

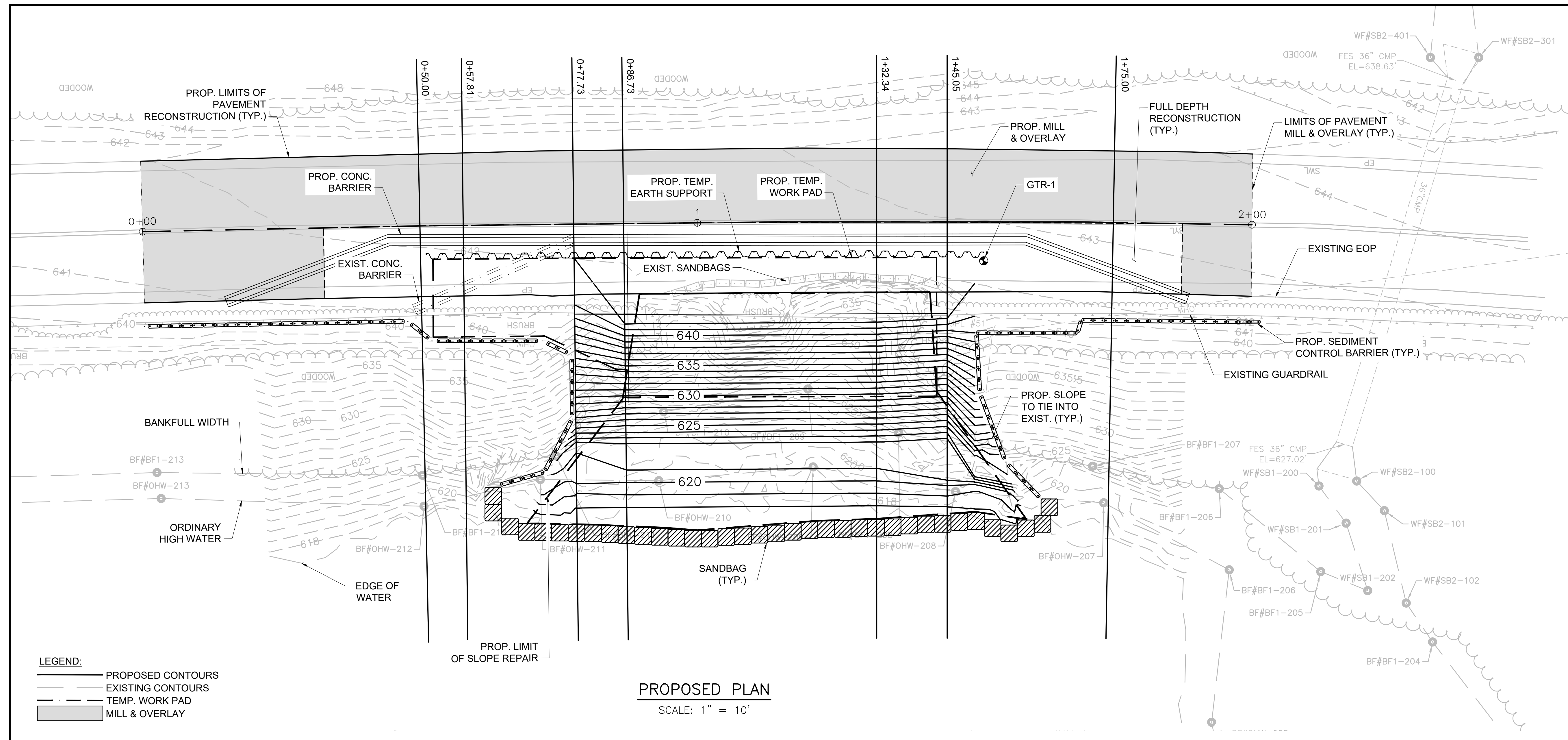
**COLRAIN
JACKSONVILLE ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	--	1	7
PROJECT FILE NO.		--	

PLAN & PROFILE

NOTES:

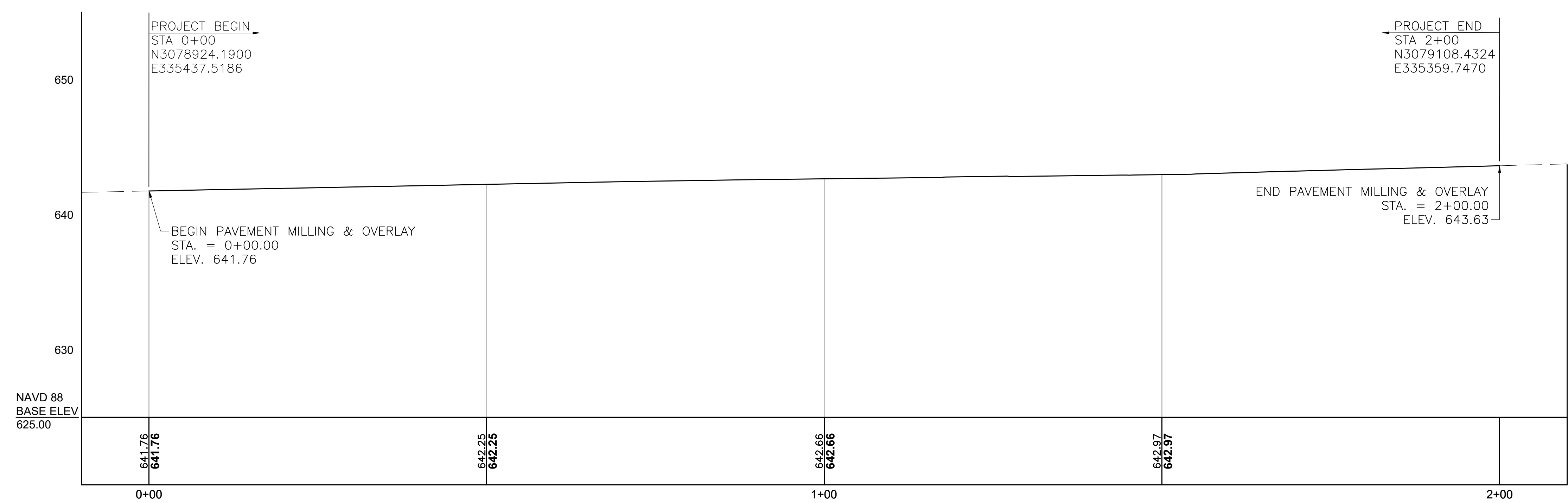
- BIDDERS ARE TO FIELD INVESTIGATE LOCATION OF OVERHEAD WIRES AND POLES. IF THE SELECTED CONTRACTOR ELECTS TO RELOCATE AND/OR SHIELD THE UTILITIES IT SHALL BE AT THE CONTRACTORS EXPENSE AND THE CONTRACT COMPLETION DATE WILL NOT BE MODIFIED. ALL COORDINATION WITH THE AFFECTED UTILITY COMPANIES WILL BE DONE BY THE CONTRACTOR WITH NOTIFICATIONS PROVIDED TO THE TOWN.
- CONTRACTOR IS RESPONSIBLE TO SURVEY AND IDENTIFY ELEVATIONS OF EXISTING PAVEMENT SO AS TO PAVE NEW ROADWAY AT THE SAME ELEVATIONS.



LEGEND:

	PROPOSED CONTOURS
	EXISTING CONTOURS
	TEMP. WORK PAD
	MILL & OVERLAY

PROPOSED PLAN
SCALE: 1" = 10'



JACKSONVILLE ROAD PROFILE

HORIZ. SCALE 1" = 10'
VERT. SCALE 1" = 5'

MMMM DD, YYYY	ISSUED FOR CONSTRUCTION
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28488.00_PROPOSED CONDITIONS_24X36.DWG Plotted on 2-May-2024 9:35 AM Xxxxx Structural Submittal (S#) DD-Month-YYYY

**COLRAIN
JACKSONVILLE ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	--	2	7
PROJECT FILE NO.		--	

GENERAL NOTES

GENERAL NOTES:

- REPORT ANY CHANGES TO THE GROUND CONDITIONS TO GEOSCIENCES TESTING & RESEARCH, INC. (GTR) SO THE EFFECT TO THE ARMOR STONE SLOPE SYSTEM CAN BE EVALUATED AND MODIFIED AS REQUIRED.
- LOCATE ALL UTILITIES, EXISTING AND PROPOSED STRUCTURES PRIOR TO START OF WORK. CONFIRM SLOPE CAN BE INSTALLED AS SHOWN. UNDERGROUND UTILITIES WITHIN 100-FT OF THE BACK OF BOULDER SLOPE SHALL BE WATER TIGHT.
- ALL SLOPES AND EXCAVATIONS SHALL BE IN ACCORDANCE WITH OSHA AND MASSDOT REGULATIONS.
- UNLESS OTHERWISE NOTES, DETAILS SHOWN ON ANY DRAWING ARE TO BE CONSIDERED TYPICAL FOR ALL SIMILAR CONDITIONS.
- VERIFY NEARBY STRUCTURES WILL NOT BE AFFECTED BY THE PROPOSED WORK.
- A COMPLETE SET OF CONSTRUCTION DRAWINGS AND CONTRACT SPECIFICATIONS SHALL BE MAINTAINED ON-SITE AT ALL TIMES, DURING CONSTRUCTION OF THE ARMOR STONE SLOPE SYSTEM.
- CONTRACTOR TO SUBMIT MATERIAL TEST RESULTS PER MASSDOT REQUIREMENTS.
- ANY CHANGE IN CONDITION OR SLOPE GEOMETRY SHALL BE REPORTED TO GTR TO DETERMINE IF DESIGN MODIFICATIONS ARE REQUIRED PRIOR TO PROCEEDING WITH CONSTRUCTION.

MATERIAL NOTES:

- DESIGN OF THE ARMOR STONE SLOPE IS BASED ON THE FOLLOWING ASSUMED PARAMETERS:

SOIL ZONE	SOIL TYPE/CLASSIFICATION	MIN. FRICTION ANGLE	MIN. COHESION	MIN. UNIT WEIGHT
STRUCTURAL FILL	MASSDOT GRAVEL BORROW TYPE B	36 DEGREES	0	135 PCF
RETAINED SOIL	ORDINARY BORROW	36 DEGREES	0	135 PCF
ARMOR SOIL	12" CRUSHED STONE (M2.01.1)	36 DEGREES	0	135 PCF
ARMOR SOIL	12" MODIFIED ROCKFILL (M2.02.4)	36 DEGREES	0	135 PCF
ARMOR STONE	500 LB TO 5 TON ARMOR STONES	36 DEGREES	0	135 PCF
RIPRAP	500 LB TO 50 LB	36 DEGREES	0	135 PCF

- BACKFILL SOILS.
 - REINFORCED BACKFILL MATERIAL SHALL BE 3" MINUS BACKFILL MEETING MASSDOT GRAVEL BORROW TYPE B AND SHALL BE APPROVED BY GEOSCIENCES TESTING AND RESEARCH, INC. (GTR) OF NORTH CHELMSFORD, MA.
- SLOPE DRAINAGE GEOTEXTILE SHALL BE MIRAFI 180N FILTER FABRIC (OR EQUAL)

CONSTRUCTION NOTES:

- CONTRACTOR TO SUBMIT PROPOSED EARTH SUPPORT SYSTEM, WATER CONTROL MEASURES, AND WORK PLAN (MEANS AND METHODS FOR TEMPORARY ROAD/SLOPE CONSTRUCTION).
- SLOPE ELEVATION VIEWS AND LOCATIONS AND GEOMETRY OF EXISTING STRUCTURES MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
- PRIOR TO CONSTRUCTION OF THE SLOPE, THE CONTRACTOR SHALL CLEAR AND GRUB THE BACKFILL ZONE AREA, BASE OF SLOPE, AND EXISTING SLOPE, REMOVING TOP SOILS, BRUSH, SOD, OR OTHER ORGANIC OR DELETERIOUS MATERIALS. ANY UNSUITABLE SOILS SHALL BE OVER-EXCAVATED, REPLACED, AND COMPACTED WITH BACKFILL MATERIAL.
- AREAS OUTSIDE OF ARMOR STONE SLOPE INSTALLATION SHALL NOT BE DISTURBED. VEGETATION IS CRITICAL TO THE STABILITY OF THE SLOPES IN THESE AREAS.
- PRIOR TO EXCAVATION TO SUBGRADE ELEVATION, NOTIFY GTR. GTR TO OBSERVE SUBGRADE TO ENSURE SOIL PROPERTIES OF SUBGRADE.
- REMOVE LOOSE AND DISTURBED SOIL WITHIN SLOPE AS CONSTRUCTION PROGRESS UP THE SLOPE IN LOCALLY EXCAVATED CONTROLLED MANNER. BACKFILL WITH APPROVED MATERIAL BACKFILL AND COMPACT IN ACCORDANCE WITH MASSDOT SPECIFICATIONS.
- IN AREAS WHERE SILTY MATERIAL IS OBSERVED (I.E. TILL), THE AREA WILL BE EXCAVATED WITH A SMOOTH BUCKET, LEAVING THE IN SITU MATERIAL UNDISTURBED.
- ARMOR STONE PLACEMENT
 - PLACE 2 TO 5 TON ARMOR STONE AS SHOWN ON THE DRAWINGS FOR THE BOTTOM THIRD. PLACE 1 TO 3 TON ARMOR STONE AS SHOWN ON THE DRAWINGS FOR THE MIDDLE THIRD. PLACE ½ TO 1 TON ARMOR STONE AS SHOWN ON THE DRAWINGS FOR THE TOP THIRD.
 - ALL VOIDS BETWEEN ARMOR STONE TO BE FILLED. CONTRACTOR TO USE A VARIETY OF STONE SIZES TO FILL VOIDS AND PROVIDE INTIMATE CONTACT BETWEEN ADJACENT ARMOR STONES.
- DRAINAGE
 - AT THE END OF EACH WORK DAY, BACKFILL SURFACE SHALL BE GRADED FROM THE SLOPE FACE A MINIMUM OF 2 PERCENT SLOPE AND A TEMPORARY SOIL BERM SHALL BE CONSTRUCTED NEAR THE SLOPE CREST TO PREVENT SURFACE WATER RUNOFF FROM OVERTOPPING THE SLOPE.
 - AT THE END OF EACH WORKDAY, BACKFILL SURFACE SHALL BE COMPACTED TO MINIMIZE PONDING OF WATER AND SATURATION OF BACKFILL.
 - PERMANENT SURFACE WATER DIVERSION SHALL BE AS REQUIRED AND PROVIDED BY THE CONTRACTOR.
 - PERMANENT SUBSURFACE WATER COLLECTION AND DIVERSION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
 - BACKFILL OF ANY UTILITIES THAT CROSS BENEATH OR PASS THROUGH THE SLOPE MUST BE COMPACTED TO 95% MAXIMUM DRY DENSITY. IF ANY UTILITY CONFLICTS EXIST, GTR MUST BE NOTIFIED PRIOR TO CONSTRUCTION TO REVIEW THE PLANS AND SPECIFICATIONS. MODIFICATIONS TO THESE PLANS AND SPECIFICATIONS MAY BE REQUIRED AFTER THE REVIEW.

INSPECTION NOTES:

- GTR WILL PERIODICALLY PERFORM SITE VISITS DURING ROUTINE EXCAVATION, ARMOR STONE PLACEMENT, GEOTEXTILE PLACEMENT AND BACKFILL TO ENSURE COMPLIANCE WITH THESE DRAWINGS, MASSDOT STANDARD SPECIFICATIONS AND THE PROJECT REQUIREMENTS.
- COMPACTION TESTING OF BACKFILL MATERIAL SHALL BE PERFORMED IN ACCORDANCE WITH MASSDOT STANDARD SPECIFICATIONS BY THE CONTRACTOR.
- THE CONTRACTOR SHALL SURVEY MONITOR THE TEMPORARY SUPPORT OF EXCAVATION AND SLOPE DAILY DURING THE CONSTRUCTION OF THE SLOPE REPAIR. CONTRACTOR SHALL SUBMIT METHOD OF SURVEY MONITORING TO ENGINEER FOR REVIEW 14 DAYS BEFORE EARTH SUPPORT INSTALLATION. ALL TESTING AND MONITORING COSTS ARE INCIDENTAL TO THE PROJECT.

MMMM DD, YYYY	ISSUED FOR CONSTRUCTION
DATE	
USE ONLY PRINTS OF LATEST DATE	



GEOSCIENCES TESTING AND RESEARCH, INC.

55 Middlesex Street, Suite 225, North Chelmsford, MA.
Phone: (978) 251-9395 www.gtrinc.net

Project Name: Jacksonville Road
Location: Colrain, MA

Boring No. GTR-1
Page: 1 of 2
GTR Job #: 23.102
GTR Rep: J. Roth
Reviewer: C. George

Drilling Co. <u>Seaboard Drilling Inc</u>	
Driller: <u>Dale Wieser</u>	Helper(s): <u>Jarod Sudya</u>
Start Date: <u>3/13/23</u>	End Date: <u>3/13/23</u>
Ground Surface Elev (ft): <u>+100.5 ft</u>	
Boring Location: <u>See Plan</u>	
Note: <u>Mobile Drill B53/ Auto Hammer</u>	

Depth	Casing BPF	Sample Data					Stratum	Additional Data	Notes
		No.	Pen/Recovery	Depth (ft.)	Blows per 6in	Field Test			
0		S-1	24/17	1-3	15 - 21 12 - 10		Top 8" Asphalt Dense, brown, f-c SAND and Gravel, trace Silt, Dry.	ASPHALT 8"	
5		S-2	24/7	5-7	18 - 5 3 - 2		Loose, brown, f-c SAND and Gravel, little Silt.		
10		S-3	24/9	10-12	17 - 7 4 - 4		M. dense, brown, f-c SAND, little Gravel, little Silt.	GRANULAR FILL	
15		S-4	24/11	15-17	37 - 27 18 - 19		Dense, brown, f-c Sand and Gravel, trace Silt.		
20		S-5	24/14	20-22	17 - 9 9 - 9		M. dense, brown, fine SAND, trace Silt.	SAND 23'	
25		S-6	14/11	25-27	18 - 24 50/<2		V. dense, brown, f-c SAND and Gravel, trace Silt.	SAND AND GRAVEL	1

NOTES:

1. Drilled through 18 inch boulder, approximately 26.5 feet to 28 feet.

Order of Sample Description (Modified Burmister)	PENETRATION RESISTANCE (N) GUIDE	
	Cohesionless Soils (Sands)	Cohesive Soils (Clays)
1. Moisture Content: Dry, Moist, Wet	Relative Density / Blows per Foot	Consistency / Blows per Foot
2. Soil Relative Density or Consistency	Very Loose >> 0 - 4	Very Soft >> Below 2
3. Color	Loose >> 4 - 10	Soft >> 2 - 4
4. Major Component: Should be capitalized	Medium Dense >> 10 - 30	Medium Stiff >> 4 - 8
5. Minor Component: "and" - 35% to 50% minor grain size	Dense >> 30 - 50	Stiff >> 8 - 15
"some" - 20% to 35% minor grain size	Very Dense >> Over 50	Very Stiff >> 15 - 30
"little" - 10% to 20% minor grain size		Hard >> Over 30
"trace" - < 10% of minor grain size		

BORING LOG GTR-1

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

BORING NOTES:

1. LOCATION OF BORINGS SHOWN ON THE PLAN THUS: GTR-#.
2. BORINGS ARE TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
3. WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
4. FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 1 1/8" I.D. SPLIT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30".



GEOSCIENCES TESTING AND RESEARCH, INC.

55 Middlesex Street, Suite 225, North Chelmsford, MA.
Phone: (978) 251-9395 www.gtrinc.net

Project Name: Jacksonville Road
Location: Colrain, MA

Boring No. GTR-1
Page: 2 of 2
GTR Job #: 23.102
GTR Rep: J. Roth
Reviewer: C. George

Drilling Co. <u>Seaboard Drilling Inc</u>	
Driller: <u>Dale Wieser</u>	Helper(s): <u>Jarod Sudya</u>
Start Date: <u>3/13/23</u>	End Date: <u>3/13/23</u>
Ground Surface Elev (ft): <u>+100.5 ft</u>	
Boring Location: <u>See Plan</u>	
Note: <u>Mobile Drill B53/ Auto Hammer</u>	

Depth	Casing BPF	Sample Data					Stratum	Additional Data	Notes
		No.	Pen/Recovery	Depth (ft.)	Blows per 6in	Field Test			
30		SS-7	24/15	30-32	14 - 17 24 - 36		Dense, brown, f-c SAND and Gravel, trace Silt.	SAND AND GRAVEL 33'	2 3
35		SS-8	20/18	35-37	31 - 45 44 - 50/2		V. dense, gray, fine SAND, little Gravel, little Silt.		4
40									
45							GLACIAL TILL		
50									
55									
							Bottom of boring at 57 feet below ground surface with roller bit refusal on possible bedrock.	57'	5

NOTES:

2. Drilled through 2 foot boulder, approximately 32.5 feet to 34.5 feet.
3. Based on drilling action and outwash top of till is approximately 33 feet below ground surface.
4. Probed ahead in open hole to determine bed rock depth .
5. Rotary wash drilling method may have affected the measured water level at the end of drilling.

Order of Sample Description (Modified Burmister)	PENETRATION RESISTANCE (N) GUIDE	
	Cohesionless Soils (Sands)	Cohesive Soils (Clays)
1. Moisture Content: Dry, Moist, Wet	Relative Density / Blows per Foot	Consistency / Blows per Foot
2. Soil Relative Density or Consistency	Very Loose >> 0 - 4	Very Soft >> Below 2
3. Color	Loose >> 4 - 10	Soft >> 2 - 4
4. Major Component: Should be capitalized	Medium Dense >> 10 - 30	Medium Stiff >> 4 - 8
5. Minor Component: "and" - 35% to 50% minor grain size	Dense >> 30 - 50	Stiff >> 8 - 15
"some" - 20% to 35% minor grain size	Very Dense >> Over 50	Very Stiff >> 15 - 30
"little" - 10% to 20% minor grain size		Hard >> Over 30
"trace" - < 10% of minor grain size		

BORING LOG GTR-1 CONTINUED

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

5. ALL BORINGS WERE MADE IN MARCH, 2023.
6. BORINGS WERE MADE BY SEABOARD DRILLING INC., LOCATED AT 649 MEADOW ST CHICKOPEE, MA 01013.
7. THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.
8. THE WATER LEVELS RECORDED IN THE TABLE ARE THOSE MEASURED ON THE DATES GIVEN AND DO NOT NECESSARILY REPRESENT GROUND WATER LEVEL AT TIME OF CONSTRUCTION.

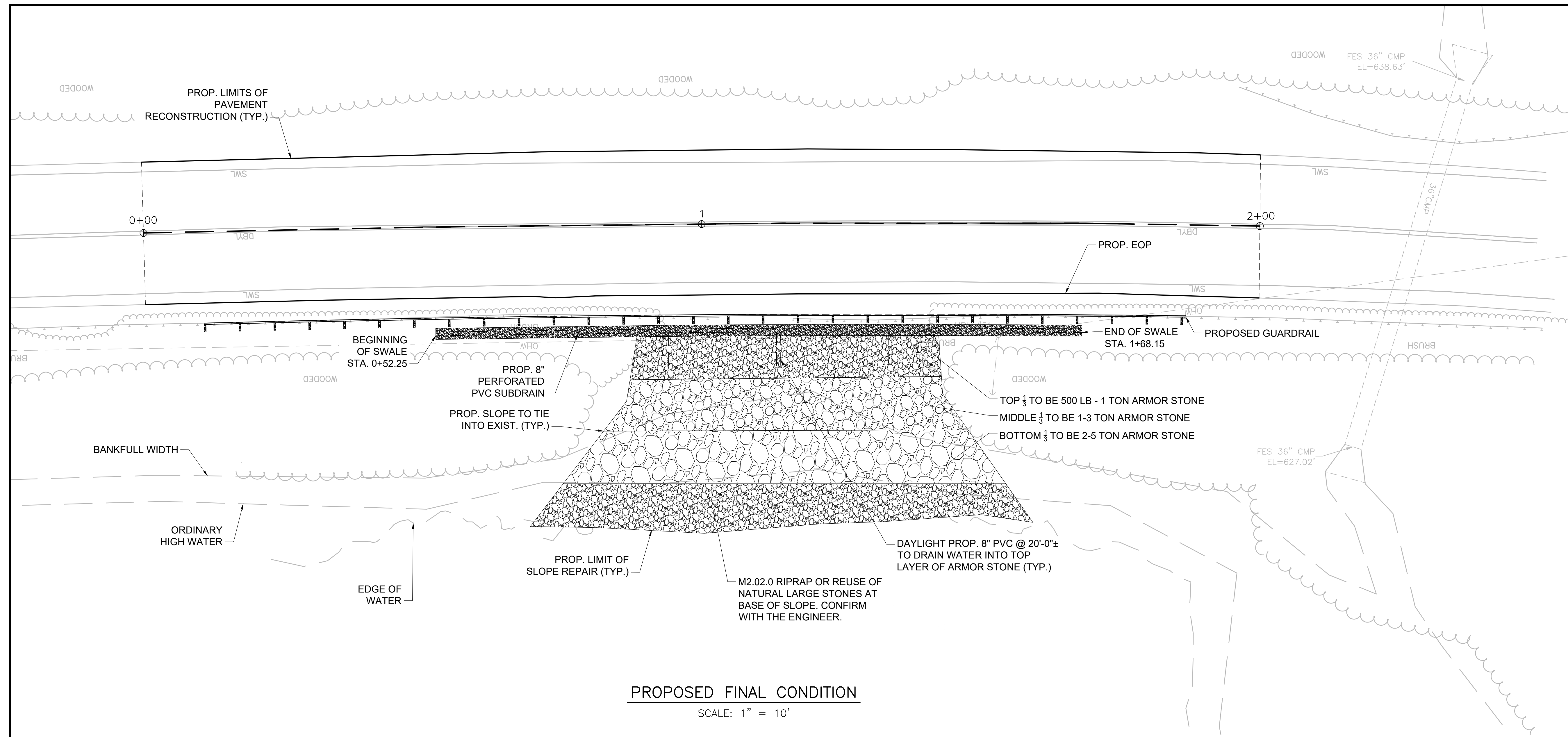
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DATE	
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28488_00_PROPOSED CONDITIONS_24X36.DWG Plotted on 2-May-2024 9:35 AM DD-Month-YYYY Xxxxx Structural Submittal (S#)

**COLRAIN
JACKSONVILLE ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	--	4	7
PROJECT FILE NO.		--	

FINAL CONDITIONS



PROPOSED FINAL CONDITION

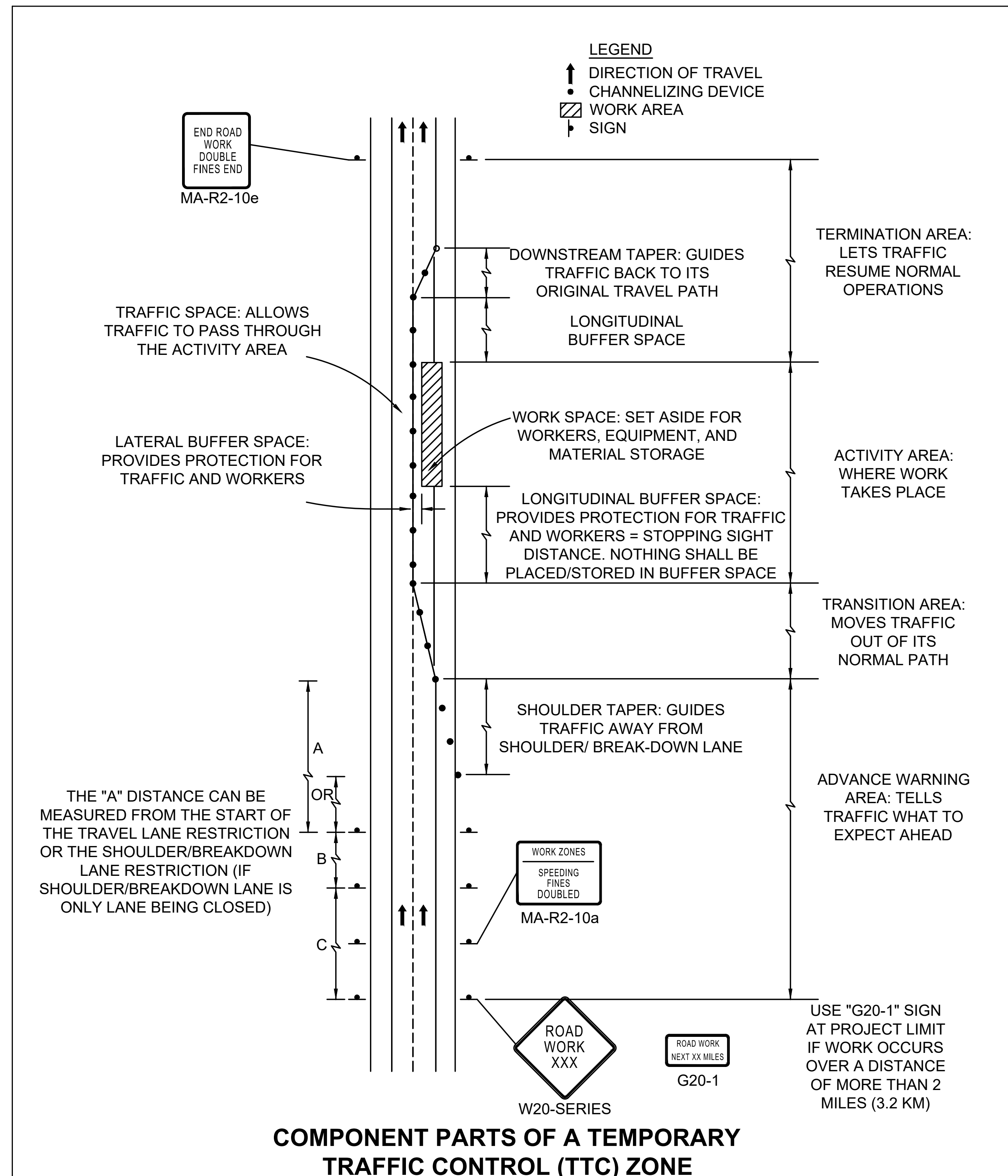
SCALE: 1" = 10'

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DATE	
USE ONLY PRINTS OF LATEST DATE	

SHEET 4 OF 7 SHEETS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	--	5	7
PROJECT FILE NO.		--	

TEMPORARY TRAFFIC CONTROL DETAILS



NOTES:

- ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS, UNLESS SUPERCEDED BY THESE PLANS.
- ALL SIGN LEGENDS, BORDERS, AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD.
- TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
- TEMPORARY CONSTRUCTION SIGNING, BARRICADES, AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
- SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, CHANNELIZING DEVICES, BARRIERS, AND CRASH ATTENUATORS MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES" AND/OR "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH).
- CONTRACTORS SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION, EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT, AND SIMILAR OPERATIONS.
- THE FIRST TEN PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH TYPE A LIGHTS.
- THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE DETERMINED BY THE ENGINEER.
- DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
- MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
- MINIMUM LANE WIDTH IS TO BE 11 FEET (3.3m) UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.
- ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.

LEGEND:

- REFLECTORIZED PLASTIC DRUM OR 36" CONE
- ▨ WORK ZONE
- 🚚 WORK VEHICLE
- P/F POLICE/FLAGGER DETAIL
- ➔ DIRECTION OF TRAFFIC
- 🚚 TRUCK MOUNTED ATTENUATOR
- ▨ TYPE III BARRICADE
- 🌐 IMPACT ATTENUATOR
- ⬅️ TRAFFIC OR PEDESTRIAN SIGNAL
- 📄 CHANGEABLE MESSAGE SIGN
- ▭ MEDIAN BARRIER
- SIGN
- ➔ ARROW BOARD
- 🚧 MEDIAN BARRIER WITH WARNING LIGHTS

THE IDEAL CAPACITY OF A MAJOR HIGHWAY IS GENERALLY CONSIDERED TO BE 1900 PASSENGER CARS PER HOUR PER LANE (PCPHPL). IN WORK ZONES ON A MULTI-LANE DIVIDED HIGHWAY, THE FOLLOWING VOLUME GUIDELINES HAVE BEEN SUGGESTED:

MEASURED AVERAGE WORK ZONE CAPACITIES

NUMBER OF LANES		NUMBER OF STUDIES	AVERAGE CAPACITY	
NORMAL (EXISTING)	OPEN (TO TRAFFIC)		VPH	VPHPL
3	1	7	1,170	1,170
2	1	8	1,340	1,340
5	2	8	2,740	1,370
4	2	4	2,960	1,480
3	2	9	2,980	1,490
4	3	4	4,560	1,520

Source: Dudek, C., Notes on Work Zone Capacity and Level of Service, Texas Transportation Institute, Texas A&M University, College Station, Texas (1984)

BY OBTAINING HOURLY TRAFFIC COUNTS FOR A PARTICULAR ROADWAY (WITH A MINIMUM OF A 48-HOUR AUTOMATIC TRAFFIC RECORDER (ATR) COUNT), THIS WILL HELP TO DETERMINE AT WHAT TIMES OF THE DAY OR NIGHT A CERTAIN NUMBER OF LANES MAY BE CLOSED.

massDOT
Massachusetts Department of Transportation
Highway Division

Standard Details and Drawings for the Development of Temporary Traffic Control Plans

FIGURE Gen-4
COMPONENT PARTS OF A TEMPORARY TRAFFIC CONTROL (TTC) ZONE

NOT TO SCALE

massDOT
Massachusetts Department of Transportation
Highway Division

Notes for Traffic Management

FIGURE Gen-1
GENERAL GUIDELINES

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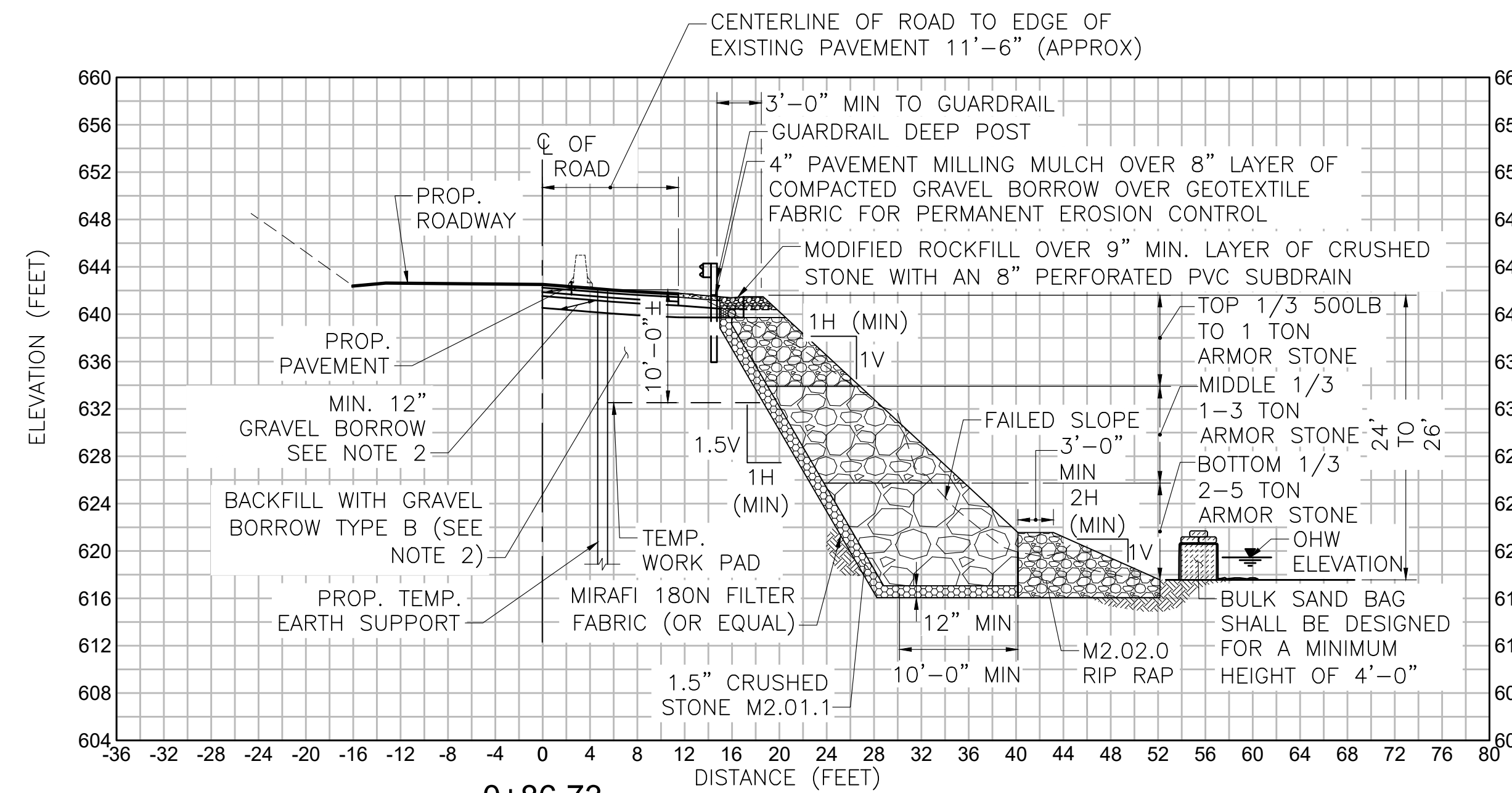
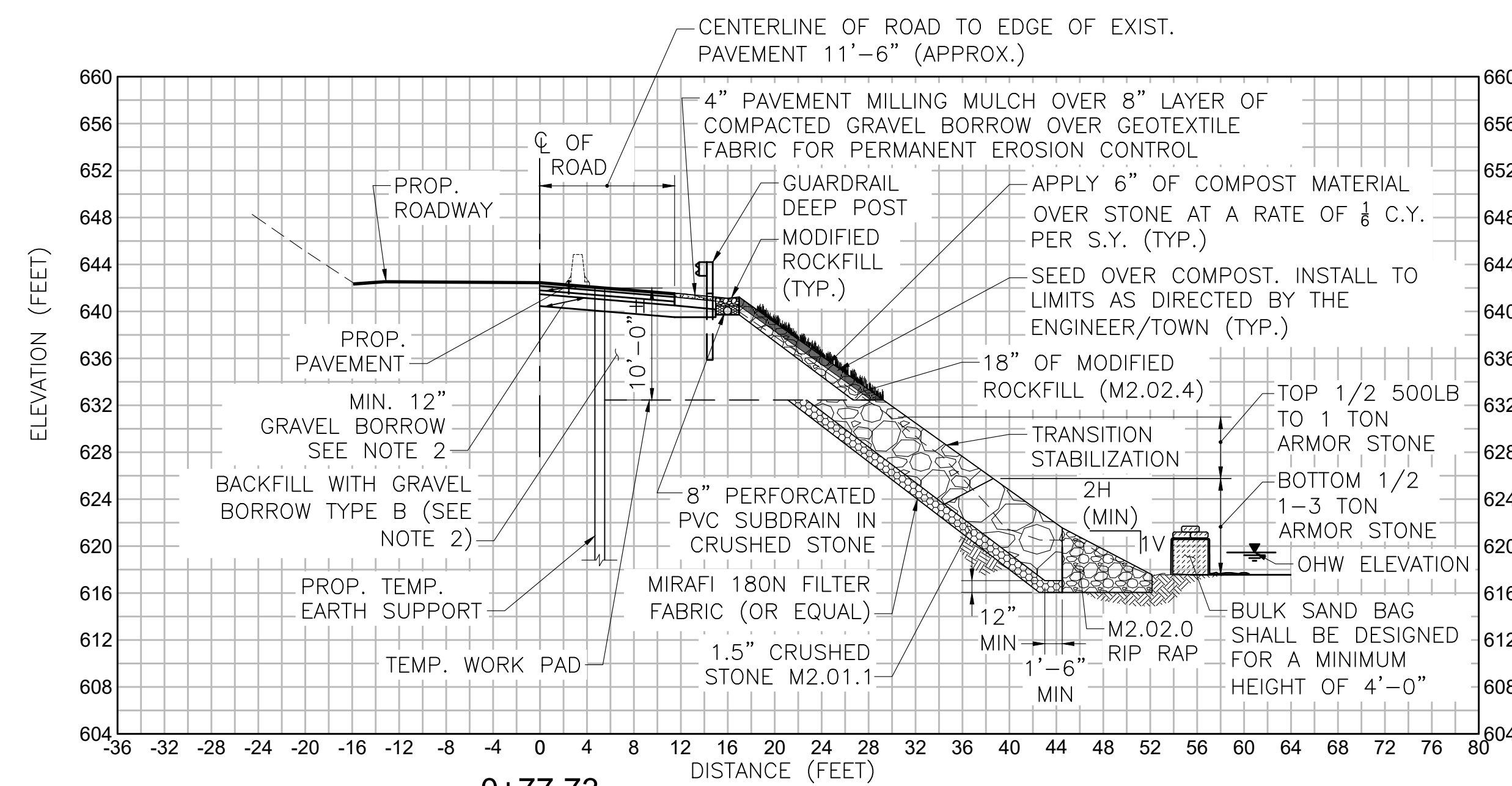
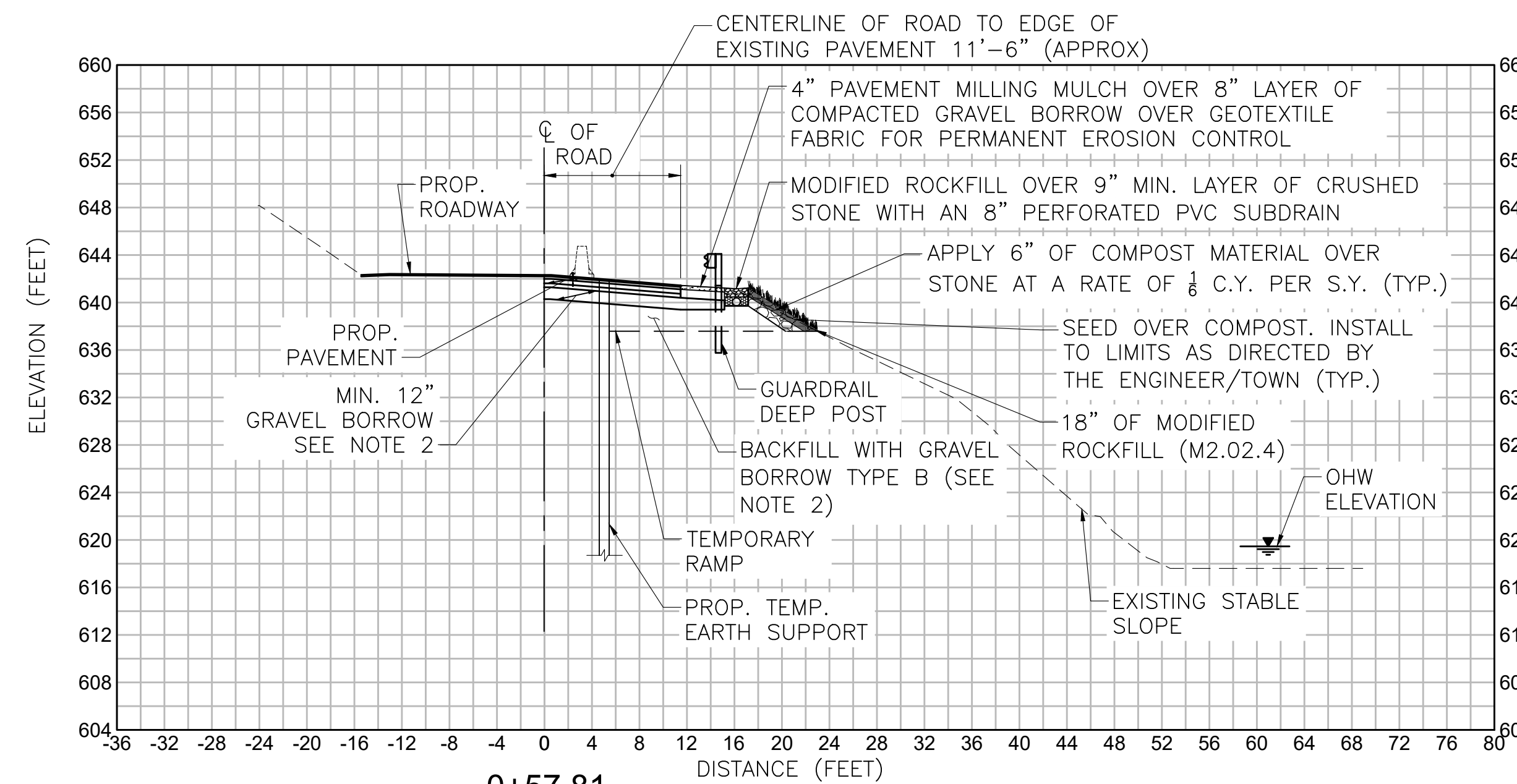
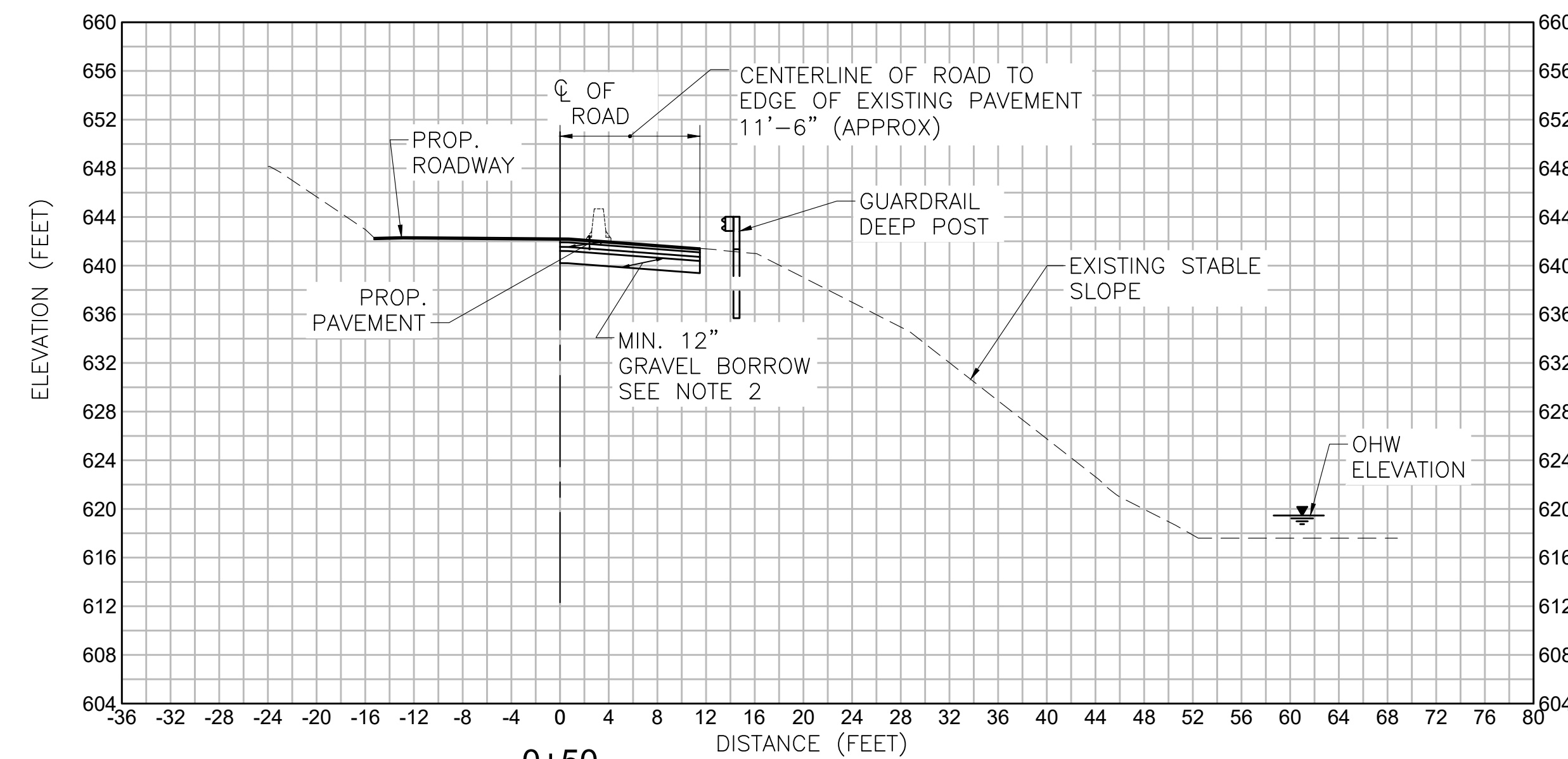
**COLRAIN
JACKSONVILLE ROAD**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	--	6	7
PROJECT FILE NO.		--	

CROSS SECTIONS

GENERAL NOTES:

1. RIPRAP OR REUSE OF NATURAL LARGE STONES AT BASE OF SLOPE. CONFIRM WITH THE ENGINEER.
2. NEW GRAVEL BORROW TO BE PLACED ONLY WHERE EXISTING MATERIAL FAILS TO MEET REQUIREMENT OF M1.03.0 TYPE B AND AS DIRECTED BY THE TOWN/ENGINEER.



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28488_00_PROPOSED CONDITIONS_24X36.DWG Plotted on 2-May-2024 9:36 AM DD-Month-YYYY Xxxxx Structural Submittal (S#)

**COLRAIN
JACKSONVILLE ROAD**

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MA	--	7	7
PROJECT FILE NO. --			

CROSS SECTIONS - CONT.

GENERAL NOTES:

1. RIPRAP OR REUSE OF NATURAL LARGE STONES AT BASE OF SLOPE. CONFIRM WITH THE ENGINEER.
2. NEW GRAVEL BORROW TO BE PLACED ONLY WHERE EXISTING MATERIAL FAILS TO MEET REQUIREMENT OF M1.03.0 TYPE B AND AS DIRECTED BY THE TOWN/ENGINEER.

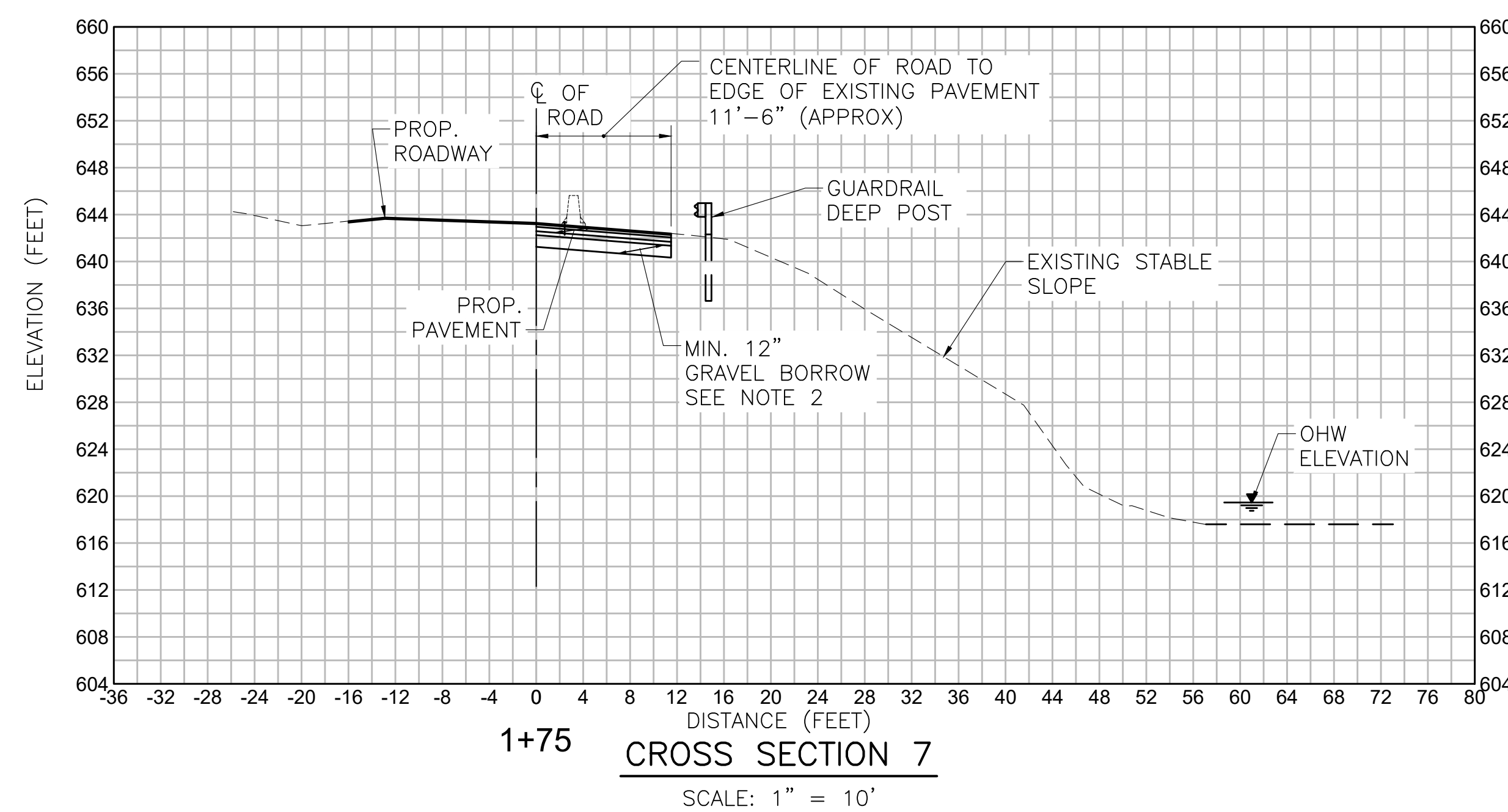
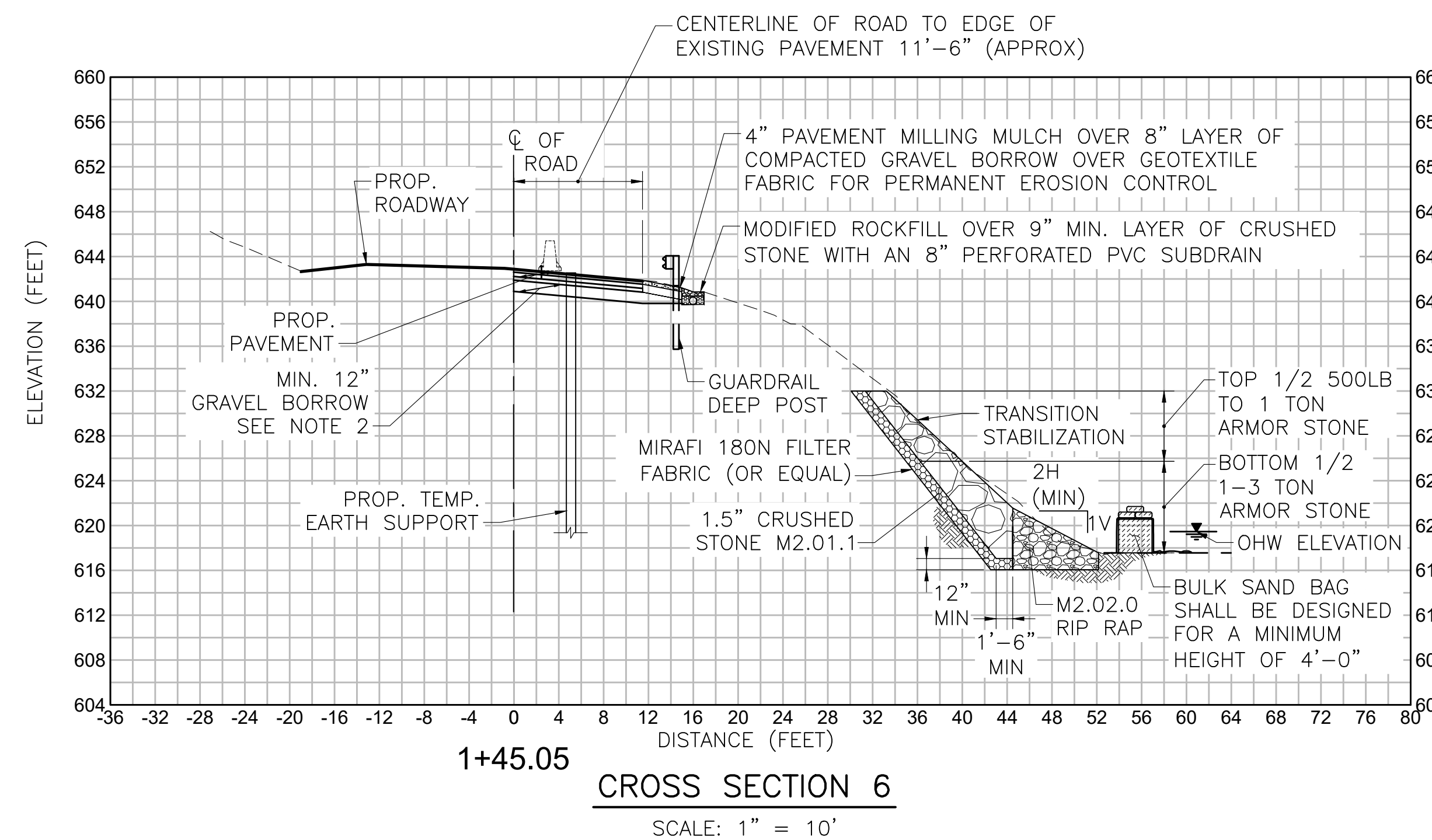
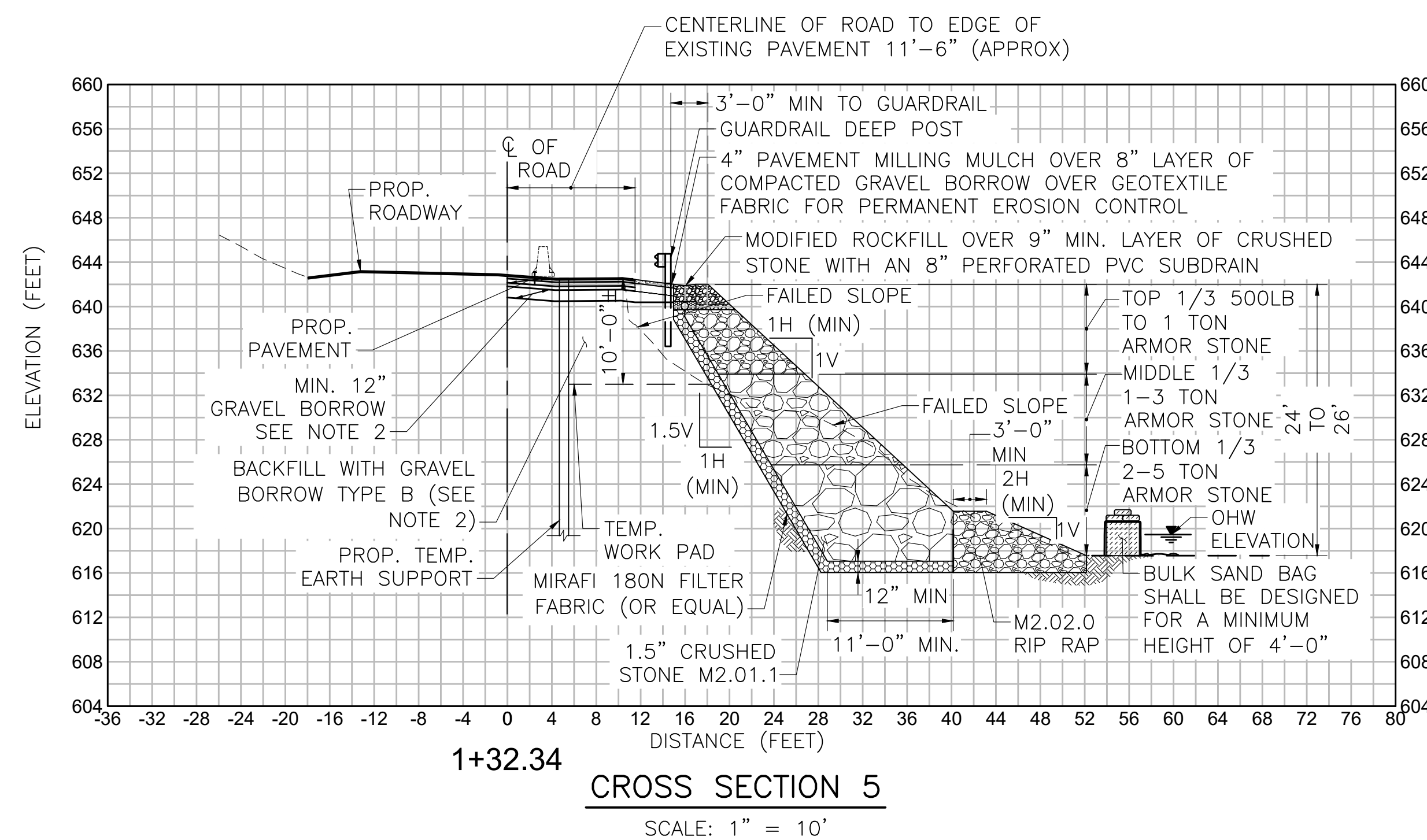


TABLE FROM NATIONAL HIGHWAY INSTITUTE FHWA-NHI-09-111

Table 5.1. Minimum and Maximum Allowable Particle Size in Inches.

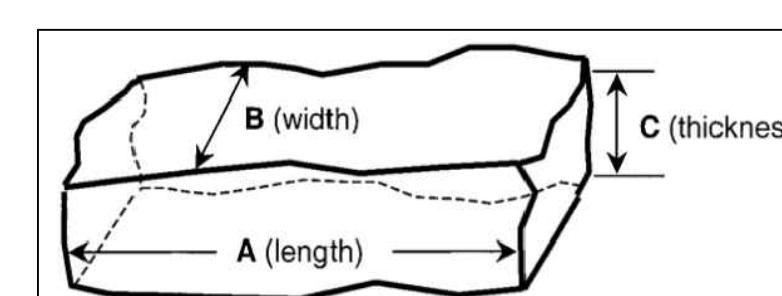
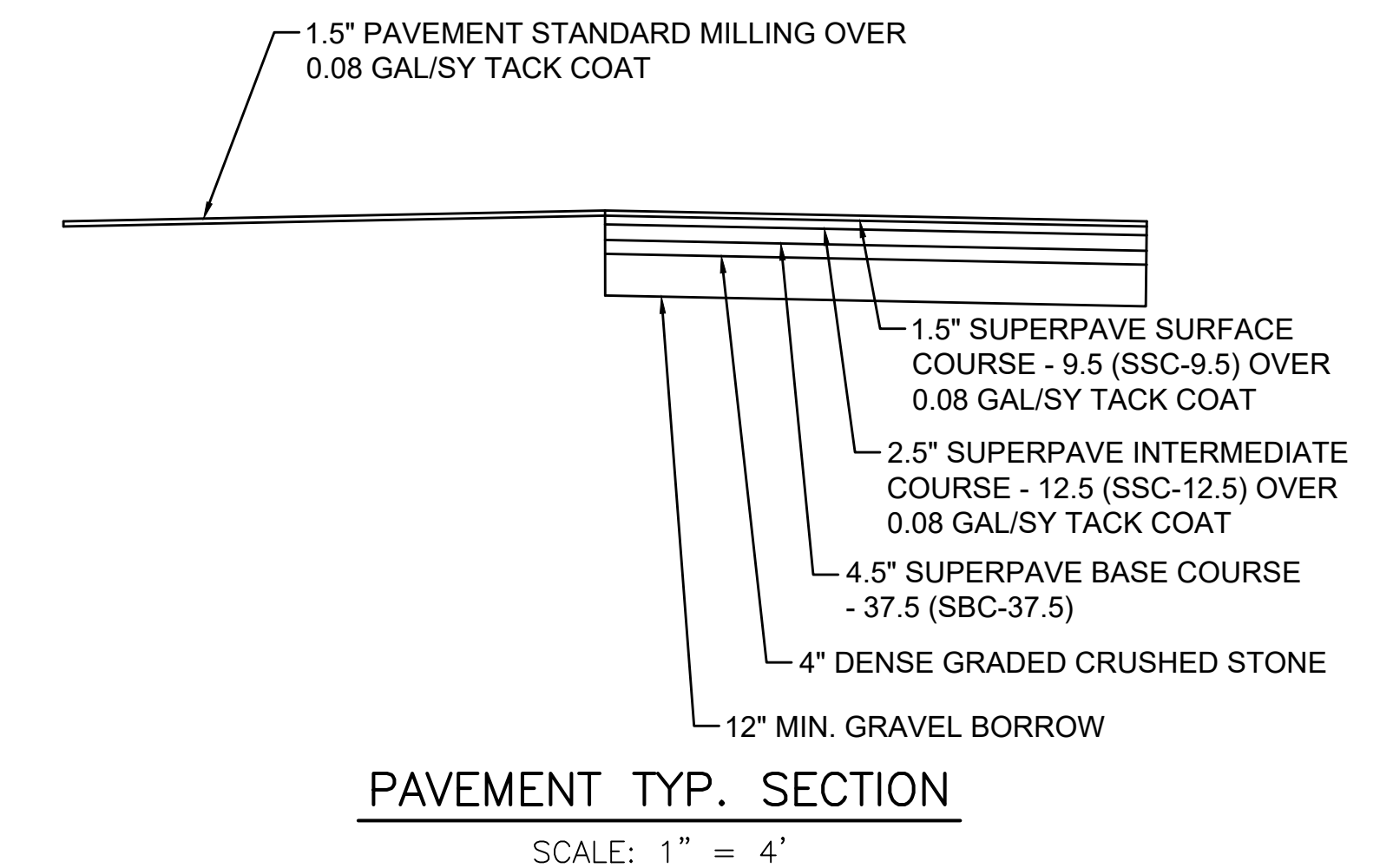
Nominal Riprap Class by Median Particle Diameter	Class	Size	d ₁₅		d ₅₀		d ₈₅		d ₁₀₀
			Min	Max	Min	Max	Min	Max	Max
I	6 in	3.7	5.2	5.7	6.9	7.8	9.2	12.0	
II	9 in	5.5	7.8	8.5	10.5	11.5	14.0	18.0	
III	12 in	7.3	10.5	11.5	14.0	15.5	18.5	24.0	
IV	15 in	9.2	13.0	14.5	17.5	19.5	23.0	30.0	
V	18 in	11.0	15.5	17.0	20.5	23.5	27.5	36.0	
VI	21 in	13.0	18.5	20.0	24.0	27.5	32.5	42.0	
VII	24 in	14.5	21.0	23.0	27.5	31.0	37.0	48.0	
VIII	30 in	18.5	26.0	28.5	34.5	39.0	46.0	60.0	
IX	36 in	22.0	31.5	34.0	41.5	47.0	55.5	72.0	
X	42 in	25.5	36.5	40.0	48.5	54.5	64.5	84.0	

Note: Particle size d corresponds to the intermediate ("B") axis of the particle.

Table 5.2. Minimum and Maximum Allowable Particle Weight in Pounds.

Nominal Riprap Class by Median Particle Weight	Class	Weight	W ₁₅		W ₅₀		W ₈₅		W ₁₀₀
			Min	Max	Min	Max	Min	Max	Max
I	20 lb	4	12	15	27	39	64	140	
II	60 lb	13	39	51	90	130	220	470	
III	150 lb	32	93	120	210	310	510	1100	
IV	300 lb	62	180	240	420	600	1000	2200	
V	1/4 ton	110	310	410	720	1050	1750	3800	
VI	3/8 ton	170	500	650	1150	1650	2800	6000	
VII	1/2 ton	260	740	950	1700	2500	4100	9000	
VIII	1 ton	500	1450	1900	3300	4800	8000	17600	
IX	2 ton	860	2500	3300	5800	8300	13900	30400	
X	3 ton	1350	4000	5200	9200	13200	22000	48200	

Note: Weight limits for each class are estimated from particle size by: $W = 0.85(\gamma_s d^3)$ where d corresponds to the intermediate ("B") axis of the particle, and particle specific gravity is taken as 2.65.



Size and weight: Based on field studies, the recommended relationship between size and weight is given by:

$$W = 0.85(\gamma_s d^3) \quad (5.4)$$

where: W = Weight of stone, lb (kg)
 γ_s = Density of stone, lb/ft³ (kg/m³)
d = Size of intermediate ("B") axis, ft (m)

MMMM DD, YYYY	ISSUED FOR CONSTRUCTION
DATE	
USE ONLY PRINTS OF LATEST DATE	