



## GUAM WATERWORKS AUTHORITY

Gloria B. Nelson Public Service Building 688 Route 15 Mangilao, Guam 96913 | (671) 300-6058

**Aplacho Drainage and Roadway Improvements  
GWA Project No. 22202  
IFB-07-ENG-2023  
GWA RFI Response No. 1 to Contractor Inquiries**

This Addendum and/or Response to Request for Information (RFI) is issued to modify the previously issued bid documents and/or given for informational purposes and to the extent the responses below modify the bid documents, please treat them as an amendment to the RFP. The following are responses to RFIs received:

NO.	RFI SUBMITTAL DATE	QUESTION/INQUIRY AS SUBMITTED	GWA RESPONSE
1.	09/24/2023	“For the uniformity of the Bid, please confirm if the below items are needed:	
		a. Field office for GWA and Project Engineer, if yes, please provide requirements.	a. Field office is not required.
		b. 24 Hours Security – this item is called on the general requirements but not clarified if needed to be 24 hour security.	b. There is no reference to 24-hour security in the General Requirements or specifications. Twenty-four hour security is not required. However, please refer to Section 0700 General Conditions, Subsection 7.12 A, “ Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:  1. All persons on Site or who may be affected by the Work; 2. All the work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and 3. Other property at the Site or adjacent thereto, including



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			trees, shrubs, lawns, walks pavements, roadway, structures, other work in progress, utilities and underground facilities not designated for removal, relocation or replacement in the course of construction.”
		c. 24 Hours Traffic Control Devices.	c. Yes, the traffic control devices shown for any stage construction shall remain in place and be utilized so long as necessary for the subsequent stages and shall be removed immediately when no longer required. (Refer to General notes no. 15).
		d. Electronic/Digital Signage for Traffic Control (the location of site is located on the middle of both curving travel lane that makes the jobsite a blind spot for the travelers/Motorist.)”	<p>d. Electronic digital signage is preferred but not required. However, all traffic control shall be in conformance with the Manual of Uniform Traffic Control Devices (MUTCD), especially for retro reflectivity and/or DPW standards drawings, which can be downloaded from the Guam GTP website <a href="http://standard-plans-for-road-and-bridge-construction-2012.pdf">standard-plans-for-road-and-bridge-construction-2012.pdf</a> (<a href="http://guamtransportationprogram.com">guamtransportationprogram.com</a>).</p> <p>Please refer to Revised sheets C-7.2 &amp; C-7.3. All Bidders are advised to take note of the additional requirements and incorporate them into their bid.</p> <ul style="list-style-type: none"><li>i. Note 8. Open trench areas adjacent and parallel to the travel lane shall be covered with steel plates or protected by placing concrete barriers to cover the trench. Steel plates within the travel lane shall have a non-skid surface. Concrete barriers are allowed only outside of travel lanes.</li><li>ii. Signage indicating “steel plate ahead” required when steel plates are in the travel lane.</li></ul>



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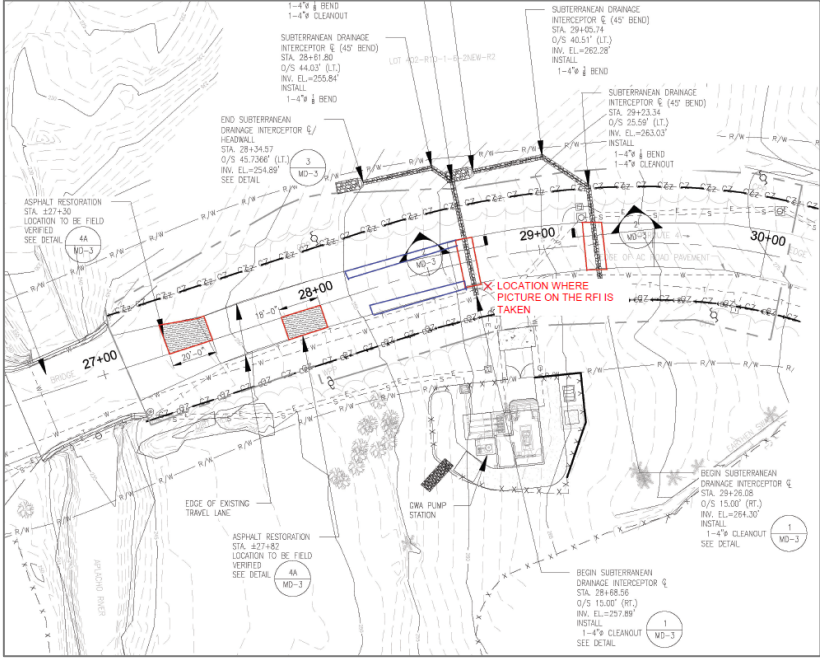
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2.	09/24/2023	<p>“During the site visit, we notice the road is already deteriorated in front of the pump station, per plan we are only requested to restore asphalt on 2 location near the bridge and assuming the location of the drainage pipes that will cross the road. There is asphalt pavement on the area that are deteriorate due to the excessive flow of water from unknown source that are near the assigned location of the work. Please confirm that those deteriorated pavement is not part of the pricing. Please see attached drawing with marked up. The redlines are part of the pricing and the blue line is just to represent some areas that are deteriorated pavement that is not part of the plan.”</p>  <p>Existing Deteriorated Pavement due to flow of water from unknown location</p> <p>Assumed Location of Pavement to be Cut and restored for Drainage Pipe Location</p>	<p>Yes, the deteriorated road noticed during the inspection is not part of the scope pricing. See Revised sheet C-5.1 and revised Item No. 5 Asphalt restoration of the Bid Schedule. All Bidders are advised to take note of the additional requirements and incorporate them into their bid.</p>
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3.	09/25/2023	"Please confirm if Topographic Survey and As Built is not required for the above subject project for bid."	<p>a. A Topographic survey is not required. Field Engineering Surveying is included in the specs.</p> <p>b. As-Built/Record drawings are included. Refer to Section 017890-2 Project Record Documents sub-section 2.1.</p>



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4.	10/02/2023	<p>“Bid item 7 Turf Establishment and Bid Item 8 Pavement Marking does not have reference drawing and specs included on the bid package, may we please request for a reference drawing and specs to price those 2 items. “</p>	<p>a. Turf Establishment – Restore to their original condition or better, all existing improvements, damaged as result of construction activities, including pavements, embankments, driveways, curbs, signs, landscaping, structures, utilities, and fence, etc. Refer to General Notes No. 8 and Turf Establishment sheet TS-2 and specs section 329200-Turf and Grasses.</p> <p>b. Pavement Markings for temporary traffic control are in Notes No. 1 sheets C-7.2 and C-7.3.</p> <p>Pavement Markings for the repaired road areas are not identified in the original plans and specs. However, pavement striping (but not reflectors) for the repaired road areas will now be required.</p> <p>See Notes in Revised sheet C -5.1 or refer to DPW standards 634-02 to 634-04.</p>
5.		<p>“On sheet C-7.2 &amp; C-7.3, Temporary Traffic Control Plan indicates that lane closure should be installed for 5000 LF except buffer and taper length.</p> <p>- As the road is curvy, steep, and narrow the traffic from one end will not be visible to the other end and slow movement of vehicle will cause due to opening of only one lane for that too long lane closure. Please advise if we can install it for adjusted length according to requirements during construction for smooth traffic flow.”</p>	<p>Please refer to Revised sheet C-7.2 &amp; C-7.3.</p>



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6.	10/02/2023	<p>“As indicated on sheet TS-2 Road restoration/Resurfacing note-4, DPW recommends 7 days cure time for the flowable fill prior to pavement restoration. Contractor shall be responsible to provide adequate protection for the flowable fill from vehicular loading during this curing period. Lane closure shall not be used as an option during this curing period.</p> <p style="text-align: center;">-As the restoration work will be done on larger area of road, is it possible to install plate on that area? Or we can restore the area in smaller portions i.e., part by part. “</p>	Please refer to RFI item 1.d regarding steel plates.
7.		<p>“On sheet C-5.1, dimensions do not match while converting it to the given scale. Like:- from STA 27+00 to STA 28+00 is 50’ only while converting to given scale.</p> <p>- Shall we double our dimension to match the exact dimension, or will you provide us another actual scaled drawing? Please confirm.”</p>	Please refer to Revised sheet C-5.1.
8.		<p>“Please provide the specification of the following items required to install AC Pavement and Traffic Control Plan.</p> <ul style="list-style-type: none"> <li>-Basecourse (sheet MD-3, detail 2 &amp; 4).</li> <li>- 2500 PSI concrete (sheet MD-3, detail 3B).</li> <li>- Crash cushion (sheet C-7.2 &amp; C-7.3)”</li> </ul>	<p>Base course: Refer to specification 310516 Part 2.1 B Select fill for Basecourse.</p> <p>2,500 PSI: Refer to specification 033000.</p> <p>Crash cushion (if used): Refer to specification 635 and shall meet Federal Highway Administration (FHWA) standards for temporary use.</p>
9.		<p>“Please provide the profile drawing of the new drainage line if possible.”</p>	Please refer to Revised sheet MD-3.



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Bidders are also notified to visit the GWA website, <http://guamwaterworks.org/bids/> to ensure that addenda to the RFP, answers to questions, and reminders are communicated to all bidders throughout the solicitation process.

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MIGUEL C. BORDALLO, P.E.  
General Manager

Enclosures

cc: MCB, JES

**1 – Revised Unit Price Bid Form**

**APLACHO DRAINAGE AND ROADWAY IMPROVEMENTS**

GWA Project No. 22202

**Description of Work: (OR)**

**Base Bid - Description of Work:**

Aplacho Drainage and Roadway Improvements. The base bid item consists but not specifically limited to the construction of two (2) units of subterranean drainage interceptor at a crossroad with a 4" diameter perforated pipe to be backfilled and geotextile. The pipe extends the drain to daylight and harden with a concrete headwall. Trench and excavate to 24" wide and 36" depth, and envelope with filter fabric and 2" (minus) drain rocks. Road improvements include asphalt concrete spot repair.

**Bidders will complete the work for the following price(s) as broken down per scope item:**

<b>Item No.</b>	<b>Description</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Qty</b>	<b>Bid Amount</b>
1	Mobilization/Demolition	Lump Sum	\$ _____	1	\$ _____
2	Project management and coordination, documentation, insurance, temporary facilities, permitting fees and site construction layout (including survey)	Lump Sum	\$ _____	1	\$ _____
3	Environmental protection (Silt fence, sand bags & BMP's)	Lump Sum	\$ _____	1	\$ _____
4	Temporary traffic control work; all traffic control devices, placement and removal of devices and detours, cleanup, restoration, and incidentals	Lump Sum	\$ _____	1	\$ _____
5	Asphalt restoration (including saw cutting, removal of pavement, subgrade preparation /compaction, aggregate course and sub-base and pavement,)	SF	\$ _____	2500	\$ _____
6	Subterranean drainage interceptor at cross road (2 locations) including pavement saw cutting, excavation, laying of perforated pipe, backfilling, compaction, construction of headwall (2 locations of 30 ft) backfilling, compaction and pavement, and riprap (complete in place)	Lump Sum	\$ _____	1	\$ _____
7	Turf Establishment	Lump Sum	\$ _____	1	\$ _____

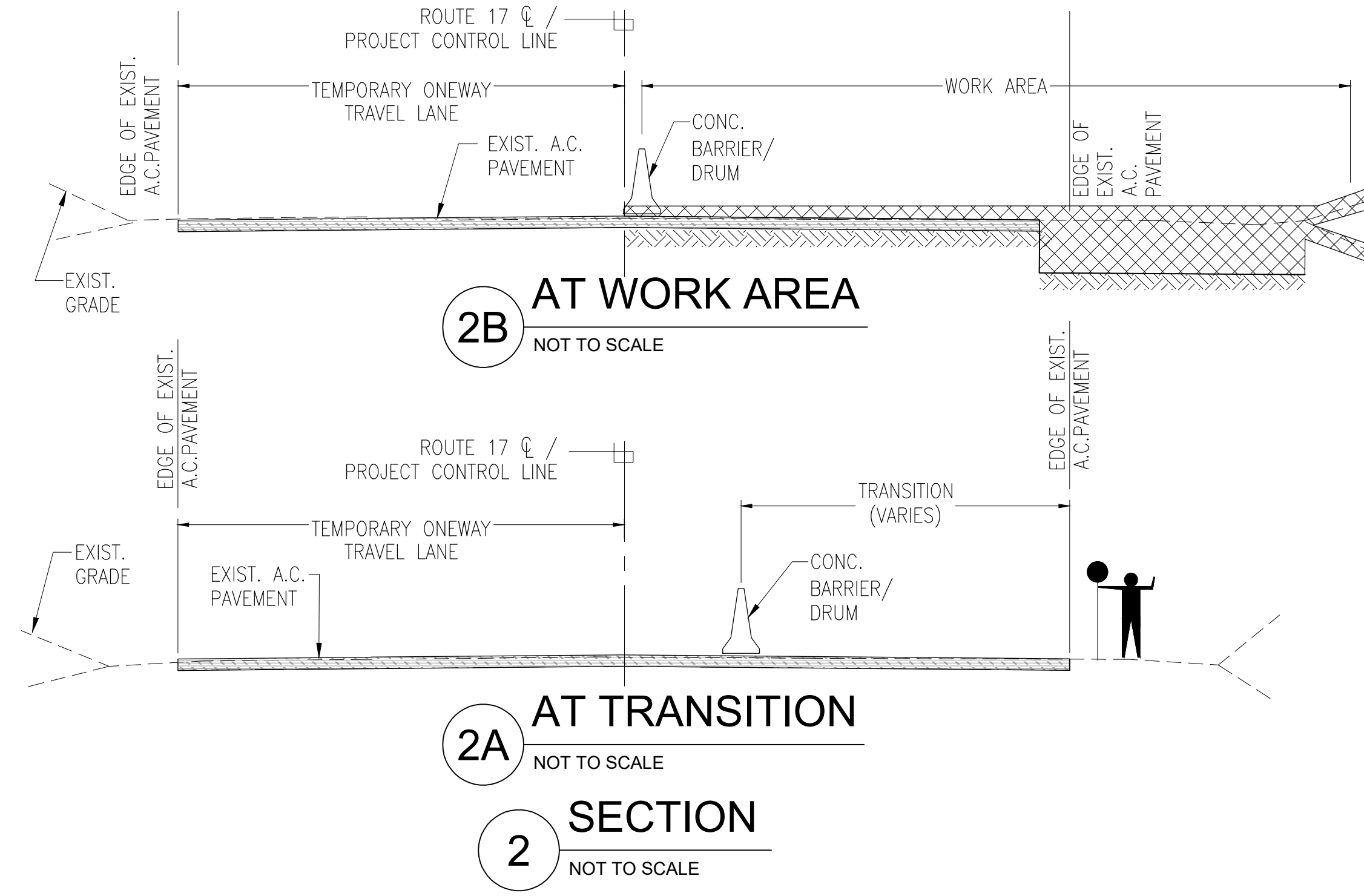


Item No.	Description	Unit	Unit Price	Qty	Bid Amount
8	Pavement Markings	Lump Sum	\$ _____	1	\$ _____
9	Project Closeout	Lump Sum	\$ _____	1	\$ _____
<b>TOTAL BASE BID (OR BID)</b> <b>(As applicable)</b> <b>(TOTAL of Items 1 through 9 inclusive)</b>					\$ _____
<i>(Please write out total bid amount in words below)</i>					
\$ _____					



**NOTES**

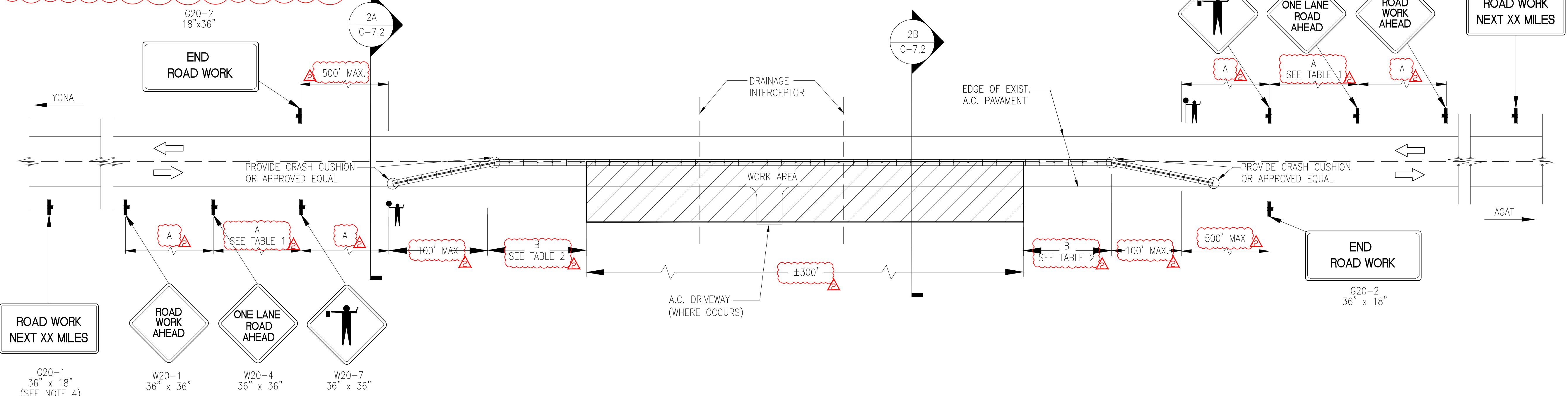
- PAVEMENT MARKINGS FOR TEMPORARY TRAFFIC CONTROL, IF REQUIRED, SHALL BE AS DIRECTED BY THE ENGINEER OR SHOWN IN THE CONTRACT PLANS.
- THE SIGN LOCATION SPACING MAY BE VARIED FROM THE DIMENSIONS SHOWN DUE TO FIELD CONDITIONS INCLUDING ROAD ALIGNMENT, SIGHT DISTANCE, INTERSECTIONS, DRIVEWAYS, PERMANENT SIGNS OR OTHER OBSTRUCTIONS.
- USE DRUMS FOR CHANNELIZING DEVICES IF TEMPORARY TRAFFIC CONTROL IS TO REMAIN IN PLACE FOR 3 DAYS OR LONGER.
- THE "ROAD WORK NEXT XX MILES" SHOULD BE INSTALLED IN ADVANCE OF TTC ZONES THAT ARE MORE THAN 2 MILES IN LENGTH. IT CAN BE MOUNTED ON A TYPE III BARRICADE. THE SIGN MAY ALSO BE USED FOR TTC ZONES OF SHORTER LENGTH.
- FOR CHANNELIZING DEVICES, SEE SHEET C-7.4.
- CONES/DRUMS SPACING FOR APPROACH SPEED OF 25 MPH AND BELOW IS 25 FT.
- TWO-WAY TRAFFIC SHALL BE RESTORED AT THE END OF EACH WORK DAY. SINGLE LANE TRAFFIC MAY ONLY BE ALLOWED DURING NON-PEAK TIME (ON 8:30A, - 4:30PM). THIS IS SUBJECT TO DPW APPROVAL.
- OPEN TRENCH AREAS ADJACENT AND PARALLEL TO THE TRAVEL LANE SHALL BE COVERED WITH STEEL PLATES OR PROTECTED BY PLACING CONCRETE BARRIERS TO COVER THE TRENCH. STEEL PLATES WITHIN THE TRAVEL LANE SHALL HAVE A NON-SKID SURFACE. CONCRETE BARRIERS ARE ALLOWED ONLY OUTSIDE OF TRAVEL LANES.
- SIGNAGE INDICATING "STEEL PLATE AHEAD" REQUIRED WHEN STEEL PLATES ARE IN THE TRAVEL LANE.



**2B AT WORK AREA**  
NOT TO SCALE

**2A AT TRANSITION**  
NOT TO SCALE

**2 SECTION**  
NOT TO SCALE



SIGN SPACING	
SPEED (MPH)	A (FT)
25 & BELOW	100
35	350
45	500

TAPER & BUFFER LENGTH		
SPEED (MPH)	TAPER L (FT)	BUFFER B (FT)
25 & BELOW	120	150
35	245	250
45	340	330

**1 TEMPORARY TRAFFIC CONTROL PLAN**  
NOT TO SCALE

**NOTES**

- WORK AREA
- FLAGGER WITH STOP/SLOW PADDLE
- CHANNELIZING DEVICES
- TEMPORARY SIGN
- TRAFFIC FLOW

**DCA**  
DUEÑAS CAMACHO & ASSOCIATES  
ENGINEERING (CIVIL/STRUCTURAL) ■ CONSTRUCTION MANAGEMENT ■ PLANNING ■ ENVIRONMENTAL SERVICES ■ SURVEYING ■ DEVELOPMENT CONSULTATION ■ GEOGRAPHIC INFORMATION SYSTEMS  
P.O. Box 8900 Tamuning, Guam 96931

**public works**  
DIPARTAMENTON CHE'CHE' PUPPLEKO

**GUAM WATERWORKS AUTHORITY**



I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION.  
DATE: 08/29/2023

PROJECT TITLE

**APLACHO DRAINAGE AND ROADWAY IMPROVEMENTS**

SUBMITTAL:  
**PERMIT SET**

Mark	Date	Description
▲	10.19.23	RFI # 5
▲	10.19.23	RFI # 1d

Project No.:	C-7.2.DWG
CAD Dwg File:	C-7.2.DWG
Issue Date:	08-29-2023
Drawn By:	JMC/JVR
Checked By:	JMC/KMR
Supv. By:	KMR

Sheet Title:  
**TEMPORARY TRAFFIC CONTROL PLAN**

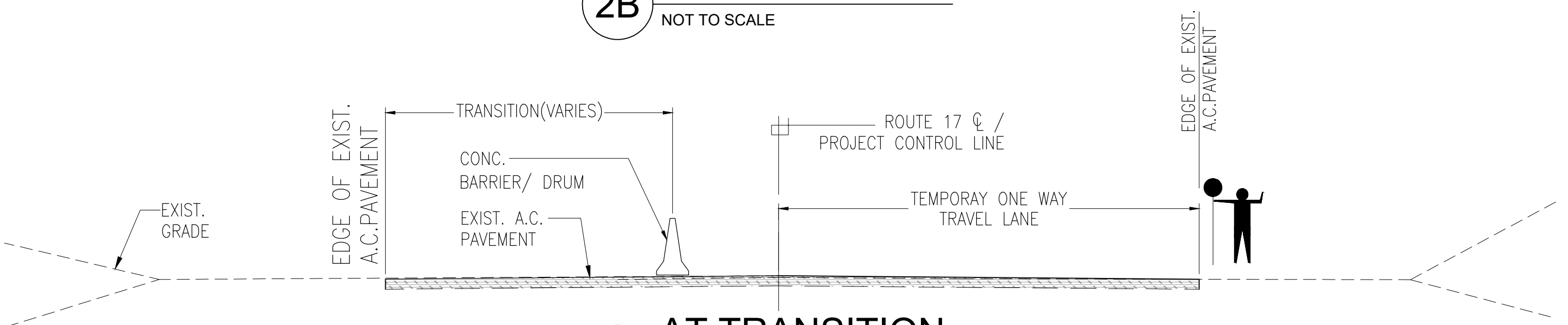
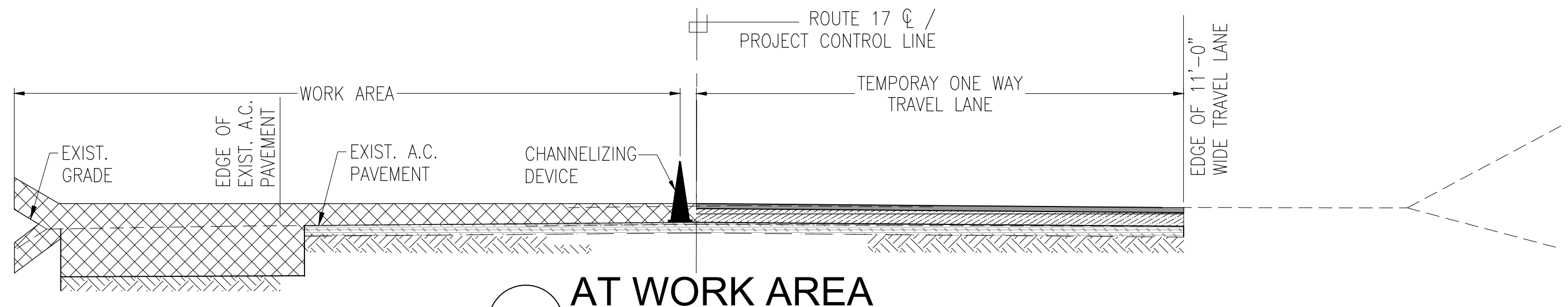
**C-7.2**

IF SHEET IS LESS THAN 22" X 34"  
REDUCED PRINT - USE GRAPHIC SCALES  
IF PRINT IS 11" X 17" PRINT IS HALF SCALE

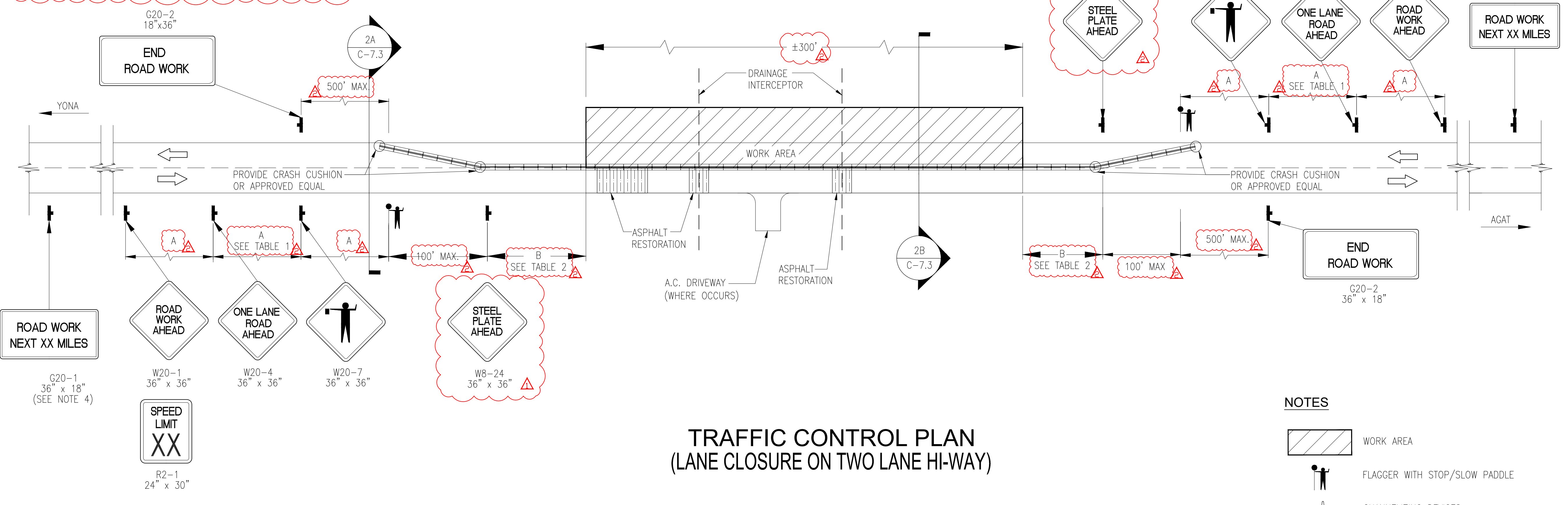
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**NOTES**

- PAVEMENT MARKINGS FOR TEMPORARY TRAFFIC CONTROL, IF REQUIRED, SHALL BE AS DIRECTED BY THE ENGINEER OR SHOWN IN THE CONTRACT PLANS.
- THE SIGN LOCATION SPACING MAY BE VARIED FROM THE DIMENSIONS SHOWN DUE TO FIELD CONDITIONS INCLUDING ROAD ALIGNMENT, SIGHT DISTANCE, INTERSECTIONS, DRIVEWAYS, PERMANENT SIGNS OR OTHER OBSTRUCTIONS.
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**2 SECTION**  
NOT TO SCALE



**TABLE 1**

SIGN SPACING	
SPEED (MPH)	A (FT)
25 & BELOW	100
35	350
45	500

**TABLE 2**

TAPER & BUFFER LENGTH		
SPEED (MPH)	TAPER L (FT)	BUFFER B (FT)
25 & BELOW	120	150
35	245	250
45	340	330

**1 TEMPORARY TRAFFIC CONTROL PLAN**  
NOT TO SCALE

**NOTES**

- WORK AREA
- FLAGGER WITH STOP/SLOW PADDLE
- CHANNELIZING DEVICES
- TEMPORARY SIGN
- TRAFFIC FLOW

**DCA**  
DUEÑAS CAMACHO & ASSOCIATES  
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**public works**  
DIPARTAMENTON CHE'CHE'O PUPPLEKO

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I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION.  
DATE: 08/29/2023

PROJECT TITLE

**APLACHO DRAINAGE AND ROADWAY IMPROVEMENTS**

SUBMITTAL:  
**PERMIT SET**

Mark	Date	Description
▲	10.19.23	RFI # 5
▲	10.19.23	RFI # 1d

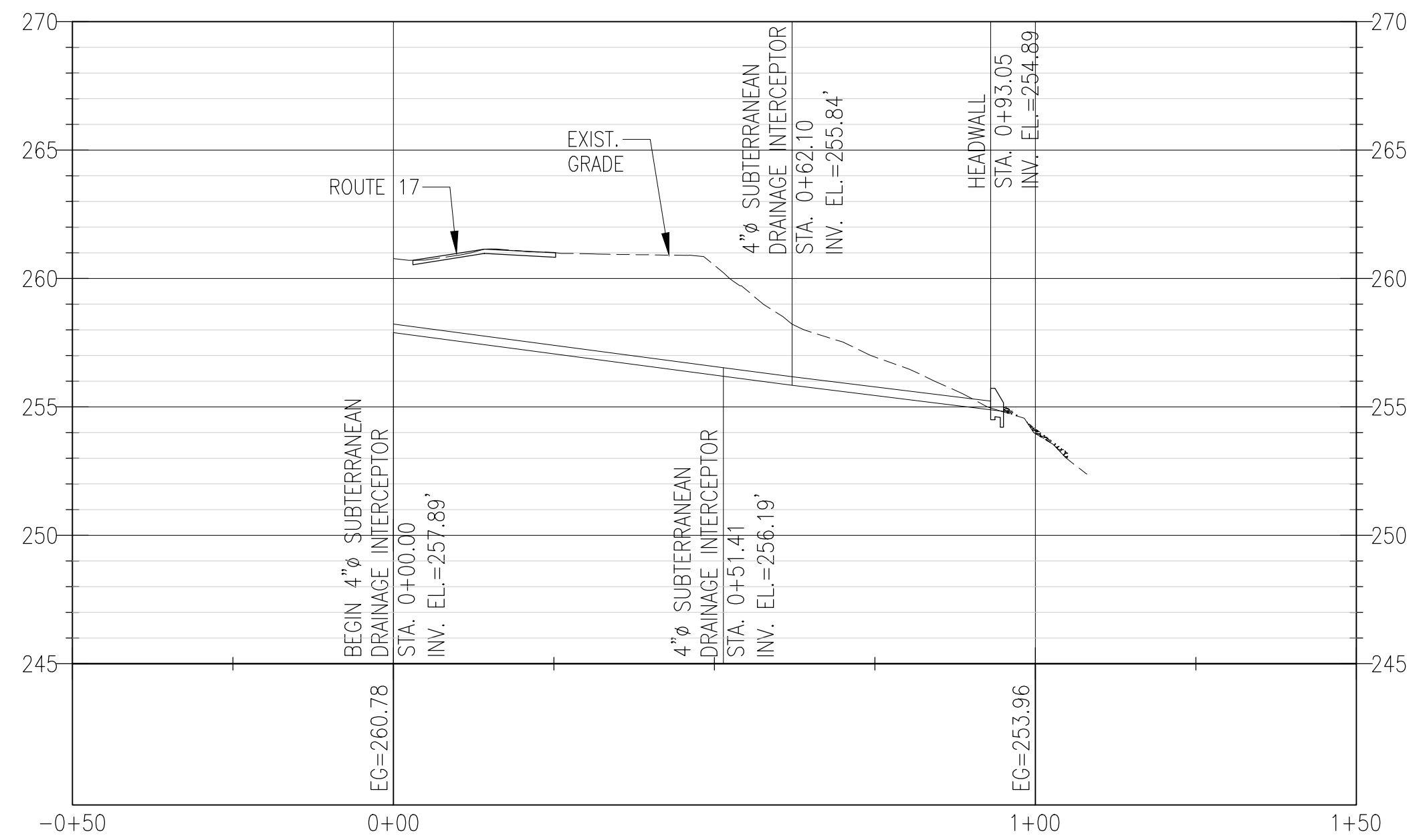
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CAD Dwg File:	C-7.3.DWG
Issue Date:	08-29-2023
Drawn By:	JMC/JVR
Checked By:	JMC/KMR
Supv. By:	KMR

Sheet Title:  
**TEMPORARY TRAFFIC CONTROL PLAN**

**C-7.3**

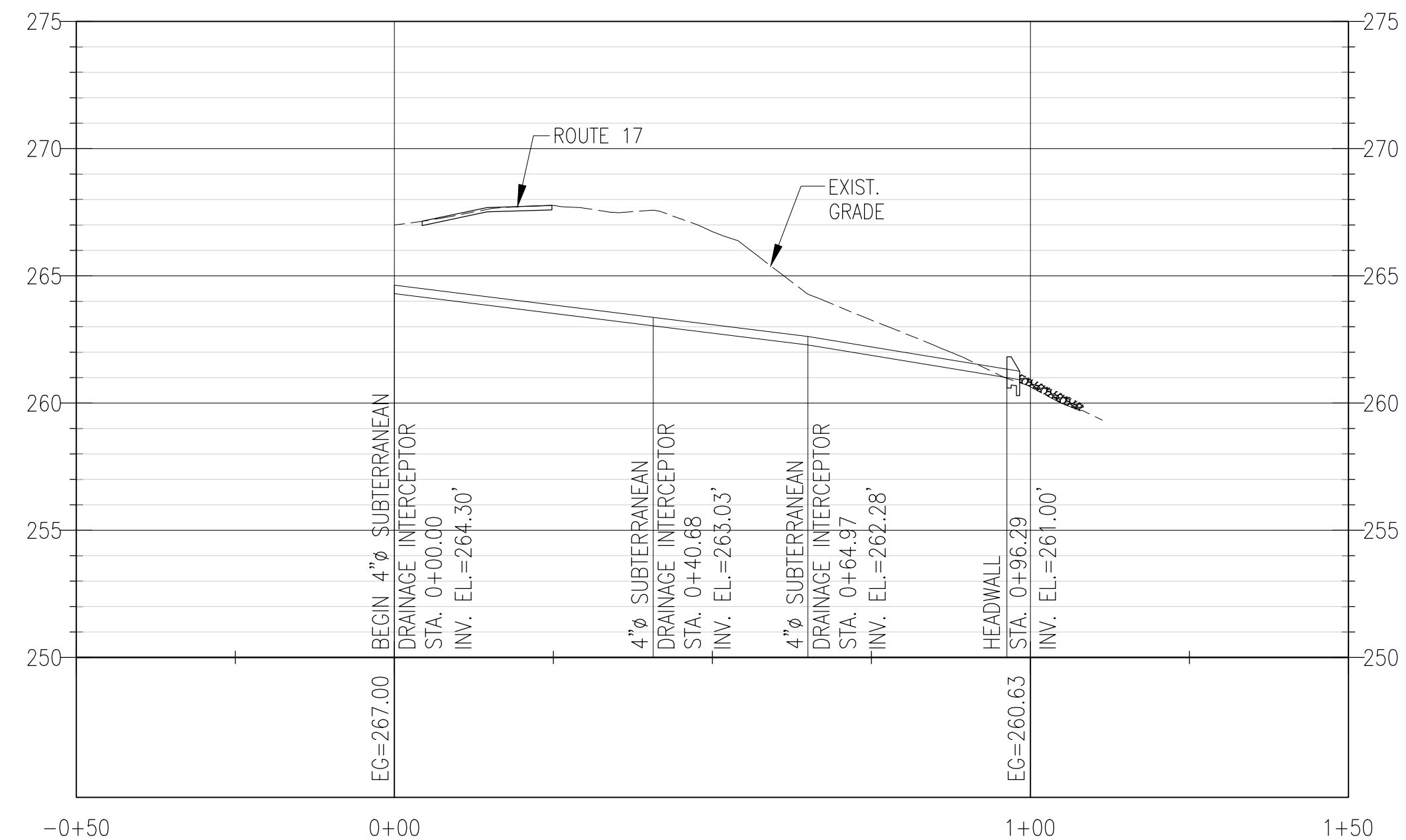
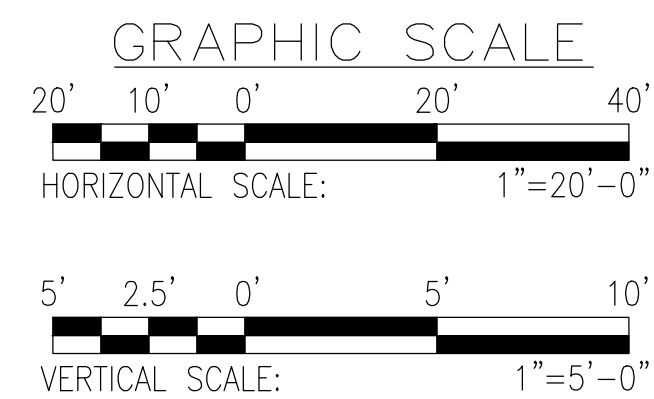
IF SHEET IS LESS THAN 22" X 34"  
REDUCED PRINT - USE GRAPHIC SCALES  
IF PRINT IS 11" X 17" PRINT IS HALF SCALE

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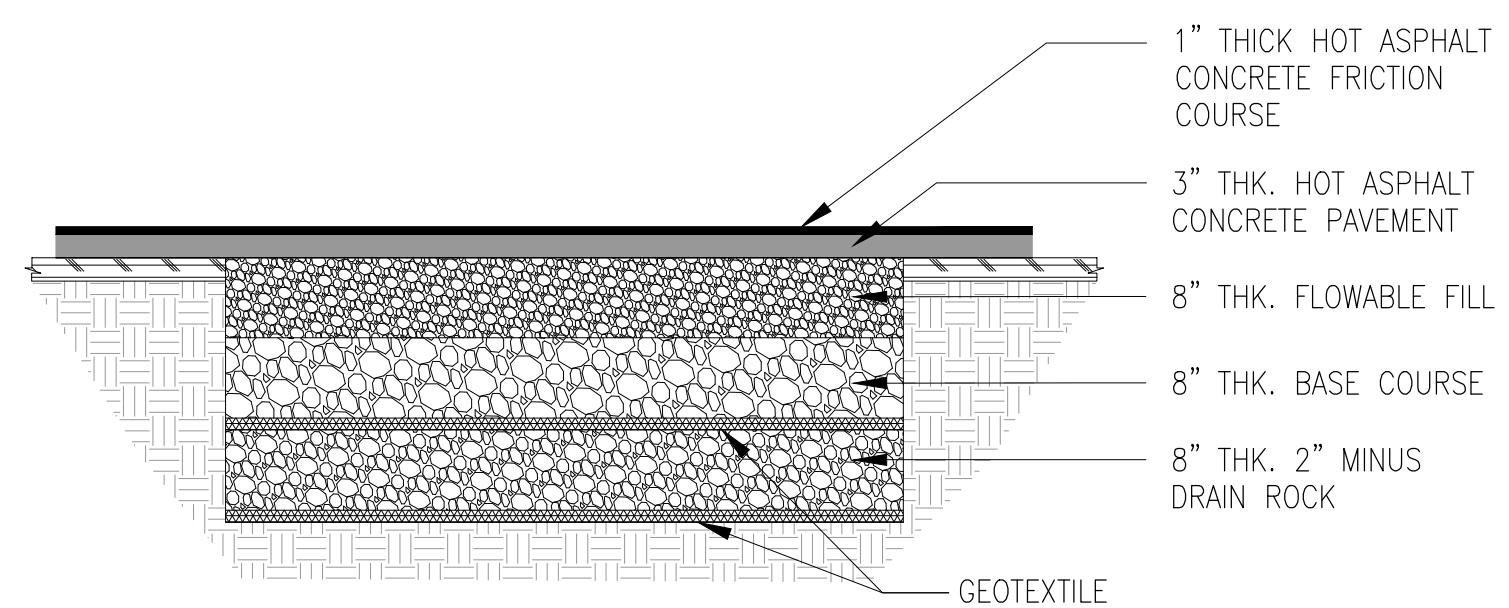
**5 SUBTERRANEAN DRAINAGE INTERCEPTOR 1**

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VERT. SCALE: 1"=5'-0"

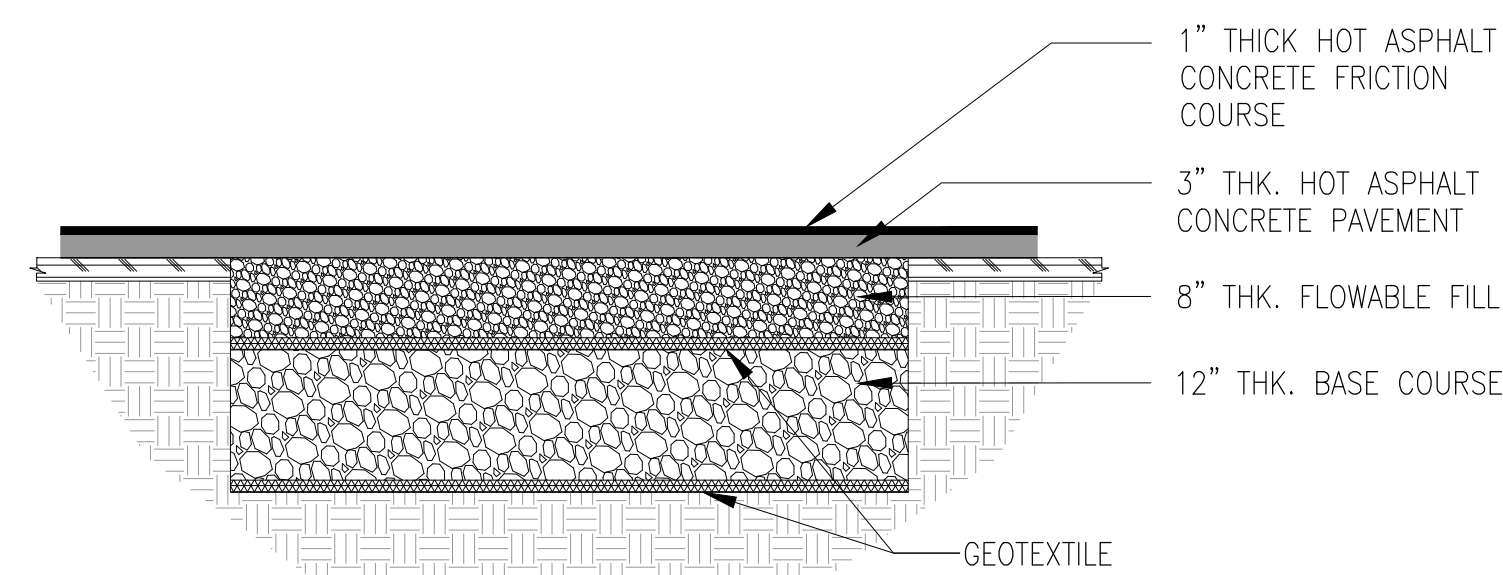


**6 SUBTERRANEAN DRAINAGE INTERCEPTOR 2**

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VERT. SCALE: 1"=5'-0"

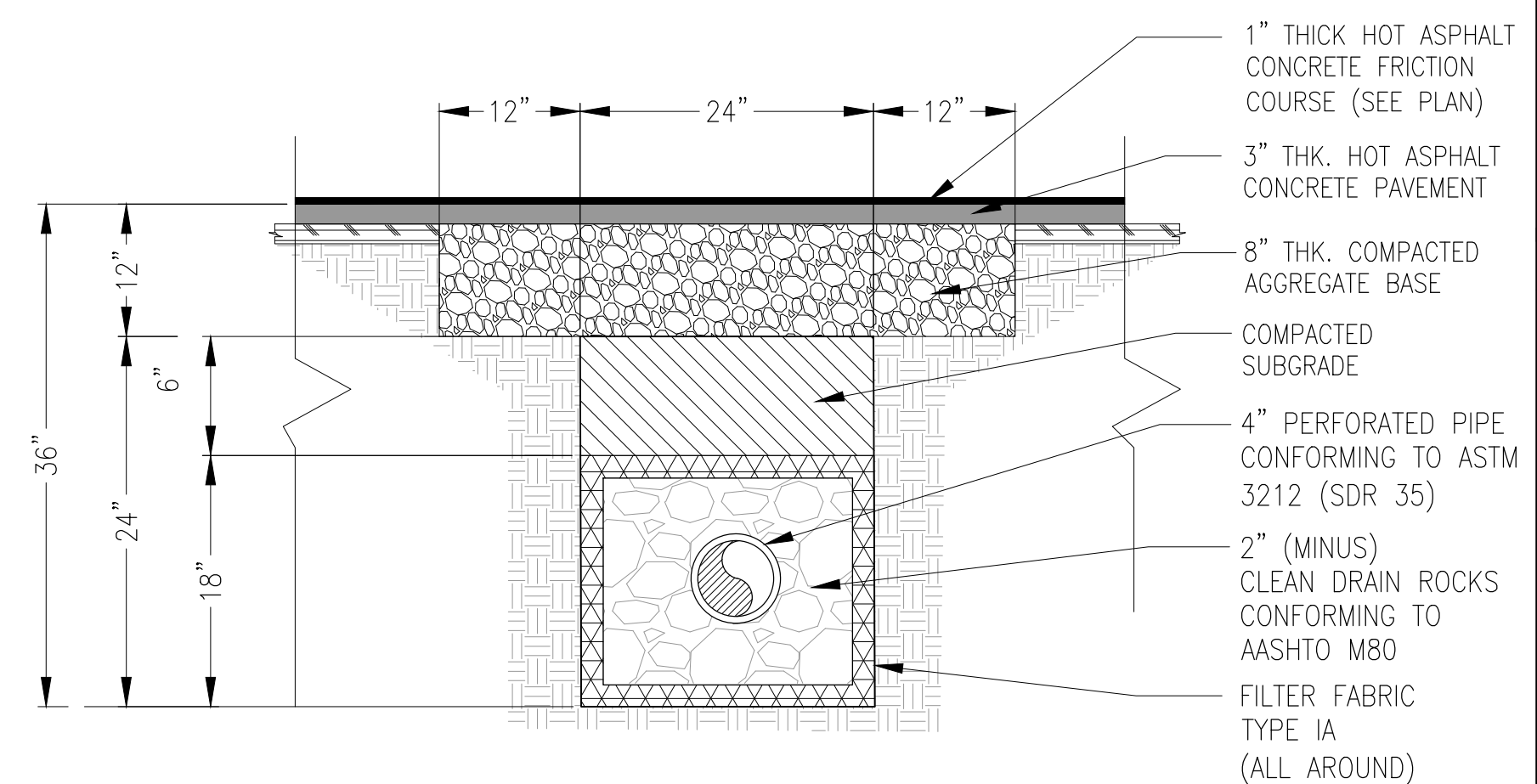


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NOT TO SCALE

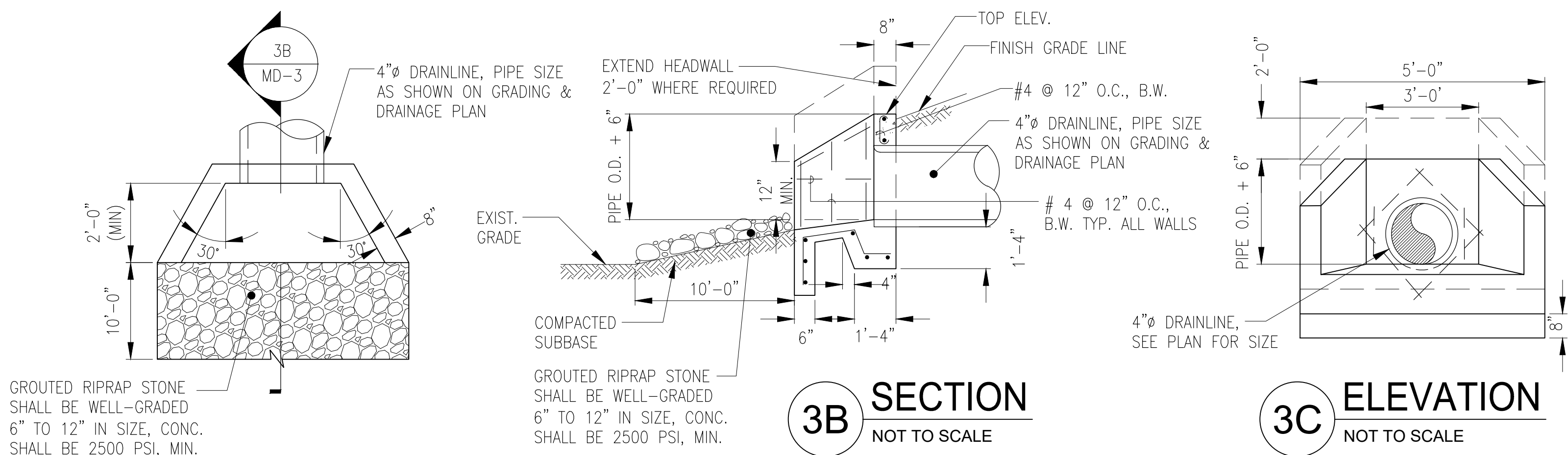


**4B TYPE B (W/OUT SEEPAGE)**  
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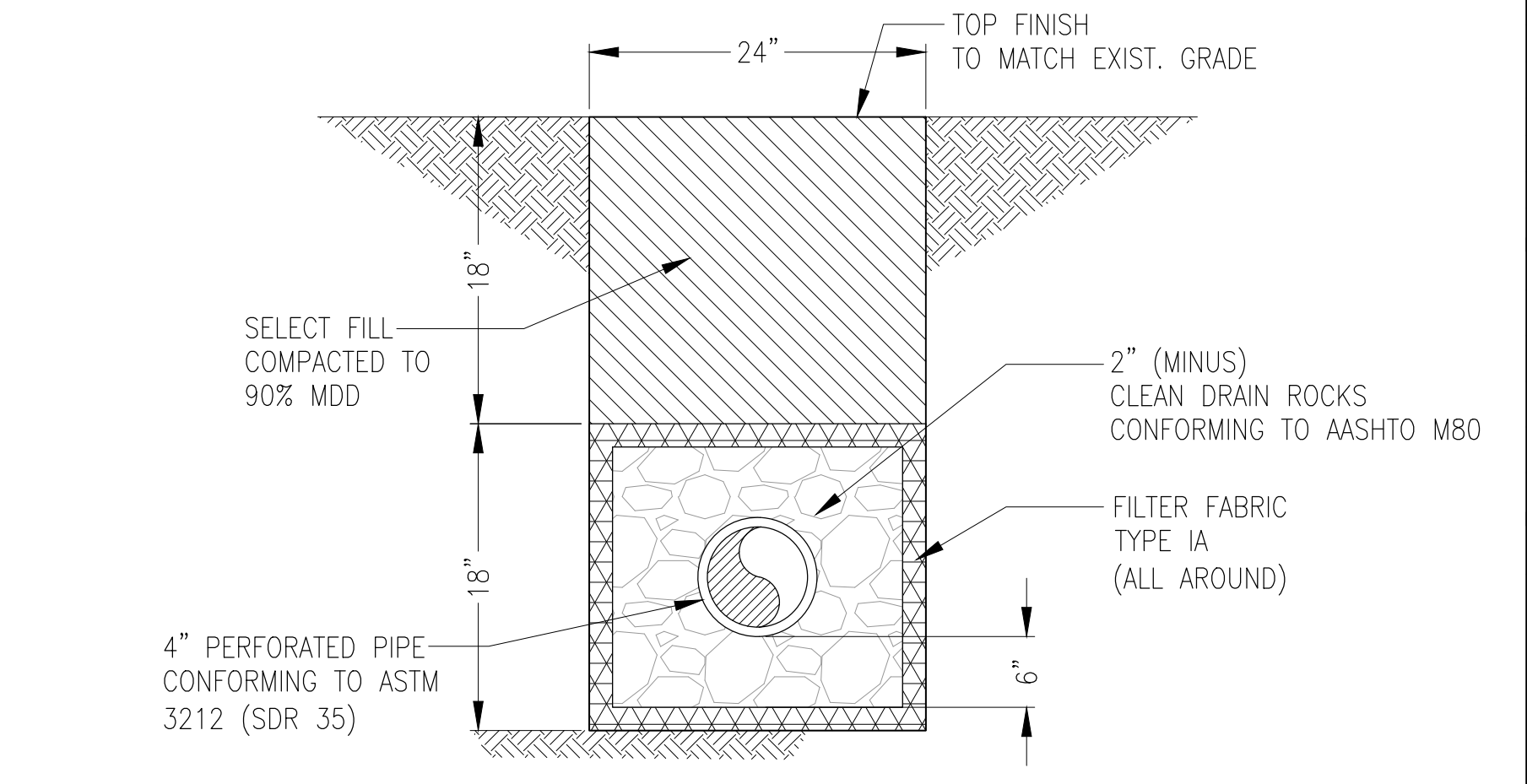
**4 ASPHALT RESTORATION**  
NOT TO SCALE



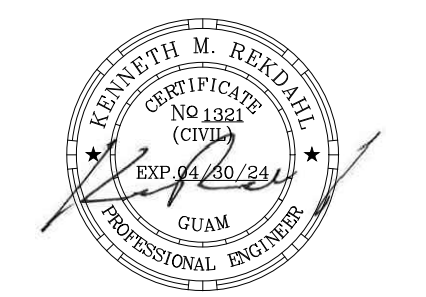
**2 TYPICAL SUBTERRANEAN DRAINAGE INTERCEPTOR TRENCH DETAIL @ ROADWAY**  
NOT TO SCALE



**3 HEADWALL & SPLASH APRON DETAIL**  
NOT TO SCALE



**1 TYPICAL SUBTERRANEAN DRAINAGE INTERCEPTOR TRENCH DETAIL @ LANDSCAPE**  
NOT TO SCALE



I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION.  
DATE: 08/29/2023

PROJECT TITLE

**APLACHO DRAINAGE AND ROADWAY IMPROVEMENTS**

SUBMITTAL:  
**PERMIT SET**

Mark	Date	RFI #	Description
10.19.23		RFI # 9	

Project No.:	MD-3
CAD Dwg File:	MD-3.DWG
Issue Date:	08-29-2023
Drawn By:	JVR
Checked By:	JMC/KMR
Supv. By:	KMR

Sheet Title:

**MISCELLANEOUS DETAILS**

**MD-3**

I:\Users\Public\Documents\Projects\1019\Route 17-25\Subterranean Drainage Interceptors\03.08.23 - BID\RFI # 9 (23.10.17)\MD-3.dwg - Jenessa V. Roman - 10/19/2023 2:16:46 PM

## Section 634. — PERMANENT PAVEMENT MARKINGS

### Description

**634.01** This work consists of applying permanent pavement markings and raised pavement markers on the completed pavement.

Pavement markings are designated as follows:

- Type A — Conventional traffic paint with type 1 glass beads
- Type B — Waterborne traffic paint with type 1 glass beads
- Type C — Waterborne traffic paint with type 3 glass beads
- Type D — Epoxy markings with type 1 glass beads
- Type E — Epoxy markings with type 1 and type 4 glass beads
- Type F — Polyester markings with type 1 glass beads
- Type G — Polyester markings with type 1 and type 4 glass beads
- Type H — Thermoplastic markings with type 1 glass beads
- Type I — Thermoplastic markings with type 1 and type 5 glass beads
- Type J — Preformed plastic markings
- Type K — Nonreflectorized markings

### Material

**634.02** Conform to the MUTCD and the following Subsections:

Conventional traffic paint	718.13
Epoxy markings	718.15
Epoxy resin adhesives	718.23
Glass beads	718.19
Polyester markings	718.16
Preformed plastic markings	718.18
Raised pavement markers	718.20
Thermoplastic markings	718.17
Waterborne traffic paint	718.14

### **Construction Requirements**

**634.03 General.** Where existing and final pavement marking locations are identical, stake the limits of all existing pavement markings (no-passing zones, edge stripes, etc.) before any pavement work. Upon completion of the final surface course, establish line limits for the new pavement for approval before marking. Establish markings according to the MUTCD. In curve widening areas, apply the pavement edge markings at the edge of the traveled way and the centerline markings midway between the pavement lines.

Remove loose particles, dirt, tar, grease, and other deleterious material from the surface to be marked. Where markings are placed on rigid pavement less than 1 year old, clean the pavement of all residue and curing compounds. Remove temporary pavement markings the same day permanent pavement markings are applied. Apply markings to a clean, dry surface according to the MUTCD.

At least 7 days before applying pavement markings, furnish a written copy of the marking manufacturer's recommendations for use. A field demonstration may be required to verify the adequacy of recommendations.

Ship marking material in appropriate containers plainly marked with the following information, as appropriate, for the material being furnished:

- (a) Manufacturer's name and address;
- (b) Name of product;
- (c) Lot/batch numbers;
- (d) Color;
- (e) Net mass and volume of contents;
- (f) Date of manufacture;
- (g) Date of expiration;
- (h) Statement of contents (if mixing of components is required);
- (i) Mixing proportions and instructions; and
- (j) Safety information.

Apply pavement markings in the direction of traffic according to the manufacturer's recommendations. Apply all markings to provide a clean-cut, uniform, and workmanlike appearance by day and night.

Make lines 4 inches wide. Make broken lines 10 feet long with 30-foot gaps. Make dotted lines 2 feet long with 4-foot gaps. Separate double lines with a 4-inch space.

Protect marked areas from traffic until the markings are dried to no-tracking condition. Remove all tracking marks, spilled marking material, markings in unauthorized areas, and defective markings.

Remove all conflicting pavement markings according to Subsection 635.13.

**634.04 Conventional Traffic Paint (Type A).** Apply paint when the pavement and air temperatures are above 40 °F. Spray paint at 15 mil minimum wet film thickness before glass beads or at a rate of 107 square feet per gallon. Immediately apply type 1 glass beads on the paint at a minimum rate of 6 pounds per gallon of paint.

On new asphalt pavements or new asphalt surface treatments, apply two coats. Apply the first coat at 360 square feet per gallon and the second coat at 150 square feet per gallon.

**634.05 Waterborne Traffic Paint (Type B and C).** Apply paint when the pavement and air temperatures are above 50 °F. Spray paint at 15 mil minimum wet film thickness before glass beads or at a rate of 107 square feet per gallon.

(a) **Type B.** Immediately apply type 1 glass beads on the paint at a minimum rate of 6 pounds per gallon of paint.

(b) **Type C.** Immediately apply type 3 glass beads on the paint at a minimum rate of 12 pounds per gallon of paint.

On new asphalt pavements or new asphalt surface treatments, apply two coats. Apply each coat at 210 square feet per gallon.

**634.06 Epoxy Markings (Types D and E).** Heat components A and B separately at 110±30 °F and mix. Discard all material heated over 140 °F. Apply epoxy when the pavement and air temperatures are above 50 °F. Apply as a spray at 110±30 °F (gun tip temperature) at a 15 mil minimum dry film thickness or 107 square feet per gallon.

(a) **Type D.** Immediately apply type 1 glass beads on the epoxy at a minimum rate of 15 pounds per gallon of epoxy.

(b) **Type E.** Use two bead dispensers. Immediately apply type 4 glass beads on the epoxy at a minimum rate of 12 pounds per gallon of epoxy immediately followed by an application of type 1 glass beads at a minimum rate of 12 pounds per gallon.



**634.07 Polyester Markings (Types F and G).** Apply polyester when the pavement and air temperatures are above 50 °F. Spray at 128±7 °F (gun tip temperature) at a 15 mil minimum dry film thickness or 107 square feet per gallon. Discard all material heated over 150 °F. Do not use fast dry polyester markings on asphalt pavements less than 1 year old.

(a) **Type F.** Immediately apply type 1 glass beads on the polyester at a minimum rate of 15 pounds per gallon of polyester.

(b) **Type G.** Use two bead dispensers. Immediately apply type 4 glass beads on the polyester at a minimum rate of 12 pounds per gallon of polyester immediately followed by an application of type 1 glass beads at a minimum rate of 12 pounds per gallon.

**634.08 Thermoplastic Markings (Type H and I).** On areas to be marked on rigid pavements and old asphalt pavements, apply an epoxy resin primer/sealer according to the thermoplastic manufacturer's recommendations. Allow the primer/sealer to dry.

Apply thermoplastic when the pavement and air temperatures are above 50 °F. Spray or extrude the thermoplastic at 430±5 °F. For centerlines and lane lines, spray or extrude 90 mil minimum dry film thickness or at a rate of 17.8 square feet per gallon. For edge lines, spray or extrude 60 mil minimum dry film thickness or at a rate of 26.7 square feet per gallon.

(a) **Type H.** Immediately apply type 1 glass beads on the thermoplastic at a minimum rate of 12 pound per 100 square feet.

(b) **Type I.** Use two bead dispensers. Immediately apply type 5 glass beads on the thermoplastic at a minimum rate of 12 pounds per 100 square feet immediately followed by an application of type 1 glass beads at a minimum rate of 12 pounds per 100 square feet.

The minimum bond strength of the thermoplastic shall be 175 pounds per square inch on rigid pavements.

**634.09 Preformed Plastic Markings (Type J).** Install to form a durable, weather resistant bond to the pavement. Apply preformed plastic markings according to the manufacturer's recommendation.

Where applied during final compaction of asphalt pavement, apply preformed plastic when the pavement temperature is about 140 °F. Roll the marking into the surface with a steel wheel roller. The finished pavement marking may extend approximately 10 mil above the final surface.

**634.10 Nonreflectorized Markings (Type K).** Apply conventional traffic paint, waterborne traffic paint, epoxy markings, polyester markings, or thermoplastic markings as described above, but with no glass beads added.

**634.11 Raised Pavement Markers.** Install raised pavement markers when the pavement and air temperatures are above 50 °F. Apply raised pavement markers with epoxy resin or asphalt adhesive.

Heat epoxy components A and B separately with indirect heat, mix, and apply at 70±10 °F. Discard all material heated over 120 °F or stiffened by polymerization.

Heat and apply asphalt adhesives at 412±12 °F. Discard all material heated over 450 °F.

Space and align the markers to within 1/2 inch of the required location. Do not place raised pavement markers over pavement joints.

The minimum bond strength will be 1.75 pounds per square inch or a total tensile strength of 25 pounds.

**634.12 Acceptance.** Material for permanent pavement markings will be evaluated under Subsections 106.02 and 106.03.

Placement of permanent pavement marking will be evaluated under Subsections 106.02 and 106.04.

### Measurement

**634.13** Measure the Section 634 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

When two coats of paint are required, measure each coat.

When pavement markings are measured by the linear foot or station, measure the length of line applied along the centerline of each 4-inch-wide line applied regardless of color. Measure broken or dotted pavement lines from end to end of the line including gaps. Measure solid pavement lines from end to end of each continuous line. For line widths other than 4 inches, the measured length of line is adjusted in the ratio of the required width to 4 inches.

When pavement markings are measured by the square foot, measure the number of square feet of symbol or letter marking based on the marking area shown in the contract or, if not shown, the area of each marking measured in place to the nearest square foot.

**Payment**

**634.14** The accepted quantities will be paid at the contract price per unit of measurement for the Section 634 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

## Section 635. — TEMPORARY TRAFFIC CONTROL

### Description

**635.01** This work consists of furnishing, maintaining, relocating, and removing temporary traffic control devices and services as ordered for the control and protection of public traffic through the project.

Advance warning arrow panel, barricade, and warning light types are designated as shown in the MUTCD.

### Material

**635.02** Conform to the MUTCD and the following Sections and Subsections:

Construction sign panels	633
Retroreflective sheeting	718.01
Temporary concrete barrier	618
Temporary plastic fence	710.11
Temporary guardrail	617
Temporary pavement markings	718.21
Temporary traffic control devices	718.22
Traffic markings	634

### Construction Requirements

**635.03 General.** Install and maintain temporary traffic control devices adjacent to and within the project as required by the traffic control plan, Section 156, and the MUTCD. Install and maintain traffic control devices as follows:

- (a) Furnish and install traffic control devices before the start of construction operations.
- (b) Install only those traffic control devices needed for each stage or phase.
- (c) Relocate temporary traffic control devices as necessary.
- (d) Remove devices that no longer apply to the existing conditions.
- (e) Immediately replace any device that is lost, stolen, destroyed, or inoperative.
- (f) Keep temporary traffic control devices clean.

(g) Furnish and maintain traffic control devices that meet the "acceptable" standard described in *Quality Standards for Work Zone Traffic Control Devices* published by ATSSA. Amend the ATSSA standards as follows:

(1) Repair or remove and replace "marginal" devices within 48 hours; and

(2) Repair or remove and replace "unacceptable" devices immediately.

(h) Remove all temporary traffic control devices upon contract completion or when approved.

(i) Furnish temporary traffic control devices that meet the NCHRP Report 350, *Recommended Procedures for the Safety Performance Evaluation of Highway Features*, for crashworthiness standards as applicable.

**635.04 Advance Warning Arrow Panels.** Perform the work described under MUTCD Part 6.

**635.05 Barricades.** Perform the work described under MUTCD Part 6. Use type III, VII, VIII, or IX retroreflective sheeting.

**635.06 Cones and Tubular Markers.** Perform the work described under MUTCD Part 6. Use 28-inch cones or tubular markers. Use type III, or VI retroreflective sheeting.

**635.07 Construction Signs.** Use type III, VII, VIII, or IX retroreflective sheeting. For roll-up signs, use type VI retroreflective sheeting. Remove or completely cover all unnecessary signs with metal, plywood, or other acceptable material.

Use crashworthy posts within the traversable area adjacent to traffic. Install posts according to Section 633.

**635.08 Drums.** Perform work described in MUTCD Part 6. Use plastic drums that are approximately 36 inches high and a minimum of 18 inches in diameter. Use type III or VI retroreflective sheeting.

**635.09 Flaggers.** Use flaggers certified by the American Traffic Safety Services Association, the National Safety Council, the International Municipal Signal Association, a state agency, or other acceptable organization. Perform the work described under MUTCD Part 6. Use type III, VII, VIII, or IX retroreflective sheeting on flagger paddles. Do not use flags.

**635.10 Pilot Cars.** Perform the work described under MUTCD Part 6. Use pilot car operators meeting the minimum qualifications of a flagger according to Subsection 635.09. Mount a rotating amber beacon on the roof of each pilot car. Do not use strobe light beacons.

**635.11 Temporary Barriers.** Perform the work described under MUTCD Part 6. Use temporary barriers that meet NCHRP Report 350 and are new or used provided they are not badly damaged. Lifting holes no larger than 4 inches or lifting loops are permitted. Individual sections may vary in length.

Mount 3-inch minimum dimension white or yellow retroreflectors, as applicable, to the top or side of the barrier on 25-foot centers. Mount the retroreflectors at a uniform height at least 2 feet above the pavement surface.

**635.12 Temporary Guardrail.** Construct temporary guardrail according to Section 617.

Mount 3-inch minimum dimension white or yellow retroreflectors, as applicable, to the top or side of the guardrail on 25-foot centers. Mount the retroreflectors at a uniform height at least 2 feet above the pavement surface.

**635.13 Temporary Pavement Markings and Delineation.** Before opening a pavement surface to traffic, remove all conflicting pavement markings by sandblasting or other methods that do not damage the surface or texture of the pavement. Make the removal pattern uneven so it does not perpetuate the outline of the removed pavement markings. Lightly coat sandblasted or removal areas on asphalt surfaces with emulsified asphalt.

Place and maintain temporary pavement markings that are neat, crack free, true, straight, and unbroken. For temporary pavement markings, use preformed retroreflective tape, traffic paint, or temporary raised pavement markers as follows:

(a) **Preformed retroreflective tape.** Apply according to the manufacturer's instructions. Remove all loose temporary preformed retroreflective tape before placing additional pavement layers.

(b) **Traffic paint.** Do not apply temporary traffic paint to the final surface. Apply traffic paint as the temporary pavement marking if no work will be performed on the project for at least 30 consecutive days. Apply temporary traffic paint at a 15 mil minimum wet film thickness (0.9 gallons per 100 square feet). Immediately apply type 1 glass beads on the paint at a minimum rate of 6 pounds per gallon of paint.

(c) **Raised pavement markers.** Do not use raised pavement markers during seasonal suspensions. When chip seals, slurry seals, or tack coats are used after marker placement, protect the markers with an approved protective cover, which is removed after the asphalt material is sprayed. Temporary raised pavement markers may be used as temporary pavement markings as follows:

(1) **10-foot broken line.** Four pavement markers spaced 3.33 feet apart followed by a 30-foot gap.

**(2) 2-foot broken line.** Two pavement markers spaced 2 feet apart followed by an 18-foot gap.

**(3) Solid line.** Pavement markers on 5-foot centers.

Remove all temporary raised pavement markers before placing additional pavement layers.

Remove all temporary pavement markings from the surface course before placing permanent pavement markings.

**635.14 Vertical Panels.** Perform the work described under MUTCD Part 6. Use type III, VII, VIII, or IX retroreflective sheeting.

**635.15 Warning Lights.** Perform the work described under MUTCD Part 6. When type C, steady-burn, warning lights are installed on barricades or drums and used in a series for delineation, use type A, flashing, warning lights on the first 2 barricades or drums in the series. Mount batteries for type B warning lights a maximum of 12 inches from ground or roadway surface as measured to top of the battery casing.

**635.16 Shadow Vehicle.** Use a shadow vehicle (15,000 pound gross vehicle mass minimum) equipped with a truck-mounted attenuator (crash cushion) attached to the rear of the vehicle, exterior flashing yellow dome light, and an advance warning arrow panel. Use advance warning arrow panel according to Subsection 635.04.

Use the shadow vehicle to provide physical protection to workers from traffic approaching from the rear during moving operations (i.e., pavement markings, traffic control set up and removal, etc.). Use the following procedures to close a lane of traffic. Alternate procedures may be used if approved by the CO.

**(a)** Move the shadow vehicle to a point approximately 200 feet from the first advance warning sign for the lane closure and stop on the shoulder.

**(b)** Activate the flashing lights and flashing arrow panel. Begin the arrow panel in the caution mode and after approximately 2 minutes display the correct flashing pass arrow.

**(c)** Move the shadow vehicle (now acting as a protection vehicle) along the shoulder to the first sign location, stopping approximately 100 feet before the sign location in a blocking position.

**(d)** Place the first sign then proceed to the next advance sign location. Repeat step (c) for the second sign and install that sign. Repeat this procedure until all advance warning signs are installed.

(e) After installing all of the advanced warning signs for the lane closure, move the shadow vehicle into the lane that is to be closed to a position 100 feet in advance of the closing taper location. Install the channelizing devices for the taper in the shielded lane.

(f) Move the shadow vehicle off the roadway and past the taper on the shoulder and remain in position until the flashing arrow panel for the closure (if one is to be provided) is placed and operating. Move the shadow vehicle with the workers as they proceed to set up the remaining devices as additional protection.

**635.17 Pavement Patch.** Use an asphalt mix according to Section 404 or 417 to repair potholes and rough spots in the traveled way before reopening travel lanes to traffic.

**635.18 Portable Changeable Message Sign.** Conform to the MUTCD Part 6.

**635.19 Temporary Crash Cushions.** Install an FHWA-approved temporary crash cushion conforming to the appropriate level of crashworthiness per NCHRP Report 350. FHWA-approved crash cushions are available on the FHWA Safety website. Install according to manufacturer's recommendations.

**635.20 Temporary Signal System.** Use a temporary signal system according to Section 636 and MUTCD Parts 4 and 6.

Use signal heads with three lenses, minimum 8 inches diameter, indicating red, yellow, and green phases. Use a signal controller capable of operating in either the solid red, solid green, or a red/yellow/green mode for each signal.

**635.21 Temporary Fence.** Use temporary fence according to Section 619.

**635.22 Portable Rumble Strip.** Use a strip 10 feet long, 18 inches wide, and 1¼ inches high to alert drivers of an approaching flagger station or work area.

**635.23 Opposing Traffic Lane Divider.** Use type III, VII, VIII, or IX retroreflective sheeting.

**635.24 Steel Plates.** Use 1-inch or thicker steel plates capable of safely carrying traffic. Secure the plates to the pavement to prevent any movement.

**635.25 Acceptance.** Material (including signs, drums, barricades, cones, tubular markers, crash cushions, concrete barriers, dividers, fence, guardrail, pavement markings, rumble strips, traffic signals, lights, and vertical panels) for temporary traffic control devices will be evaluated under Subsections 106.02 and 106.03. Vehicles for pilot cars and shadow vehicles will be evaluated under Subsection 106.02.

Placement of temporary traffic control devices will be evaluated under Subsections 106.02 and 106.04.



Temporary traffic control services will be evaluated under Subsection 106.02.

### **Measurement**

**635.26** Measure the Section 635 items listed in the bid schedule according to Subsection 109.02 and the following as applicable when ordered by the CO and installed.

Measure temporary traffic control items only one time even if relocated or replaced, except for items paid by the hour.

Measure advance warning arrow panels by the hour or by the each. When measurement is by the hour, round portions of an hour up to the half hour.

Measure barricades by the linear foot of width.

Measure construction signs by the square foot of front face sign panel. Do not measure posts and temporary supports.

Measure flaggers, for each hour a person is actually performing the work. Round portions of an hour up to the half hour. Measure time in excess of 40 hours per week at the same rate as the first 40 hours.

Measure pilot cars (including operators) for each hour the car is actually performing the work. Round portions of an hour up to the half hour. Measure time measured in excess of 40 hours per week at the same rate as the first 40 hours.

When there is a pay item for moving temporary barriers, do not measure movement of temporary barriers for work access or the convenience of the Contractor.

Measure temporary guardrail from center-to-center of end posts.

Measure temporary pavement markings for only one application of pavement markings per lift. When temporary pavement markings are measured by the linear foot or mile, measure the number of linear feet or miles of lines applied along the centerline of each 4-inch wide line applied regardless of color. Measure solid lines from end to end of each continuous line. Measure broken lines from end to end including gaps. For line widths greater than 4 inches, adjust the measured length of line in the ratio of the required width to 4 inches. When temporary pavement markings are measured by the square foot, measure the number of square feet of symbols or letter markings based on the marking area shown in the contract or, if not shown, the area of each marking measured in place to the nearest square foot.

Measure temporary raised pavement markers one time for each lift of pavement even if replaced. Measure temporary raised pavement markers used at the option of the Contractor in lieu of temporary pavement markings as equivalent temporary pavement markings and not as temporary raised pavement markers.

Measure pavement marking removal of actual line removed. Do not measure gaps.

Measure temporary crash cushions for each entire crash configuration.

When there is a pay item for moving temporary crash cushion, do not measure movement of temporary crash cushion for work access or the convenience of the Contractor.

Measure replacement barrels or cartridges for crash cushions for the barrels or cartridges damaged by public traffic.

### **Payment**

**635.27** The accepted quantities will be paid at the contract price per unit of measurement for the Section 635 pay items in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

Progress payments for temporary traffic control devices will be made as follows:

- (a) 50 percent of the unit bid price will be paid upon installation.
- (b) An additional 25 percent of the unit bid price will be paid following completion of 50 percent of the contract amount.
- (c) Payment of the remaining portion of the unit bid price will be paid when the temporary traffic control devices are removed from the project.

Progress payments for items paid for by the hour will be paid at 100 percent of the unit bid price when ordered by the CO and furnished.

# **STANDARD SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS**

**FP-03  
U.S. Customary Units**



**U.S. Department  
of Transportation  
Federal Highway  
Administration**



**Federal  
Lands Highway**