	9'-6''	5'-1''	7'-7''	4'-10''	7'-2''
#11	-	-	7'-10''	11'-8''	6'-3''	9'-4''	5'-9''	8'-8''

Location Category B - All bars not in Location Category A.

= Non-epoxy coated = Epoxy coated

Note:
1. When bar lap is not specified on the Plans, the above dimensions shall be used.
2. These bar laps do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These bar laps only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f'c = 4000 psi.
4. These bar laps assume cover of 2''. Greater lap lengths will be required for cover less than 2''.
5. These bar laps are Class B splices based on the development lengths in Det. No. REBAR-DL-103. Class B splices are 1.3 times the development length.
6. Class A splices may be used when (a) the area of reinforcement provided is at least twice that required by analysis over the entire length of the lap splice and (b) one-half or less of the total reinforcement is spliced within the required lap splice length. Class A splices are 1.0 times the development length.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR OFFICE OF STRUCTURES DATE: 03/21/2017	BAR LAP DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.6 (4500 P.S.I.) CONCRETE
VERSION 1.0	DETAIL NO. REBAR-BL-103 SHEET 1 OF 1

BAR SIZE	LOCATION CATEGORY A							
	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	1'-10''	2'-5''	1'-10''	2'-2''	1'-10''	2'-2''	1'-10''	2'-2''
#5	2'-5''	3'-1''	2'-4''	3'-0''	2'-4''	2'-9''	2'-4''	2'-9''
#6	3'-5''	4'-5''	2'-9''	3'-7''	2'-9''	3'-7''	2'-9''	3'-7''
#7	4'-8''	6'-1''	3'-6''	4'-7''	3'-2''	4'-2''	3'-2''	4'-2''
#8	6'-1''	7'-11''	4'-7''	5'-11''	3'-8''	4'-9''	3'-8''	4'-9''
#9	7'-8''	10'-0''	5'-9''	7'-6''	4'-8''	6'-0''	4'-6''	5'-11''
#10	-	-	7'-4''	9'-6''	5'-10''	7'-8''	5'-7''	7'-3''
#11	-	-	9'-0''	11'-9''	7'-2''	9'-5''	6'-8''	8'-8''

Location Category A - Bars in horizontal layers in top of pour with 12'' or more of concrete below them such as in: footings, pier caps, etc.

BAR SIZE	LOCATION CATEGORY B							
	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	1'-5''	2'-1''	1'-5''	1'-8''	1'-5''	1'-8''	1'-5''	1'-8''
#5	1'-10''	2'-9''	1'-9''	2'-8''	1'-9''	2'-1''	1'-9''	2'-1''
#6	2'-8''	3'-11''	2'-1''	3'-2''	2'-1''	3'-2''	2'-1''	3'-2''
#7	3'-7''	5'-4''	2'-8''	4'-0''	2'-6''	3'-8''	2'-6''	3'-8''
#8	4'-8''	7'-0''	3'-6''	5'-3''	2'-10''	4'-2''	2'-10''	4'-2''
#9	5'-11''	8'-10''	4'-5''	6'-8''	3'-7''	5'-4''	3'-6''	5'-2''
#10	-	-	5'-8''	8'-5''	4'-6''	6'-9''	4'-3''	6'-5''
#11	-	-	6'-11''	10'-4''	5'-7''	8'-4''	5'-2''	7'-8''

Location Category B - All bars not in Location Category A.

= Non-epoxy coated = Epoxy coated

Note:
1. When development length is not specified on the Plans, the above dimensions shall be used.
2. These development lengths do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These development lengths only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f'c = 3000 psi.
4. These development lengths assume cover of 2''. Greater development lengths will be required for cover less than 2''.
5. The Excess Reinforcement Factor was assumed to be 1.0 when calculating these dimensions.
6. Atr was assumed to be 0 when calculating the Reinforcement Confinement Factor.
7. If depth of member does not allow bar development length indicated in Location Categories A and B; then hooks shall be added to all bars not conforming, as per D, E, and F per Det. No. REBAR-DL-201.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR OFFICE OF STRUCTURES DATE: 03/21/2017	DEVELOPMENT LENGTH DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.3 (3500 P.S.I.) CONCRETE
VERSION 1.0	DETAIL NO. REBAR-DL-101 SHEET 1 OF X

BAR SIZE	LOCATION CATEGORY A							
	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	1'-7''	2'-1''	1'-7''	1'-11''	1'-7''	1'-11''	1'-7''	1'-11''
#5	2'-1''	2'-8''	2'-0''	2'-7''	2'-0''	2'-5''	2'-0''	2'-5''
#6	3'-0''	3'-10''	2'-5''	3'-1''	2'-5''	3'-1''	2'-5''	3'-1''
#7	4'-0''	5'-3''	3'-0''	3'-11''	2'-9''	3'-7''	2'-9''	3'-7''
#8	5'-3''	6'-10''	3'-11''	5'-2''	3'-2''	4'-1''	3'-2''	4'-1''
#9	6'-8''	8'-8''	5'-0''	6'-6''	4'-0''	5'-3''	3'-11''	5'-1''
#10	-	-	6'-4''	8'-3''	5'-1''	6'-7''	4'-10''	6'-3''
#11	-	-	7'-10''	10'-2''	6'-3''	8'-2''	5'-9''	7'-6''

Location Category A - Bars in horizontal layers in top of pour with 12'' or more of concrete below them such as in: footings, pier caps, etc.

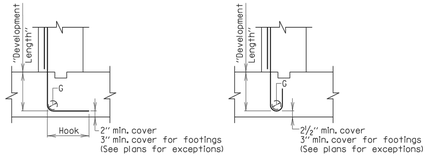
BAR SIZE	LOCATION CATEGORY B							
	CENTER TO CENTER SPACING							
	3''		4''		5''		≥ 6''	
#4	1'-3''	1'-10''	1'-3''	1'-6''	1'-3''	1'-6''	1'-3''	1'-6''
#5	1'-7''	2'-5''	1'-6''	2'-3''	1'-6''	1'-10''	1'-6''	1'-10''
#6	2'-3''	3'-5''	1'-10''	2'-9''	1'-10''	2'-9''	1'-10''	2'-9''
#7	3'-1''	4'-8''	2'-4''	3'-6''	2'-2''	3'-2''	2'-2''	3'-2''
#8	4'-0''	6'-0''	3'-0''	4'-6''	2'-5''	3'-8''	2'-5''	3'-8''
#9	5'-2''	7'-8''	3'-10''	5'-9''	3'-1''	4'-7''	3'-0''	4'-6''
#10	-	-	4'-11''	7'-4''	3'-11''	5'-10''	3'-9''	5'-7''
#11	-	-	6'-0''	9'-0''	4'-10''	7'-2''	4'-5''	6'-8''

Location Category B - All bars not in Location Category A.

= Non-epoxy coated = Epoxy coated

Note:
1. When development length is not specified on the Plans, the above dimensions shall be used.
2. These development lengths do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These development lengths only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f'c = 4000 psi.
4. These development lengths assume cover of 2''. Greater development lengths will be required for cover less than 2''.
5. The Excess Reinforcement Factor was assumed to be 1.0 when calculating these dimensions.
6. Atr was assumed to be 0 when calculating the Reinforcement Confinement Factor.
7. If depth of member does not allow bar development length indicated in Location Categories A and B; then hooks shall be added to all bars not conforming, as per D, E, and F per Det. No. REBAR-DL-203.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR OFFICE OF STRUCTURES DATE: 03/21/2017	DEVELOPMENT LENGTH DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.6 (4500 P.S.I.) CONCRETE
VERSION 1.0	DETAIL NO. REBAR-DL-103 SHEET 1 OF 1



STANDARD 90° HOOK STANDARD 180° HOOK

BAR SIZE	* LOCATION CATEGORY		
	D	E	F
#3	7''	10''	8''
#5	9''	1'-0''	10''
#6	10''	1'-3''	1'-0''
#7	1'-0''	1'-5''	1'-2''
#8	1'-2''	1'-7''	1'-4''
#9	1'-4''	1'-10''	1'-6''
#10	1'-5''	2'-1''	1'-8''
#11	1'-7''	2'-3''	1'-10''

Note:
For Hook Dimensions and Bends, see Detail No. REBAR-BB-102.

* LOCATION CATEGORY:

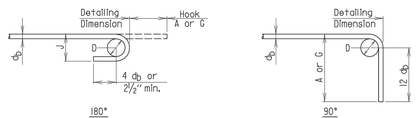
D- All bars terminating with a standard 180°hook with side cover (normal to plane of hook) not less than 2½'', and for 90°deg. hook, cover on bar extension beyond hook not less than 2''.
E- All bars not in Category D.
F- All bars with hook enclosed vertically or horizontally within ties or stirrup-ties spaced along the full development length not greater than 3d where d is the diameter of the hooked bar.

Note:
1. When development length is not specified on the Plans, the above dimensions shall be used.
2. These development lengths do not apply when bar is in lightweight concrete or any other strength of concrete.
3. These development lengths only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f'c = 4000 psi.
4. If depth of member does not allow bar development length indicated in Categories A, B, and C; Detail No. REBAR-DL-103; then hook shall be added to all bars not conforming, as per D,E & F.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR OFFICE OF STRUCTURES DATE: 05/10/2011	DEVELOPMENT LENGTH DIMENSIONS OF HOOKED BARS FOR GRADE 60 REINFORCING STEEL IN MIX NO.6 (4500 P.S.I.) CONCRETE NON-EPOXY COATED REINFORCING
VERSION 1.0	DETAIL NO. REBAR-DL-203 SHEET 1 OF 1

HOOKS
TABLE I
REFERENCES

1. ACI Types 1 thru 26
2. SHA Standard Pin Bending
3. SHA Radius Bending



BAR SIZE	RECOMMENDED END HOOKS, ALL GRADES			
	Finished bend diameter	180 - deg hook		90 - deg hook
	D, in.	A or G in	J, in.	A or G in
#3	2¼	5	3	6
#4	3	6	4	8
#5	3¾	7	5	10
#6	4½	8	6	1-0
#7	5¼	10	7	1-2
#8	6	11	8	1-4
#9	9½	1-3	11¾	1-7
#10	10¾	1-5	1-1¼	1-10
#11	12	1-7	1-2¾	2-0
#14	18¼	2-3	1-9¾	2-7
#18	24	3-0	2-4½	3-5

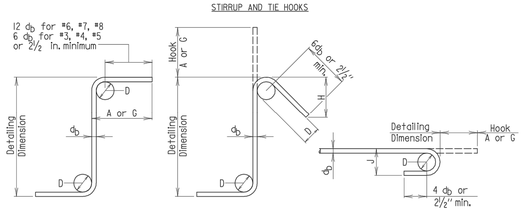
APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR OFFICE OF STRUCTURES DATE: 11/17/1997	REINFORCING STEEL HOOK TABLES AND DIAGRAMS
VERSION 1.0	DETAIL NO. REBAR-BB-102 SHEET 1 OF 2

HOOKS
TABLE II
REFERENCES

1. ACI Types S1 thru S11
2. ACI Types T1 thru T8
3. SHA Ties and Stirrups

(Note: Tie and stirrup types supplied in sizes #3-#8)

STIRRUP AND TIE HOOKS



BAR SIZE	STIRRUP AND TIE HOOK DIMENSIONS, in.				
	D, in.	90 - deg hook	135 - deg hook		
		A or G	A or G	H, approx	
#3	1½	4	4	2½	
#4	2	4½	4½	3	
#5	2½	6	5½	3¾	
#6	4½	1-0	7¾	4½	
#7	5¼	1-2	9	5¼	
#8	6	1-4	10¼	6	

BAR SIZE	RECOMMENDED END HOOKS, ALL GRADES		
	Finished bend diameter	180 - deg hook	
	D, in.	A or G in	J, in.
#3	2¼	5	3
#4	3	6	4
#5	3¾	7	5
#6	4½	8	6
#7	5¼	10	7
#8	6	11	8

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR OFFICE OF STRUCTURES DATE: 11/17/1997	REINFORCING STEEL HOOK TABLES AND DIAGRAMS
VERSION 1.0	DETAIL NO. REBAR-BB-102 SHEET 2 OF 2

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REVISIONS			
NO.	DATE	DESCRIPTION	BY

DATE 7/15/2021
SCALE AS SHOWN
DESIGNED BY HMK
DRAWN BY DRC

STANDARDS

FREDERICK AND PENNSYLVANIA
LINE RAILROAD TRAIL
OVER MONOCACY RIVER

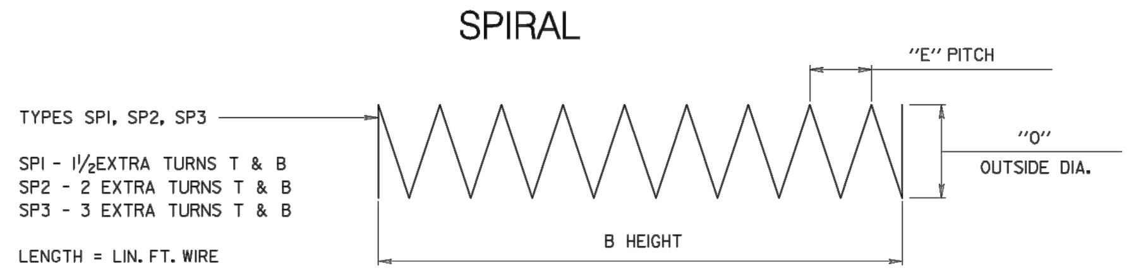
DRAWING NO. 52-10
SHEET 54 OF 55
KCI JOB NUMBER 27206468

PLOTTED: $DATE$
BY: $USERNAME$
FILE: $FILE$

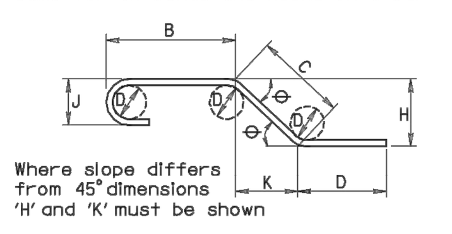
TYPICAL BAR BENDS

DETAILS AND NOTES

SPIRAL



Unless otherwise noted diameter D is the same for all bends and hooks on a bar



ENLARGED VIEW SHOWING BAR BENDING DETAILS

Notes:

1. All dimensions are out-to-out of bar or to tangent points for 135° and 180° hooks.
2. 'J' dimensions on 180° hooks to be shown only where necessary to restrict hook size. Otherwise standard hooks are to be used.
3. Where 'J' is not shown. "J' will be kept equal to or less than 'H' on truss bars. Where 'J' can exceed 'H' it should be shown.
4. 'H' dimension on stirrups to be shown where necessary to fit within concrete.
5. Where bars are to be bent more accurately than standard bending tolerances, bending dimensions which require closer fabrication should have limits indicated.

NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

APPROVAL: E.S. Freedman DIRECTOR OFFICE OF STRUCTURES DATE: 02/10/1994
VERSION 1.0

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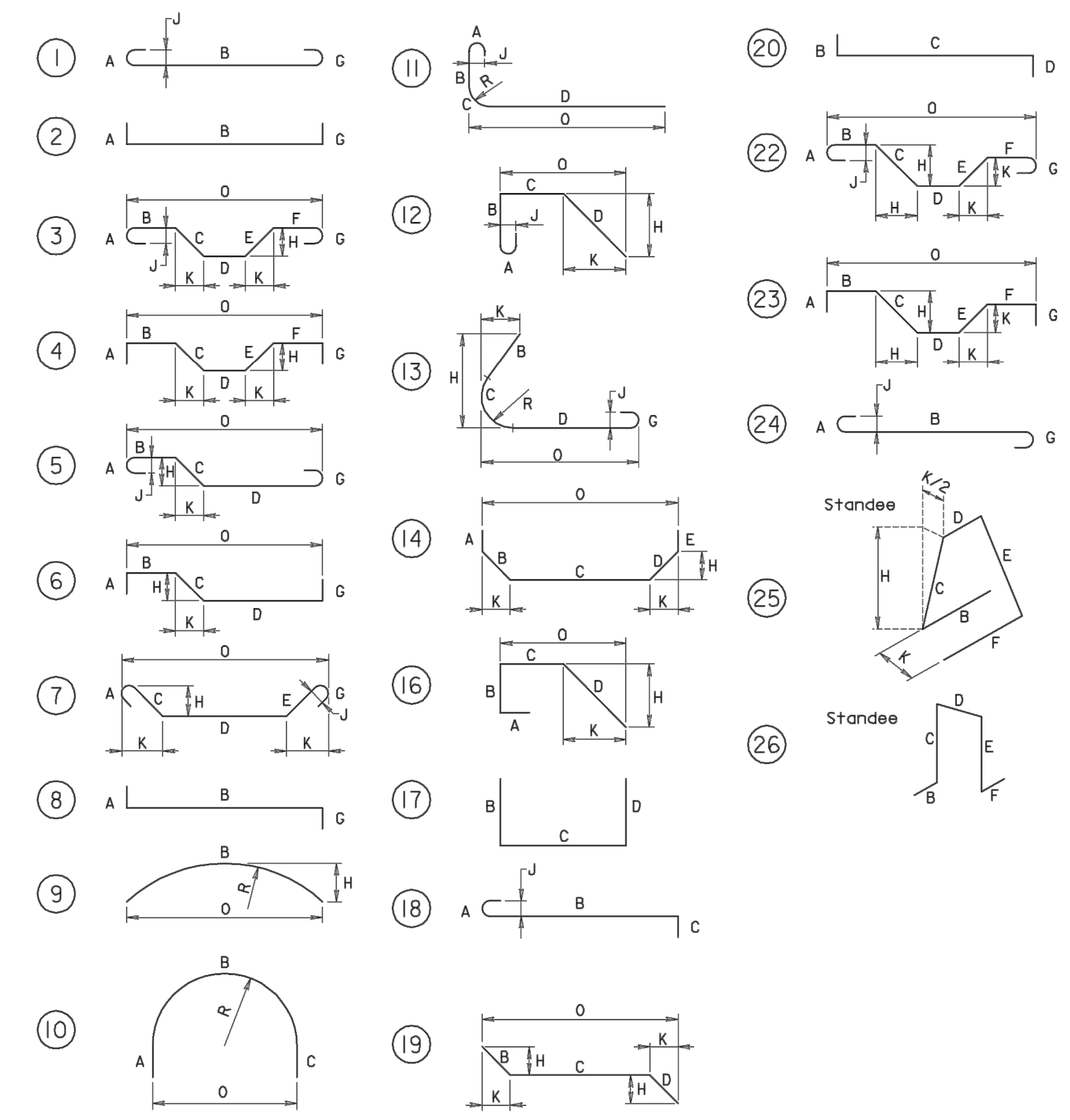
BAR BEND TYPES
GENERAL NOTES

DETAIL NO. REBAR-BB-101 SHEET 1 OF 8

ACI TYPICAL BAR BENDS

STANDARD PIN BENDING



NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

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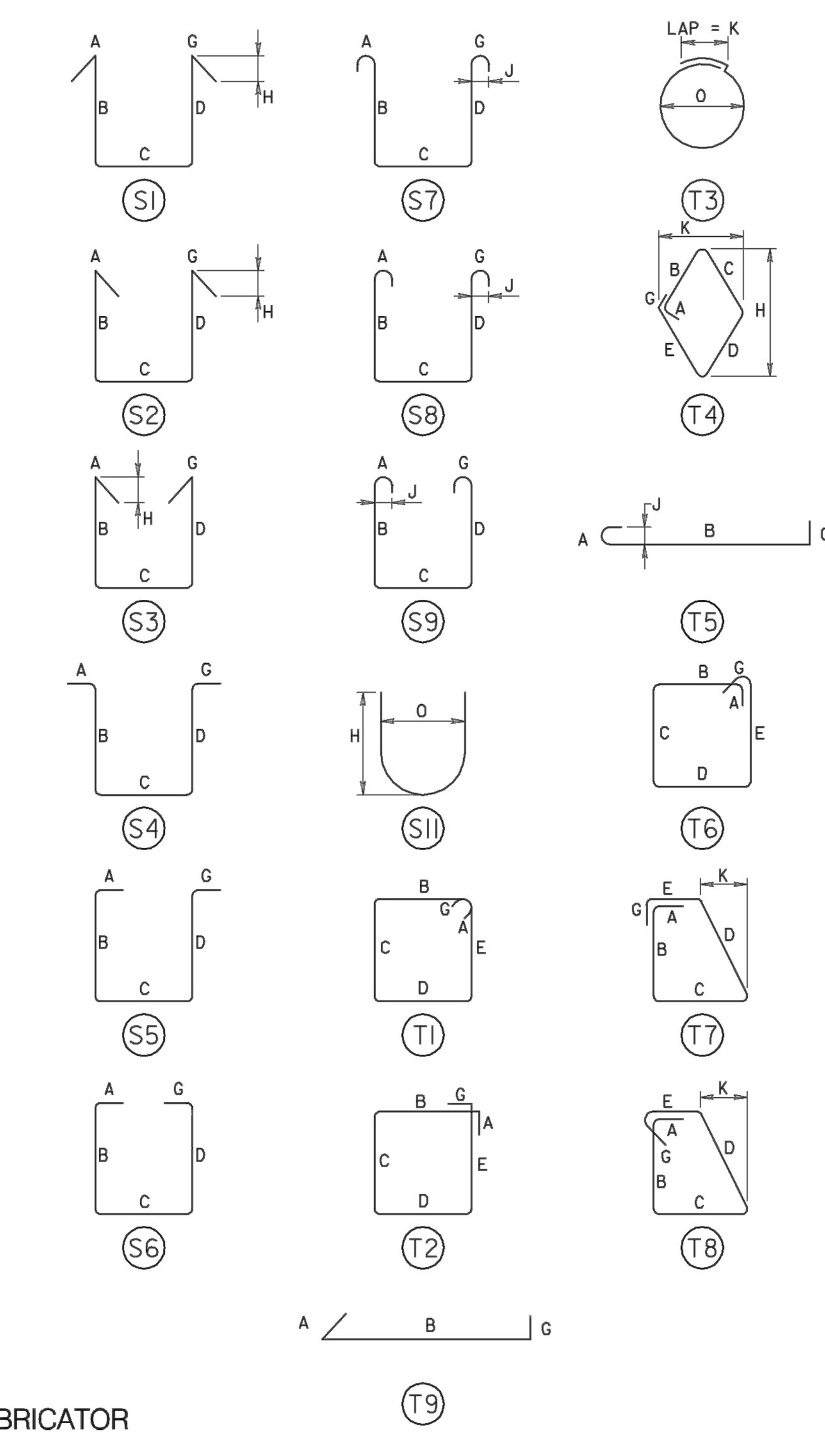
BAR BEND TYPES
ACI - STANDARD PIN BENDING

DETAIL NO. REBAR-BB-101 SHEET 2 OF 8

ACI TYPICAL BAR BENDS

TIES AND STIRRUPS



NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

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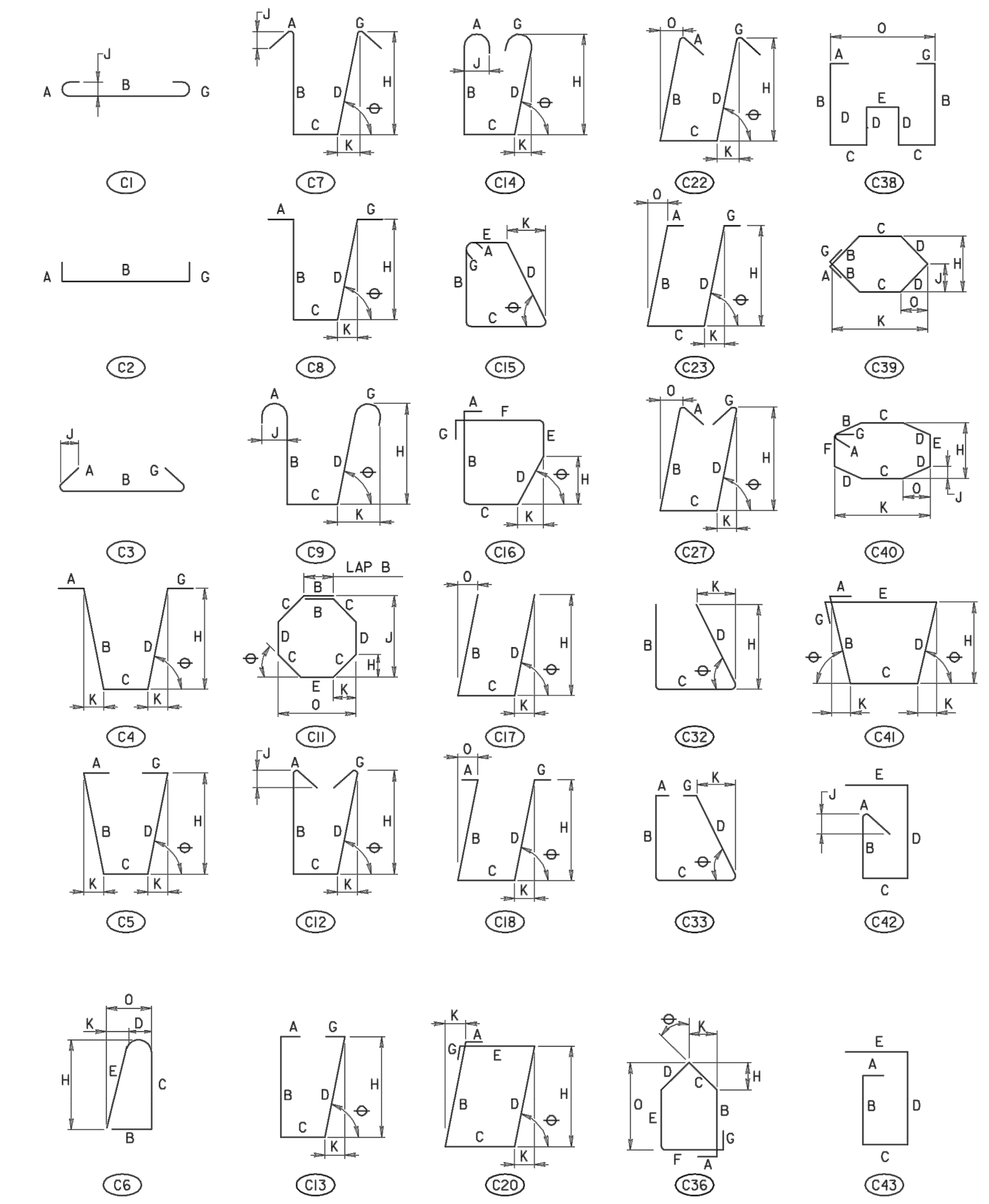
BAR BEND TYPES
ACI - TIES A

DETAIL NO. REBAR-BB-101 SHEET 3 OF 8

SHA TYPICAL BAR BENDS

TIES AND STIRRUPS



NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

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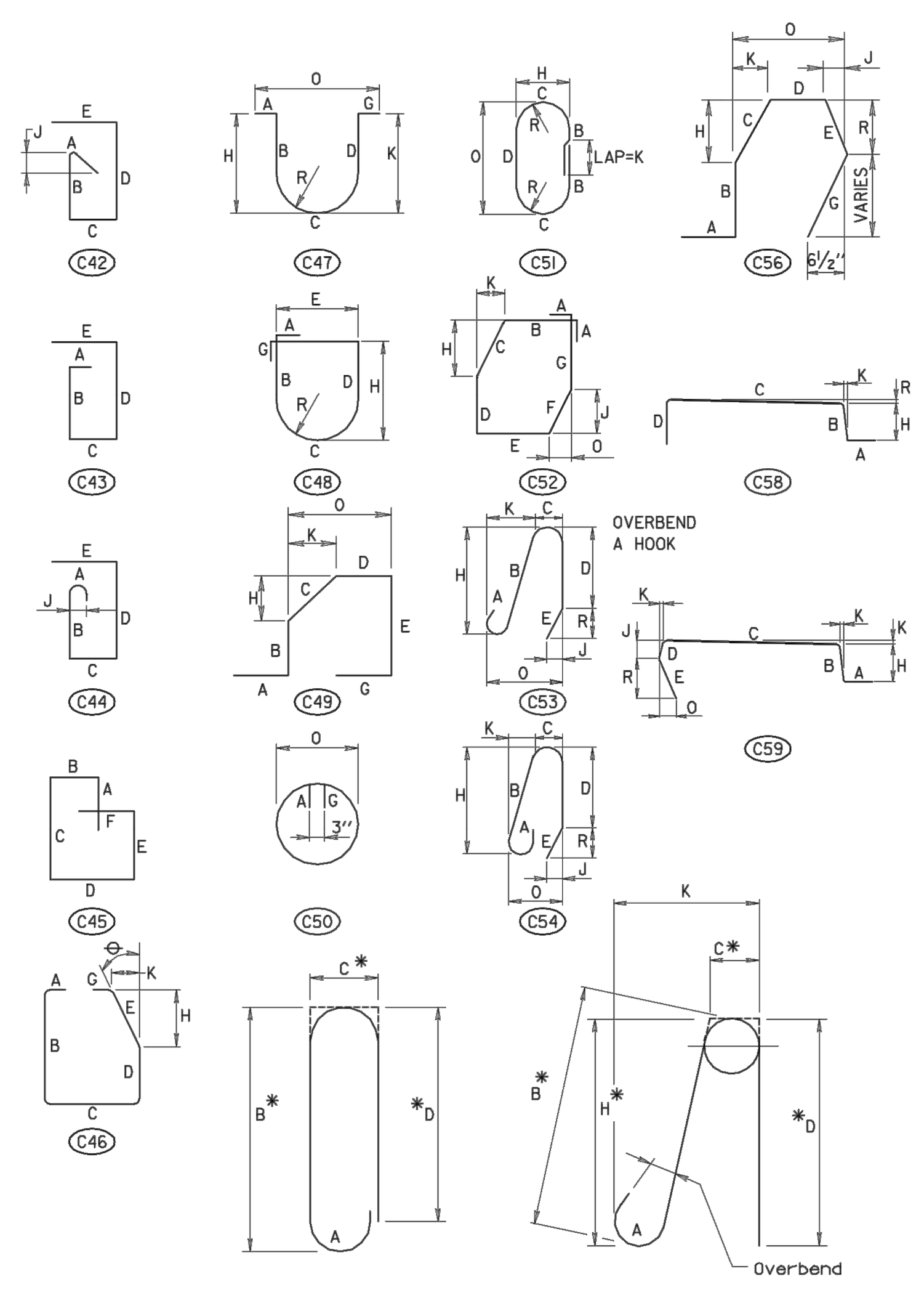
BAR BEND TYPES
SHA - TIES AND STIRRUPS

DETAIL NO. REBAR-BB-101 SHEET 4 OF 8

SHA TYPICAL BAR BENDS

TIES AND STIRRUPS



For Wing Wall Parapet

* Measured to Tangents of Curves.

NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

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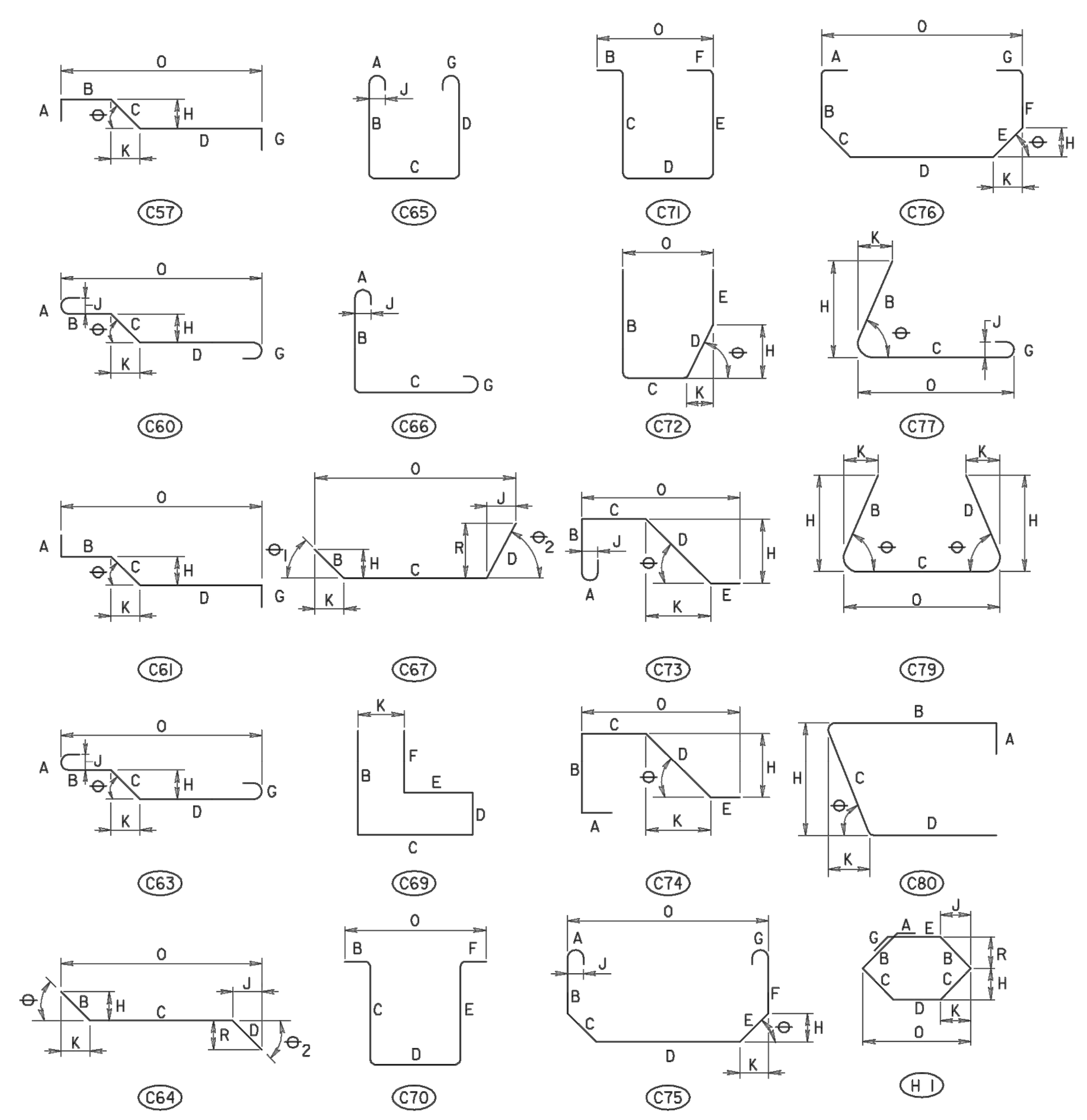
BAR BEND TYPES
SHA - TIES AND STIRRUPS

DETAIL NO. REBAR-BB-101 SHEET 5 OF 8

SHA TYPICAL BAR BENDS

STANDARD PIN BENDING



NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

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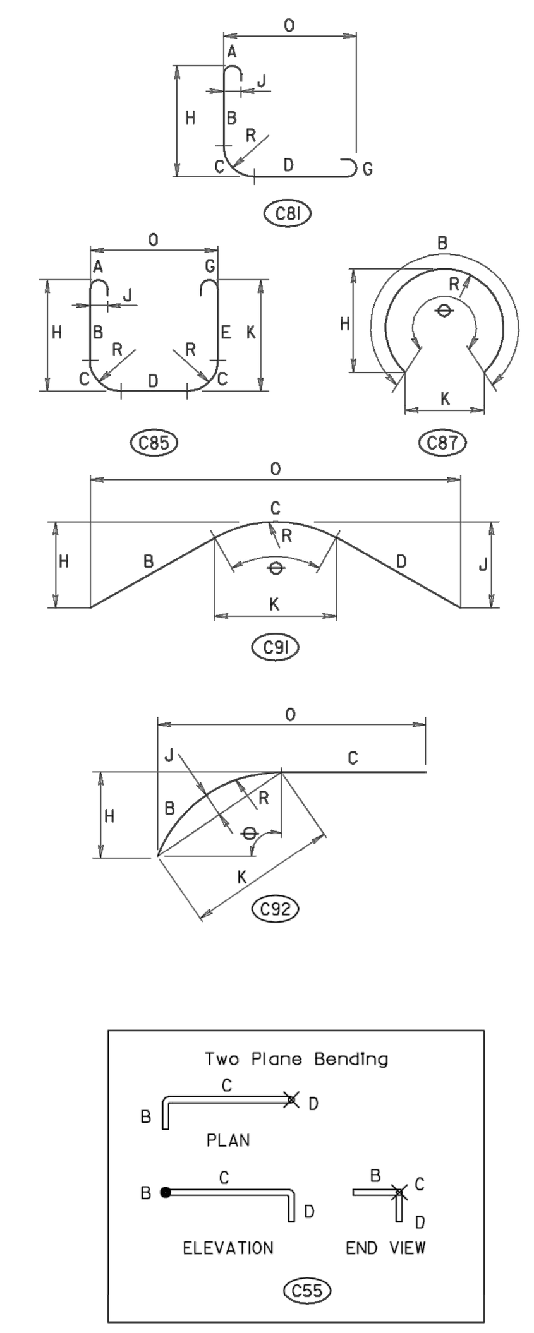
BAR BEND TYPES
SHA - STANDARD PIN BENDING

DETAIL NO. REBAR-BB-101 SHEET 6 OF 8

SHA TYPICAL BAR BENDS

RADIUS BENDING



NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

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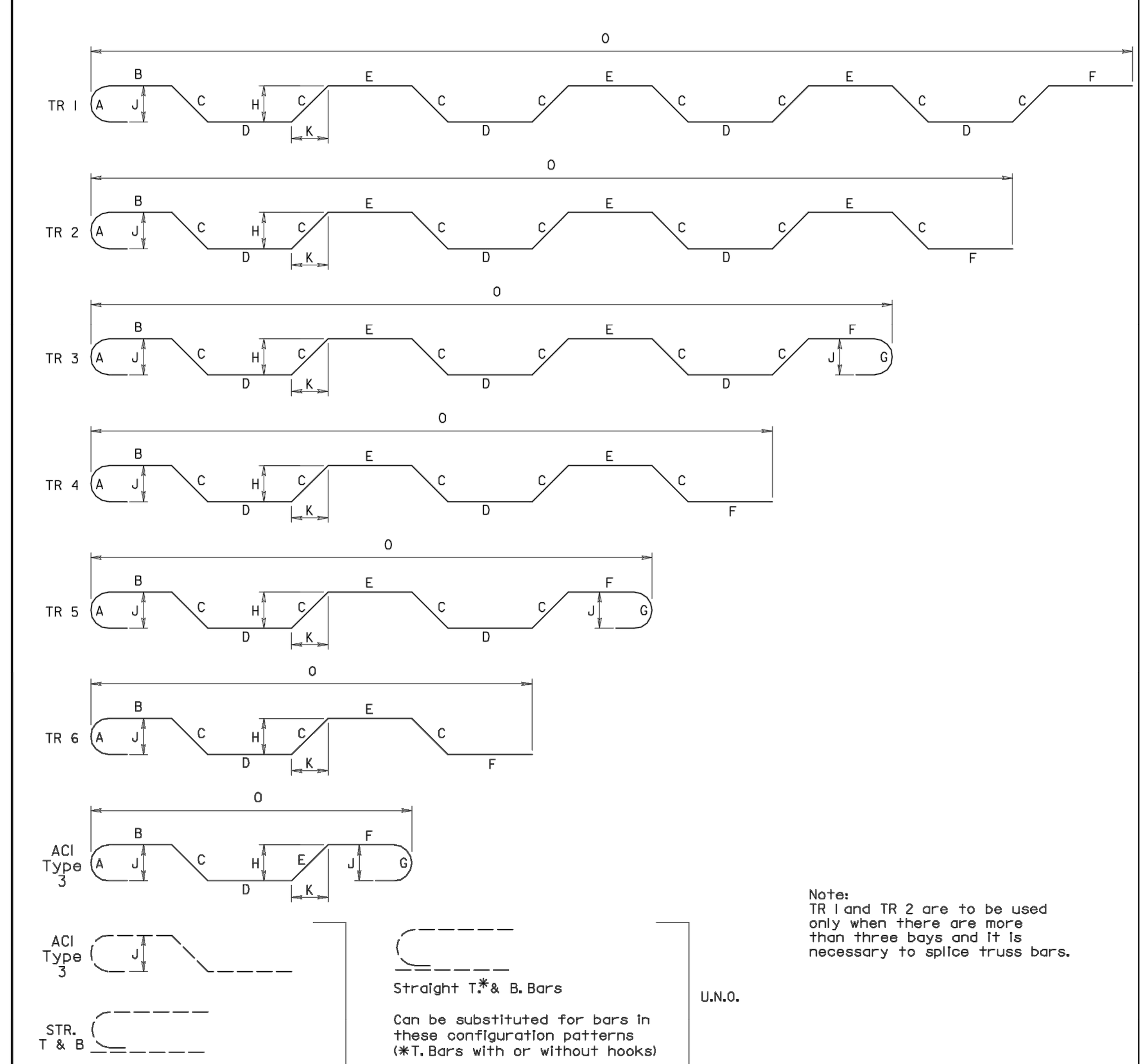
BAR BEND TYPES
SHA - RADIUS BENDING

DETAIL NO. REBAR-BB-101 SHEET 7 OF 8

SHA TYPICAL BAR BENDS

TRUSS BAR CONFIGURATIONS



Note:
TR 1 and TR 2 are to be used only when there are more than three bays and it is necessary to splice truss bars.

Hooks for truss bars optional.

NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

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BAR BEND TYPES
TRUSS BAR CONFIGURATIONS

DETAIL NO. REBAR-BB-101 SHEET 8 OF 8

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SCALE AS SHOWN
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DRAWN BY DRC

STANDARDS

FREDERICK AND PENNSYLVANIA LINE RAILROAD TRAIL OVER MONOCACY RIVER

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KCI JOB NUMBER 27206468