

MODEL: Sheet PAPER SIZE: 17x11 (in.) DATE: 12/21/2021 TIME: 8:19:06 AM USER: jalbrig1
www.ohioodot-pw.bentley.com/ohioodot-pw-02/Document/01 Active Projects/District 12/Cuyahoga/955377400-Engineering/Roadway/Sheets/95537 GT001.dgn



DESIGN DESIGNATION	SLM	SLM	SLM
	13.74-13.78	13.78-16.33	16.33-17.94
CURRENT ADT (2022)	13,500	59,000	41,500
DESIGN YEAR ADT (2042)	13,500	60,000	47,000
DESIGN HOURLY VOLUME (2022)	1,200	5,400	4,700
DIRECTIONAL DISTRIBUTION	1.0	0.53	0.50
TRUCKS (24 HOUR B&C)	0.20	0.30	0.30
DESIGN SPEED	65	65	65
LEGAL SPEED	60	60	60
DESIGN FUNCTIONAL CLASSIFICATION:			
Principal Arterial - Other Freeways			
NHS PROJECT	YES		

None

UNDERGROUND UTILITIES
Contact Two Working Days Before You Dig
 OHIO811.org Before You Dig
OHIO811, 8-1-1, or 1-800-362-2764 (Non members must be called directly)

PLAN PREPARED BY:
 ODOT - District 12
 Planning and Engineering
 5500 Transportation Blvd.
 Garfield Heights, OH 44125

STATE OF OHIO
ERIKA JOY
KENZIG
E-78379
REGISTERED
PROFESSIONAL ENGINEER

SIGNED: EJK
DATE: 12/21/21

[illegible]

THE STANDARD SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING SUPPLEMENTAL SPECIFICATIONS LISTED IN THE PLANS AND CHANGES LISTED IN THE PROPOSAL SHALL GOVERN THIS IMPROVEMENT.

Title Sheet

CONFORMED SET

APPROVED _____
DATE 12/17/21 DISTRICT DEPUTY DIRECTOR

APPROVED Jack Marchbanks/96
DATE 3-9-22 DIRECTOR, DEPARTMENT OF
TRANSPORTATION

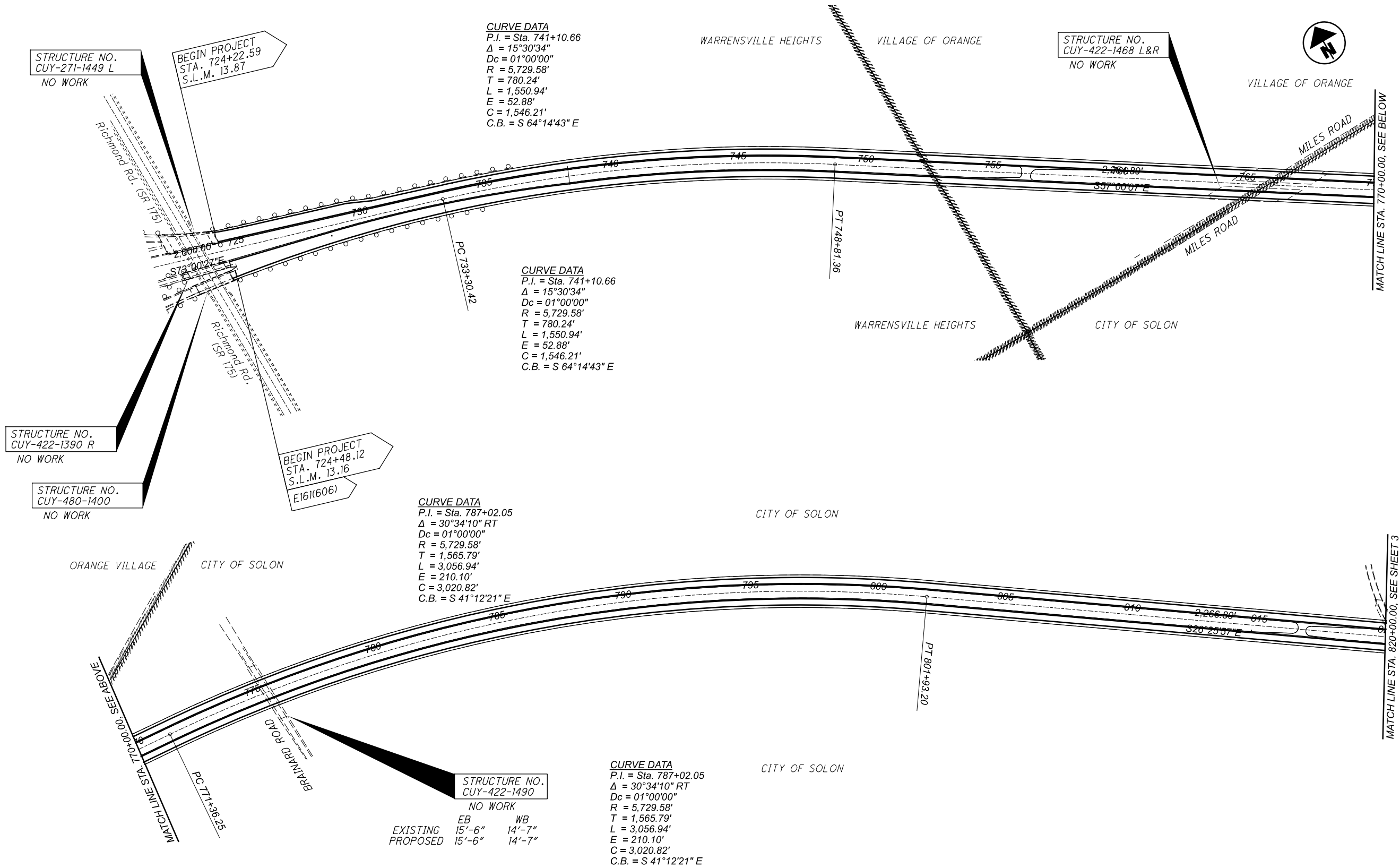
DESIGN AGENCY

DESIGNER
JDA

REVIEWER	
EJK 08/27/21	

PROJECT ID	99537
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SHEET	TOTAL
1	31



Schematic Plan
Begin Project to Sta. 820+00.00

DESIGN AGENCY



DESIGNER

JDA

REVIEWER

EJK 08/27/21

PROJECT ID

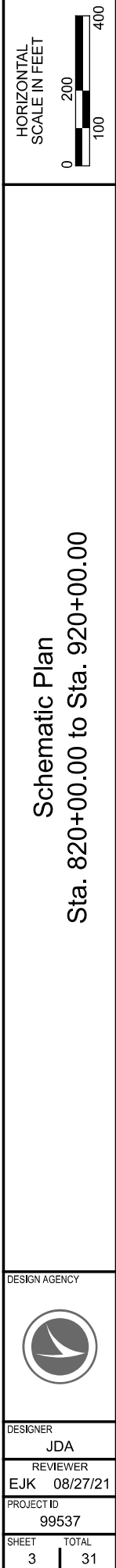
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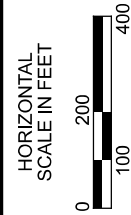
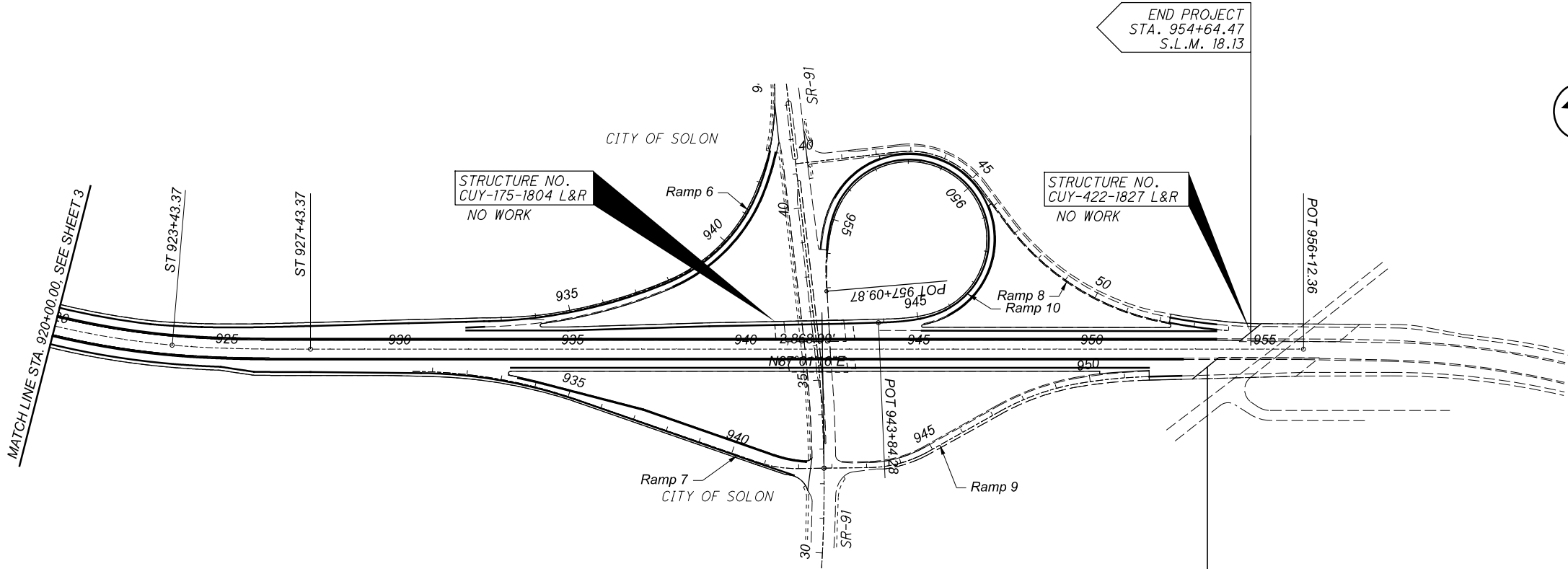
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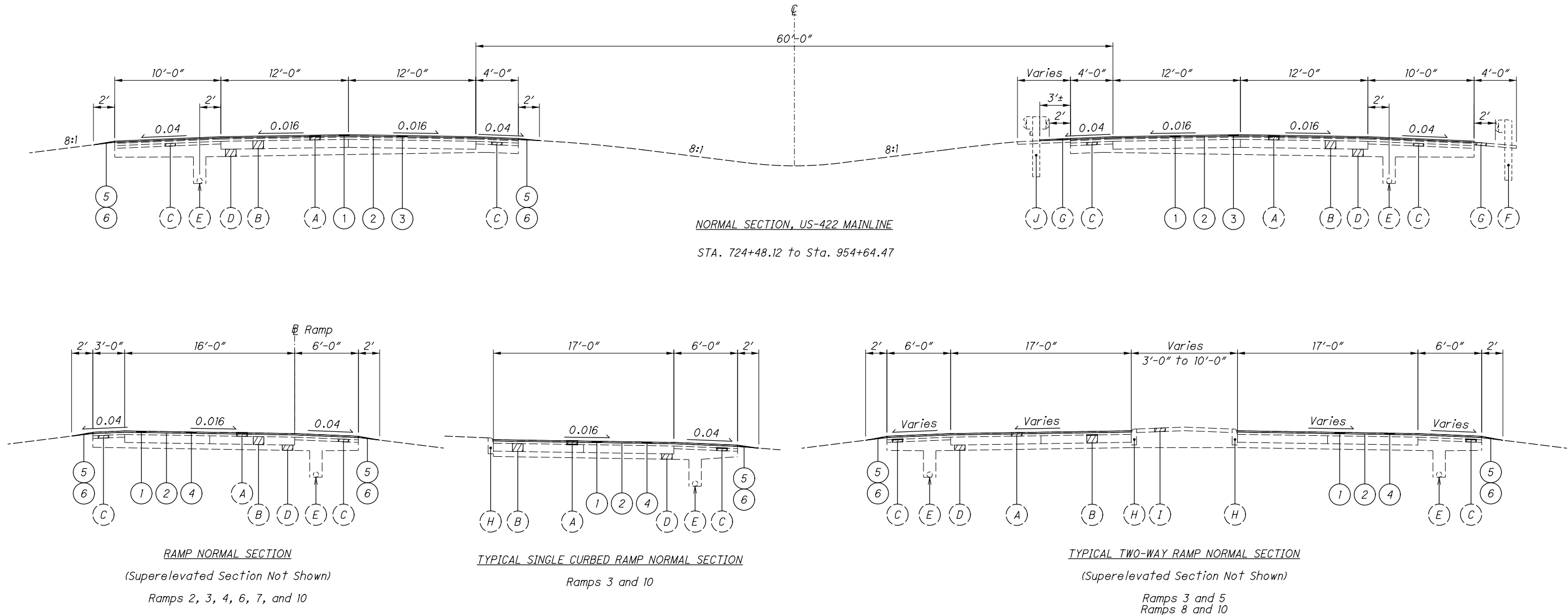
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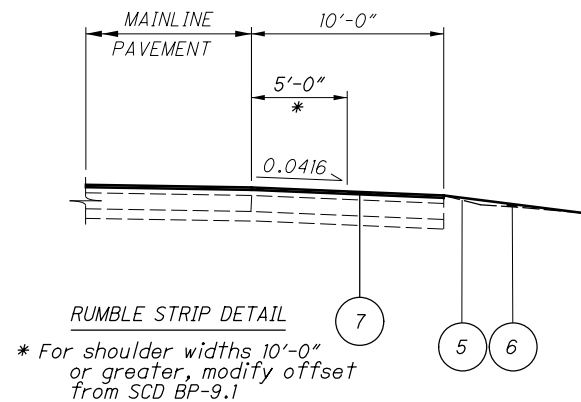
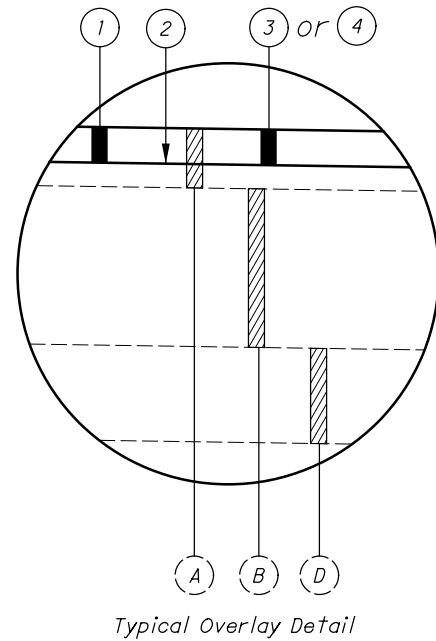


Schematic Plan
Sta. 920+00.00 to End Project

DESIGN AGENCY	
DESIGNER	JDA
REVIEWER	EJK
PROJECT ID	08/27/21
SHEET	99537
4	TOTAL 31



- | Existing Legend | Proposed Legend |
|----------------------------------|---|
| (A) ±4" Asphalt Concrete Overlay | (1) Item 254 - Pavement Planing, Asphalt Concrete, As Per Plan, 1.5" |
| (B) 9" Reinforced Concrete Base | (2) Item 407 - Non-Tracking Tack Coat |
| (C) Bituminous Aggregate Base | (3) Item 442 - Asphalt Concrete Surface Course, 12.5MM, Type A (446), As Per Plan, PG76-22M, 1.5" |
| (D) Aggregate Base or Subbase | (4) Item 442 - Asphalt Concrete Surface Course, 12.5MM, Type A (447), As Per Plan, PG76-22M, 1.5" |
| (E) Underdrain | (5) Item 209 - Linear Grading, As Per Plan |
| (F) Guardrail, Type 5 | (6) Item 617 - Compacted Aggregate, As Per Plan |
| (G) Asphalt Under Guardrail | (7) Item 618 - Rumble Strips, Shoulder (Asphalt Concrete), As Per Plan |
| (H) Curb | |
| (I) Concrete Median | |
| (J) Guardrail | |



General

Project Description

This project consists of the Preventive Maintenance Resurfacing in Cuyahoga County of U.S.422 from I.R. 271 (SLM 13.87) to Solon Rd. (SLM 18.27) in the City of Solon, the City of Warrensville Heights, and the Village of orange in Cuyahoga County.

Existing Typical Sections

Existing typical sections have been taken from the records and are believed to represent the existing pavement, but the State of Ohio does not guarantee the accuracy of the same.

For further information in regard to the existing typical sections and drainage details, the Contractor shall refer to the previous construction plans.

These plans may be reviewed at the following location:

Ohio Department of Transportation
District 12 Office
5500 Transportation Boulevard
Garfield Heights, Ohio 44125

Plan Sheet Stationing

The roadway was not surveyed prior to the preparation of these resurfacing plans. Record drawings were used to prepare plan sheets and calculate estimated pavement area quantities and pavement marking quantities.

Right of Way

All work shall be performed within the existing right of way or easements.

Work Limits

The work limits shown on these plans are for physical construction only. Provide the installation and operation of all work zone traffic control and work zone traffic control devices required by these plans whether inside or outside these work limits.

Contingency Quantities

The Contractor shall not order materials or perform work for items designated by plan note to be used "As Directed By The Engineer" unless authorized by the Engineer. The actual work locations and quantities used for such items shall be incorporated into the final change order governing completion of this project.

Equipment and Material Storage

In order to provide for the safety of the traveling public the Contractor's attention is directed to 614.03. In addition the following provisions shall apply:

- 1. Any removed items shall not be stored on the right of way for more than thirty (30) days.
- 2. The storage of equipment, materials, and vehicles within the highway right of way will be permitted. The number of areas and exact locations shall be approved by the Engineer.
- 3. All disturbed areas shall be returned to their original condition at no expense to the state.

Cooperation Between Contractors

The Contractor shall cooperate and coordinate his/her operations with the contractors on other projects that may be in force during the life of the contract. No waiver of any provisions of 105.07 of the Construction and Material Specifications is intended.

Staging Areas

There are no specific areas given in the plans for the Contractor to use as a staging area(s). If the Contractor wants to use an area(s) for staging, regardless if it falls within the project limits or not, the Contractor is to use the Right of Way E-Permitting System at <https://odhcp.bemcorp.net/Accounts/Account/Account> in order to apply for a permit per Section 107.02 of the CMS. For specific permitting questions, the Contractor can contact the District Permitting Office, (Melvin Safford) at 216-584-2137 or at District12Permits@dot.ohio.gov.

If a permit is granted, all conditions of the permit shall be met in addition to the requirements of 104.04 of the CMS, at no additional cost to the State. If the Project Engineer deems that all the conditions of the permit were not met, then 10% of the Contract bid amount for mobilization shall be withheld until all the conditions of the permit are satisfied

wonder
Protection of Right-of-Way Landscaping

Prior to beginning work, the Contractor, the Project Engineer and a representative of the maintaining agency will review and record all landscaping items within the right-of-way (both within and outside the construction limits). A record of this review will be kept in the Project Engineer's files. Prior to final acceptance, a final review of landscaping items will be made.

Constrict all activities, equipment storage and staging to within the construction limits. Unless otherwise identified in the plans or proposal, the construction limits are identified as 30 feet from the edge of pavement.

Submit a written request to the Project Engineer to use any area outside these limits. The document submitted must clearly identify the area and explain the proposed use and restoration of the area. Use of these areas for disposal of waste material and construction debris, excavation of borrow material and placement of portable plants is prohibited. The request must be approved, in writing, before the Contractor has permission to use the area.

Any items damaged beyond the construction limits, as defined above, will be replaced in kind or as approved by the Project Engineer.

Item 619 – Field Office, Type B, As Per Plan

In addition to the requirements of CMS 619, the Contractor shall furnish and set up a Wi-Fi router meeting the requirements of IEEE 802.11ac for the exclusive use of the Department.

All other field office items supplied shall meet the requirements of a Type B Field Office.

Item 619 – Field Office, Type B, As Per Plan **6 Months**

Item 623 - Construction Layout Stakes and Surveying, As Per Plan

In addition to the requirements of the CMS, this item of work will include the following additional requirements.

An Ohio professional surveyor shall determine the minimum vertical clearances of all existing and new bridges within the project limits after completion of all the work, but prior to final acceptance of the project. At a minimum, measurements shall be taken along the centerline of each fascia beam at the edge of shoulders, edge lines, lane lines, and crown of the roadway below. The measurements shall be documented on the ODOT vertical clearance survey form. The form shall bear the stamp or seal of the Ohio professional surveyor who has taken the measurements. The Ohio professional surveyor shall submit the completed form to the Project Engineer and the District Bridge Maintenance Engineer prior to final acceptance of the project.

Payment for all of the above work shall be at the unit price bid for Item 623 – Construction Layout Stakes, As Per Plan, which shall include all labor, equipment, materials and incidentals necessary to complete the above work.

DESIGN AGENCY



DESIGNER

JDA

REVIEWER

EJK 08/27/21

PROJECT ID

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Utilities

Listed below are all known utilities located within the project construction limits together with their respective owners. The Ohio Department of Transportation has used the best available information to determine the utility companies serving this area but cannot guarantee that this utility company list is complete.

AT&T
13630 Lorain Ave. 2nd Floor
Cleveland, Ohio 44111
Attn: James Janis
Design Manager
Phone: (216) 476-6142
pj8191@att.com

Buckeye Partners, L.P.
Five TEK Park
9999 Hamilton Boulevard
Breinigsville, PA 18031
Attn: David Jones
Phone: (610) 904-4409
DAJones@buckeye.com

Charter Communications
7 Severance Circle
Cleveland Heights, Ohio 44118
Attn: Pat Santoiemmo
Phone: (216) 575-8016
Pat.Santoiemmo@charter.com

City of Cleveland Division of Water
1201 Lakeside Ave.
Cleveland, Ohio 44114
Attn: Fred Roberts
Phone: (216) 664-2444 x75590
fred_roberts@ClevelandWater.com

Dominion East Ohio Gas Co.
320 Springside Dr., Suite 320
Akron, Ohio 44333
Phone: (330) 664-2409
Relocation@dominionenergy.com

Everstream Solutions
1228 Euclid Ave, Suite 250
Cleveland, Ohio 44115
Attn: Stacey Dasher
Office: (216) 923-2206
Cell: (216) 408-9205
sdasher@everstream.net

Illuminating Company (First Energy)
6896 Miller Rd, Suite 101
Brecksville, Ohio 44141
Attn: John M. Zassick
Office: (440) 546-8706
jmzassick@firstenergycorp.com

Windstream
560 Ternes Ave
Elyria, Ohio 44035
Attn: Geoffrey Hamm
OSP Engineer II
Phone: (440) 329-4245
geoffrey.p.hamm@windstream.com

Ohio Department of Transportation
District 12 – Roadway Services
5500 Transportation Boulevard
Garfield Heights, Ohio 44125
Attn: Keith Hamilton
District Traffic Engineer
Phone: (216) 584-2220
Keith.Hamilton@dot.oh.gov

City of Solon
34200 Bainbridge Road
Solon, Ohio 44139
Attn: John J Busch
Phone: (440) 349-6745
jbusch@solonohio.org

There are no underground utilities shown on this plan. The nature of the work required by this project will not affect any known underground utilities that exist under or adjacent to the work area.

Roadway and Erosion Control

Item 209 – Linear Grading, As Per Plan

This item of work shall consist of grading along the outside edge of the paved shoulder to eliminate high spots and provide positive sheet flow off the pavement and shoulder into roadside ditches or drainage structures. This item is not intended to be used to excavate a uniform depth to place Item 617 – Compacted Aggregate, As Per Plan.

Any debris collected shall be removed and disposed of as specified in Section 105.16 & 105.17 of the Construction and Material Specifications.

Payment for the above work shall be made at the unit bid price for Item 209, Station, Linear Grading, As Per Plan and shall include all labor, tools, equipment and materials necessary to perform this item of work.

The following estimated quantities have been carried to the General Summary.

Item 209 – Linear Grading, As Per Plan497 MI

Drainage

Review of Drainage Facilities

Prior to the start of work and again before final acceptance, perform an inspection with representatives of the Department, Contractor, and Locals of all existing drainage facilities that are to remain in service which may be affected by the work. The condition of the existing conduits and their appurtenances is determined from field observations. Records of the inspection are maintained by the Department.

Confirm all existing sewers inspected initially by the above-mentioned parties are maintained and left in a condition comparable to that determined by the original inspection. The Contractor is responsible to correct any change in the condition resulting from their operations as directed or approved by the Engineer.

Payment for all operations described above is included in the Contract price for the pertinent 614 conduit items.



Pavement

Profile and Alignment

Place the proposed pavement to follow the alignment of the existing pavement. Previous construction plans showing the original alignment are available for inspection at the ODOT District 12 office. Place the proposed asphalt concrete as shown on the typical sections. The intent of the plans is to maintain the existing profile.

Planing Requirements

The duration of time between planing the asphalt and placing the asphalt overlay shall be kept to a minimum. In no instance shall this time exceed 7 calendar days. The time limit shall begin on the first day of planing and shall continue based on calendar days, minus any weather days, until completion of the asphalt concrete surface course. This is to ensure that the potential degradation of the exposed pavement due to traffic is kept to a minimum. This requirement applies to both mainline and ramps alike.

In the event that the time between exposing the existing pavement and placing the asphalt surface course exceeds 7 calendar days, liquidated damages as per 108.07 of the CMS shall be assessed.

Asphalt Concrete Surface Course Sealing Requirements

In addition to the gutter sealing requirements specified in SCD BP-3.1 and C&MS 401.15, after completion of the surface course, the contractor shall use a certified 702.01 PG binder to seal the following locations:

- All castings including but not limited to monuments, manholes, water valves, catch basins, curb inlets.
- Butt joints and feather joints including bridge approaches.
- Forward joint for driveway asphalt and trailing joint when butting to existing asphalt drive.
- Perimeter of all pavement repairs or other asphalt inlays when pavement repairs /inlays are not overlaid with an asphalt concrete surface course.
- All cold longitudinal joints between paved shoulders and guardrail asphalt.

The material used shall be a certified 702.01 PG binder. The width of the sealer shall be 2-3 inches.

Any additional costs associated with the work identified in this note shall be included in the appropriate asphalt concrete surface course item of work.

Longitudinal Joints (Flexible Pavement)

Longitudinal joints between a pavement lane and adjoining shoulder or speed change lane, and between a speed change lane and the adjoining shoulder shall be made the same day. All longitudinal joints shall be hot with the exception of one cold joint per roadway. Locate the cold joint along the centerline or a lane line. Longitudinal joint locations shall be as approved by the Engineer. Each ramp shall have a maximum of one longitudinal cold joint located approximately halfway across the ramp.

Item 254 – Pavement Planing, Asphalt Concrete, As Per Plan

This item shall be used to remove the existing asphalt overlay full width at an average depth of 1.5” as specified in the plans. Areas which have transverse wedges (butt joints) are to be removed in two passes as required for maintaining traffic. No additional payment shall be made for the second pass.

Item 251 - Partial Depth Pavement Repair (442), As Per Plan A

This item shall be used for the repair of unsound, cold-patch, or pop-out areas of longitudinal joints as directed by the Engineer. This work shall be performed prior to the planing operation. The depth of the repair shall be 4” below the top of the planed asphalt surface. The width of the repair shall be 12” centered over the existing joint.

Use replacement materials conforming to the requirements of Item 442, 19mm.

The following estimated quantity has been carried to the General Summary

Item 251 – Partial Depth Pavement Repair 4,904 SY

Item 251 - Partial Depth Pavement Repair (442), As Per Plan B

This item shall be used for the repair of unsound, cold-patch, or pop-out areas of transverse joints and cracks as directed by the Engineer. This work shall be performed prior to the planing operation. The depth of the repair shall be 4” below the top of the planed asphalt surface. The width of the repair shall be 12” centered over the existing joint.

Use replacement materials conforming to the requirements of Item 442, 19mm.

The following estimated quantity has been carried to the General Summary:

Item 251 – Partial Depth Pavement Repair (442),
As Per Plan B 4,414 SY

Item 442 – Asphalt Concrete Surface Course, 12.5mm, Type A, (446), As Per Plan, PG76-22M

Joint coring in accordance with 446.04 is not required for cold longitudinal joints placed over Void Reducing Asphalt Membrane (VRAM). Construct cold longitudinal joints over VRAM using the same techniques, equipment, and roller patterns used on the rest of the mat. Obtain 10 mat cores for each lot of material in accordance with 446.04. Pay factors for each lot of material will be determined according to Table 446.04-2.

The coarse virgin aggregate and at least 50% of fine virgin aggregate for this item shall be limited to air cooled blast furnace slag (ACBFS) or Trap Rock from Ontario.

Table 442.02-2 applies except No. 4 sieve requirements are 52 to 60 Total Percent Passing. For the No. 4 sieve do not exceed 63% in production.

Item Special, Paver Mounted Thermal Profiling (PMTP)

This item consists of providing a paver mounted thermal profiling (PMTP) system to identify the presence of any thermal segregation of an uncompacted mat of hot mix asphalt. Methods and procedures for determining the thermal profile using a paver-mounted thermal imaging system shall conform to the specifications found in the special provisions.

ODOT Office of Pavement Engineering shall be notified at least two weeks prior to the start of PMTP data collection.

All, labor, equipment, software, and incidentals necessary to install the equipment and analyzing the date shall be included for payment with the Lump Sum bid for Item Special, Paver Mounted Thermal Profiling (PMTP).

Item 442 – Asphalt Concrete Surface Course, 12.5mm, Type A, (447), As Per Plan, PG76-22M

The coarse virgin aggregate for this item shall be limited to a blend of air cooled blast furnace slag (ACBFS) or Trap Rock from Ontario and limestone. The Contractor shall use a minimum 60% of ACBFS or Trap Rock from Ontario with limestone comprising the remaining percentage. At least 50% of the fine virgin aggregate for this item shall be limited to ACBFS or Trap Rock from Ontario.

Table 442.02-2 applies except No. 4 sieve requirements are 52 to 60 Total Percent Passing. For the No. 4 sieve, do not exceed 63 in production.

When ACBFS is used for a fraction of the coarse aggregate, provide a total asphalt binder content greater than or equal to 6.2%. If ACBFS makes up 100% of the coarse aggregate, apply the binder content requirements of CMS 442.

Item 617 – Compacted Aggregate, As Per Plan

This item shall be used to place compacted aggregate at a variable depth only where needed to fill in low spots and eliminate drop offs along shoulders. Material shall be limited to reclaimed asphalt concrete pavement (RAP).

The actual depth of compacted aggregate placed will vary depending upon existing conditions. For estimating purposes, an average depth of one inch (1”) has been used. Water, if needed, shall be applied according to 617.05 and shall be included for payment under Item 617 – Compacted Aggregate, As Per Plan.

The following estimated quantity has been carried to the General Summary for use as directed by the Engineer:

Item 614 – Compacted Aggregate, As Per Plan 155 CY

Item 618 – Rumble Strips, Shoulder (Asphalt Concrete), As Per Plan

For all freeways, the lateral position of edge line rumble strips shown in SCD BP-9.1 is revised as follows:

1. Median and Outside Shoulder Offset for shoulders less than 6’: Dimension A and B are equal to 6”
2. Median and Outside Shoulder Offset for shoulders 6’ to 12’: Dimension A and B are equal to half the shoulder width minus 12”.
3. Median and Outside Shoulder Offset for shoulders greater than 12’: Dimension A and B are equal to 5’.

The following estimated quantity shall be used to construct Item 618 – Rumble Strips, Shoulder (Asphalt Concrete), As Per Plan as per Standard Drawing BP-9.1 except as noted above:

Item 618 – Rumble Strips, Shoulder (Asphalt Concrete),
As Per Plan..... 14.6 Miles

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REVIEWER

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Traffic Control

Permanent Pavement Markings on Bridges

Proposed pavement markings on bridges shall be placed on top of existing markings.

Raised Pavement Markers

Install raised pavement markers for lane lines at a spacing of eighty feet (80') center-to-center.

Item 621 – Raised Pavement Marker Removed

This item shall include the removal and disposal of existing RPMs.

The following estimated quantity has been carried to the General Summary:

Item 621 – Raised Pavement Marker Removed **742 Each**

Detection Maintenance

If vehicle detection becomes unexpectedly disabled, requires modification, or is scheduled to be temporarily removed during the construction project, the Contractor shall immediately notify the Project Engineer and District City of Solon Engineer.

If the loss of vehicle detection is known prior to the start of construction, it shall be discussed at the preconstruction meeting. At such time, The City of Solon Engineer shall advise the Project Engineer and the Contractor on the appropriate action to rectify any loss of vehicle detection. This may include placing the traffic signal on minimum or maximum recall, modifying the minimum green times, and removing the malfunctioning detection from service. Where non-intrusive detection (i.e. video, radar) already exists, the Contracto shall ensure that detection is operating and maintained by reconfiguring the detection units accordingly during all construction phases. This is to avoid the signal from maxing out the affected signal phase and creating unnecessary delays.

Locations where non-intrusive detection is proposed and the existing vehicle detection is to be abandoned, the non-intrusive vehicle detection shall be installed, configured, and made fully functional prior to the existing detection being disabled. The Contractor shall continue to maintain and modify the detection until final acceptance of the traffic signal. This is to ensure vehicle detection remains fully functional throughout construction.

Item 632 – Detector Loop, As Per Plan

All stop line inductance detector loops shown in the plans shall be the powerhead configuration shown on TC-82.10. The width shall be as specified on TC-82.10 and the length shall match the existing detector loop length, with a maximum length of 35'. The stop line detector loops shall not be wired to any other loops and shall have their own detector channel. The location of the loops shall be such that the powerhead is located at the stop line, not past it.

All dilemma zone inductance detector loops called for in the plans shall be the Angular Design Detection (A.D.D.) loop as shown on TC-82.10. Dimensional shall be as specified on TC-82.10.

System loops shall be as depicted in the plans.

All stop line detection shall be tested for a bicycle target and all dilemma detection zones shall be tested for a motorcycle target.

Install detector loops in the surface course within 72 hours of its placement.

When replacing the loop detectors, the loop detector wire shall be replaced to the pull box or pole, whichever is applicable, under Item 632 and TC-82.10. The new cable splice kits shall be included in this pay item.

The Contractor shall contact the Project Engineer and John Busch, (440) 349-6745, City Engineer for Solon, seven (7) days prior to planning through an intersection to adjust signal operation as needed.

The City of Solon Engineer shall concur with the location of the replacement loops.

The following estimated quantity has been carried to the General Summary for use as described above:

Item 632 – Detector Loop, As Per Plan **6 Each**

REFERENCE NO.	LOCATION	632	632
		6' X 20' POWERHEAD DETECTOR LOOP	4.5' X 9' ANGULAR DESIGN DETECTOR LOOP
		EACH	EACH
L-1	Ramp 7 at SR-91 200' Back from Stop Line Left Turn Lane	1	
L-2	Ramp 7 at SR-91 200' Back from Stop Line Center Lane Right Turn Lane	1	
L-3	Ramp 7 at SR-91 200' Back from Stop Line Right Turn Lane	1	
L-4	Ramp 7 at SR-91 At Stop Line Left Turn Lane	1	
L-5	Ramp 7 at SR-91 At Stop Line Center Lane Right Turn lane	1	
L-6	Ramp 7 at SR-91 At Stop Line Right turn lane	1	
SUBTOTALS		6	0
TOTAL CARRIED TO GEN. SUMMARY		6	



General

It is the responsibility of the Contractor to provide through vehicular access in both directions at all times throughout the project area. The project shall be constructed in phases in order to minimize traffic disruption and inconvenience to the general public. The Contractor shall be responsible for providing all equipment, materials and manpower needed to adequately maintain traffic as provided for in the plans and specifications.

The Contractor is reminded that, in the conduct of this project, the sequence of operations shall be planned in a fashion which minimizes the number of lane reductions and/or lane width reductions required to maintain traffic through the project.

Permitted lane closures shall be as shown on the “Schedule of Through Lanes to be Maintained” table. The time limits shown in this table shall be adhered to or road user costs will be assessed.

Construction Sequence

No permanent maintenance of traffic zones are detailed in these plans. Traffic shall be maintained in accordance to the “Schedule of Through Lanes to be Maintained” note. All work zone closures shall comply with the appropriate Standard Construction Drawings.

Prior to opening all lanes to normal traffic, the Contractor shall ensure that the pavement is in a drivable condition with no potholes or dust and that all longitudinal drop-offs greater that 1-1/2” and transverse drop-offs are ramped as per the “Maintaining Traffic and Sequence of Operations” note.

Maintenance of Traffic Control Zones

The Contractor shall be responsible to maintain the signs, drums or cones specified in the Standard Construction Drawings. When the Contractor is notified of deficiencies, he shall correct the deficiencies as soon as possible, preferably within 12 hours and no later than 24 hours. If any noted deficiencies are not corrected within 24 hours the Engineer shall deduct one day pay for Item 614 – Maintaining Traffic, not as a penalty but as road user costs. The Contractor shall be subject to these road user costs for each and every day that these provisions are not met. All costs for maintaining the work zones as described above shall be included under Item 614 – Maintaining Traffic.

Suspension of Work

If the Contractor fails to comply with the provisions for traffic control as set forth in these plans or with provisions of the OMUTCD, the Engineer shall suspend work until the Contractor complies with the necessary requirements.

Lane Closure/Reduction Required

Length and duration of lane closures and restrictions shall be at the approval of the Engineer. It is the intent to minimize the impact to the traveling public. Lane closures or restrictions over segments of the project in which no work is anticipated within a reasonable time frame, as determined by the Engineer, shall not be permitted. The level of utilization of maintenance of traffic devices shall be commensurate with the work in progress.

Payment

All work and traffic control devices shall be in accordance with CMS 614 and other applicable portions of the specifications, as well as the Ohio Manual of Uniform Traffic Control Devices. Payment for all labor, equipment, and materials shall be included in the lump sum contract price for Item 614 – Maintaining Traffic unless separately itemized in the plans.

Schedule of Through Lanes to be Maintained

All lane closures may only be implemented at the times permitted by the “District 12 Permitted Lane Closure Times” list, which is located on the ODOT website:

www.dot.state.oh.us/districts/D12/HighwayManagement/Pages/PermittedLaneClosures.aspx

The latest revision, at 14 days prior to the bid date, shall be in effect for this project.

No lane or shoulder closures shall be in place when no work is being performed, unless directed by the Engineer. Shoulder closures shall only be allowed at the times specified for lane closures.

Any roadway not listed shall not have any lane closures on weekdays from 6:30am to 9:00am and 3:00pm to 6:00pm. Contact Troy Onesti, District 12 Work Zone Traffic Manager, at (216) 584-2204 if there are any questions.

All notes on the Permitted Lane Closure Times shall be part of the project.

IR-422 Ramps*		
Location	Permitted Ramp Closures, Lane Reductions	
	Short Term Closure	Partial Width Closure (maintain one 11’ lane)
One-Lane Ramps	9:00pm – 5:00am **	7:00pm – 5:00am
Two-Lane Ramps	Not Permitted	7:00pm – 5:00am

*Not for use on the IR-422/IR-480 system interchange.

**Each ramp shall be closed for a maximum of two (2) separate times using an approved detour. Any closure shall be as directed by the Engineer.

Ramp Closures for Resurfacing

The Contractor may close one ramp at a time at each location for milling, partial depth pavement repairs, or resurfacing. Closures for ramps scheduled for repairs and resurfacing shall be limited according to the days of the week and hours shown in the “Schedule of Through Lanes to be Maintained” table.

The motoring public shall be given advance warning of closures at least 72 hours in advance through the use of either a ground mounted flat sheet sign or a portable changeable message sign. A LEO with patrol car (paid for separately) shall be used for each ramp closure and be present for the entire closure time.

Freeway entrance ramps shall be closed with a PCMS suggesting a recommended detour.

Freeway exit ramps shall be closed with a PCMS routing traffic to the next exit and a second PCMS indicating a U-turn at the exit, unless directed differently by the Project Engineer.

For ramp closures, one or two additional PCMS units will be needed as described above. These will be in addition to the PCMS units specified in the plans and shall be included for payment in Item 614 – Maintaining Traffic.

Alternate Methods

If the Contractor so elects, he may submit alternate methods for the maintenance of traffic, provided the intent of the provisions is followed and no additional inconvenience to the traveling public results there from. No alternate plan shall be placed into effect until approval has been granted, in writing, by the Director.

All items proposed for use under these provisions must comply with current Department standards for their use when the plan detail, Standard Construction Drawing or other bid document governing their use is not provided as part of the bid package.

Construction Traffic

All construction traffic shall use acceptable truck routes to access the construction area. Use of local residential streets is strictly prohibited unless allowed in writing by the local enforcement authorities.

Lane Value Contract Table

Description of Critical Lane/Ramp to be Maintained	Direction	Lanes	Restricted Time Period	Time Unit	Disincentive (per time unit per lane)
US-422					
US-422	EB	2	As Per the Permitted Lane Closure Schedule	Each Minute	\$330
US-422	WB	2	As Per the Permitted Lane Closure Schedule	Each Minute	\$330

The Contractor shall be assessed a disincentive in the amount of the largest disincentive within all sections impacted by the physical lane restriction, including the Transition Area, Activity Area, and Termination Area as defined by the OMUTCD.

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Maintaining Traffic – General Provisions

1.

Traffic shall be maintained in accordance with the “Schedule of Through Lanes to be Maintained.” the Contractor shall set up and operate his equipment in such a manner as to minimize encroachment upon the traveled width of pavement
2.

The Contractor shall notify the Engineer, the responsible law enforcement agency and the Ohio Department of Transportation, District 12 Public Information Officer ((216) 584-2007) not less than 24 hours prior to a scheduled disruption of traffic.
3.

Nighttime work shall be permitted in accordance with these plans and notes. The Contractor shall provide flood lighting of the work area in accordance with CMS 401.15 in order to assure the safest conditions during nighttime work. A lighting plan for nighttime operations shall be presented to and approved by the Engineer.
4.

The Contractor shall furnish, erect and maintain all warning and information signs necessary for maintaining traffic. The sign faces shall be reflectorized with type G sheeting complying with the requirements of CMS 730.19. The Contractor shall determine what signs are needed and advise the Engineer two weeks in advance of his detailed plans. See the OMUTCD and standard drawings for the minimum signage required.
5.

Traffic control devices shall be set up prior to the start of construction and shall be properly maintained during the time special conditions exist. They shall remain in place only as long as they are needed and shall be immediately removed thereafter. Where operations are performed in stages, there shall be in place only those devices that apply to the condition present during the stage in progress. All signs with messages which do not apply during a certain period shall be covered or set aside out of the view of traffic.
6.

Placement of final roadway pavement markings and raised pavement markers shall be accomplished in accordance with the "Schedule of Through Lanes to be Maintained." The Contractor shall provide 2 shadow vehicles as per MT-99.20 following the pavement marking equipment. The shadow vehicles shall travel 500’ apart with the remote vehicle traveling on the shoulder (left or right as applicable) where usable shoulder is available. The first shadow vehicle in a traffic lane shall be equipped with a truck mounted attenuator meeting NCHRP 350 requirements. Each shadow vehicle shall have a yellow flashing beacon plus 48" construction warning signs mounted on the back facing traffic with standard type messages advising motorists of the work ahead, advisory warning speed, and which lane is closed.
7.

During non-working periods, open excavations shall be delineated with warning flashers and/or other approved devices as deemed appropriate by the Engineer.
8.

Existing signs located within the road work areas which are necessary for interim or permanent traffic control shall be removed and re-erected in locations as approved by the Engineer.
9.

No stoppage of traffic shall occur without law enforcement personnel at each location to direct traffic.
10.

Whenever a total closure is implemented, the Contractor shall provide a portable changeable message sign from ODOT’s pre-approved list. It shall be placed 1.5 miles to 2 miles in advance of the closure or as directed by the Engineer.
11.

For any operation not specifically mentioned in these plans, the traffic shall be maintained in accordance with the OMUTCD.

Holiday Closures

No work shall be performed and all existing lanes shall be open to traffic during the following designated holidays or events:

Christmas	New Year's	Mother's Day
Memorial Day	Fourth of July	Easter
Labor Day	Thanksgiving	

The period of time that the lanes are to be open depends on the day of the week on which the holiday or event falls. The following schedule shall be used to determine this period:

Day of the Week	Times All Lanes Must Be Open
Sunday	12 noon Friday Through 6:00AM Monday
Monday	12 noon Friday Through 6:00AM Tuesday
Tuesday	12 noon Monday Through 6:00AM Wednesday
Wednesday	12 noon Tuesday Through 6:00AM Thursday
Thursday	12 noon Wednesday Through 6:00AM Monday
Thursday (Thanksgiving Only)	6:00AM Wednesday through 6:00AM Monday
Friday	12 noon Thursday Through 6:00AM Monday
Saturday	12 noon Friday Through 6:00AM Monday

Should the Contractor fail to meet any of these requirements, the Contractor shall be assessed a disincentive per the Lane Value Contract (PN 127).

Maintaining Traffic and Sequence of Operations

All asphalt concrete operations shall be conducted in a manner that will assure minimum danger and inconvenience to highway users. The procedure for the removal or placement of any existing or proposed asphalt course shall be such that no greater than 1-1/2” discontinuity in the elevation of the traveled surface shall be exposed to traffic.

Traffic shall not be permitted to cross any partial-width removal or resurfacing joint during the actual removal or paving operation except as necessary. Any partial-width longitudinal joints with a discontinuity greater than 1-1/2” which must be exposed to traffic shall be ramped using Item 614 – Asphalt Concrete for Maintaining Traffic at a rate not steeper than 6:1.

Temporary transverse removal or paving joints which must be exposed to traffic shall be ramped using Item 614 – Asphalt Concrete for Maintaining Traffic at a rate not to exceed 1” in 10’.

For removal of existing overlays, a transition may be planed into the existing overlay and may be substituted for the asphalt ramps previously described.

Whenever traffic is subject to partial width removals or overlays prior to full width completion, the Contractor shall provide W8-11-48 “UNEVEN LANES” signs (dual sign installation). Placement shall be as directed by the Engineer and included in the lump sum payment for Item 614 – Maintaining Traffic.

Whenever any part of the traveled surface is closed, the motorists shall be warned and diverted by the Contractor through the use of a flashing arrow, in addition to those provisions set forth in the OMUTCD, the Traffic Engineering Manual and the applicable Standard Construction Drawings.

Floodlighting

Floodlighting of the work site for operations conducted during nighttime periods shall be accomplished so that the lights do not cause glare to the drivers on the roadway. To ensure the adequacy of the floodlight placement, the Contractor and the Engineer shall drive through the work site each night when the lighting is in place and operative prior to commencing any work. If glare is detected, the light placement and shielding shall be adjusted to the satisfaction of the Engineer before work proceeds.

Payment for all labor, equipment and materials shall be included in the lump sum contract price for Item 614 – Maintaining Traffic.

Truck Mounted Attenuator

When setting up and tearing down advanced signs for a work zone, a Truck Mounted Attenuator shall trail the work crew per CMS 614.03D. Also provide a rear-facing Type B or Type C Arrow Board mounted to the TMA truck per SS821 & SS921. Payment shall be included in the lump sum payment for Item 614 – Maintaining Traffic.

Major Work Items

The following major work items will require traffic maintenance which shall be incorporated into the Contractor’s sequence of operations.

- A.

Removal of existing RPMs
- B.

Completion of partial depth pavement repairs
- C.

Planing of asphalt concrete
- D.

Adjustment of existing castings
- E.

Placing of asphalt concrete
- F.

Placing proposed pavement markings and raised pavement markers
- G.

Placing of rumble strips

Item 614 – Asphalt Concrete for Maintaining Traffic, As Per Plan

This item shall be used to provide temporary asphalt ramps for transverse discontinuities. Ramping shall be placed at the rate of 1” per 10’ or to be used as directed by the Engineer.

Remove temporary asphalt ramps as part of this item. Materials shall be removed prior to the placement of the next course of asphalt.

Item 614 – Asphalt Concrete for Maintaining Traffic,
As Per Plan.....

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Work Zone Markings

The following estimated quantities have been carried to the General Summary for use at locations identified by the Engineer for work zone pavement markings per the requirements of CMS 614.04 and 614.11. Place temporary markings at the same locations as the proposed permanent markings.

After the planing is completed, use the following temporary markings:

Item 614 – Work Zone Lane Line, Class I, 642 Paint	<u>8.74 Mile</u>
Item 614 – Work Zone Edge Line, Class I, 4”, 642 Paint.....	<u>19.80 Mile</u>
Item 614 – Work Zone Stop Line, Class I, 642 Paint.....	<u>109 Ft</u>
Item 614 – Work Zone Crosswalk Line, Class I, 642 Paint.....	<u>334 Ft</u>
Item 614 – Work Zone Dotted Line, Class I, 6”, 642 Paint.....	<u>6,543 Ft</u>
Item 614 – Work Zone Channelizing Line, Class I, 12”, 642 Paint	<u>8,990 Ft</u>
Item 614 – Work Zone Arrow, Class I, 12”, 642 Paint	<u>34 Each</u>

After the surface course is placed, use the following temporary markings:

Item 614 – Work Zone Lane Line, Class III, 642 Paint	<u>8.74 Mile</u>
Item 614 – Work Zone Edge Line, Class III, 4”, 642 Paint.....	<u>19.80 Mile</u>
Item 614 – Work Zone Stop Line, Class III, 642 Paint	<u>109 Ft</u>
Item 614 – Work Zone Crosswalk Line, Class III, 642 Paint	<u>334 Ft</u>
Item 614 – Work Zone Dotted Line, Class I, 6”, 642 Paint.....	<u>6,543 Ft</u>
Item 614 – Work Zone Channelizing Line, Class III, 12”, 642 Paint	<u>8,990Ft</u>
Item 614 – Work Zone Arrow, Class III, 642 Paint	<u>34 Ft</u>

Item 614 – Portable Changeable Message Signs, As Per Plan

The Contractor shall furnish, install, maintain and remove when no longer needed, a changeable message sign. The sign shall be of a type shown on a list of approved PCMS units available on the Office of Materials Management web page. The list contains Class A and B units with minimum legibility distances of 800 ft. and 650 ft., respectively.

Each sign shall be trailer-mounted and equipped with a functional dimming mechanism, to dim the sign during darkness, and a tamper and vandal proof enclosure. Each sign shall be provided with appropriate training and operation instructions to enable on-site personnel to operate and troubleshoot the unit. The sign shall also be capable of being powered by an electrical service drop from a local utility company. The PCMS shall be delineated in accordance with CMS 614.03.

Placement, operation, maintenance and all activation of the signs by the Contractor shall be as directed by the Engineer. The PCMS shall be located in a highly visible position yet protected from traffic. The Contractor shall, at the direction of the Engineer, relocate the PCMS to improve visibility or accommodate changed conditions. When not in use, the PCMS shall be turned off. Additionally, when not in use for extended periods of time, the PCMS shall be turned, facing away from all traffic.

The Engineer shall be provided access to each sign unit and shall be provided with appropriate training and operation instructions to enable ODOT personnel to operate and troubleshoot the unit, and to revise sign messages, if necessary.

All messages to be displayed on the sign will be provided by the Engineer. A list of all required pre-programmed messages will be given to the Contractor at the project preconstruction conference. The sign shall have the capability to store up to 99 messages. Message memory or pre-programmed displays shall not be lost as a result of power failures to the on-board computer. The sign legend shall be capable of being changed in the field. Three-line presentation formats with up to six message phases shall be supported. PCMS format shall permit the complete message for each phase to be read at least twice.

The PCMS shall contain an accurate clock and programming logic which will allow the sign to be activated, deactivated or messages changed automatically at different times of the day for different days of the week.

The PCMS unit shall be maintained in good working order by the Contractor in accordance with the provisions of CMS 614.07. The Contractor shall, prior to activating the unit, make arrangements with an authorized service agent for the PCMS to assure prompt service in the event of failure. Any failure shall not result in the sign being out of service for more than 12 hours, including weekends. Failure to comply may result in an order to stop work and open all traffic lanes and/or in the Department taking appropriate action to safely control traffic. The entire cost to control traffic accrued by the Department due to the Contractor's noncompliance will be deducted from moneys due, or to become due, the Contractor on his or her contract.

The Contractor shall be responsible for 24-hour-per-day operation and maintenance of these signs on the project for the duration of the phases when the plan requires their use.

The estimated quantity provides for nine PCMS units at 6 SNMT (30 days) each per Work Location.

Payment for the above described item shall be at the contract unit price. Payment shall include all labor, materials, equipment, fuels, lubricating oils, software, hardware and incidentals to perform the above described work. The Contractor shall only be paid for PCMS units when they are in operation on the project as specified in the plans or by the Engineer.

Item 614 – Portable Changeable Message Sign,	
As Per Plan	<u>54 SNMT</u>

Portable Changeable Message Signs for Lane Closure(s)

The Contractor shall place a PCMS 0.5 to 2 miles in advance of any lane closures or as directed by the Engineer. The PCMS shall read: ROAD WORK AHEAD/RIGHT (LEFT) (2) LANE(S) CLOSED. If traffic becomes congested and there is stopped traffic, the message board shall be changed to: STOPPED TRAFFIC AHEAD/PREPARE TO STOP. The WTS shall be responsible for monitoring traffic during lane closures and changing the message signs as necessary. The message shall be changed when there is no lane closure (e.g. ROAD WORK AHEAD/NIGHTLY LANE CLOSURES), or per the Engineer.

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Item 614 – Law Enforcement Officer with Patrol Car for Assistance

Use of Law Enforcement Officers (LEOs) by contractors other than the uses specified below will not be permitted at project cost. LEOs should not be used where the OMUTCD intends that flaggers be used.

In addition to the requirements of CMS 614 and the latest edition of the OMUTCD, a uniformed LEO with an official patrol car (car with top-mounted emergency flashing lights and complete markings of the appropriate law enforcement agency) shall be provided for the following traffic control tasks:

- During the entire advance preparation and closure sequence where complete blockage of traffic is required.
- During a traffic signal installation when impacting the normal function of the signal or the flow of traffic or when traffic needs to be directed through an energized traffic signal contrary to the signal display (e.g., directing motorists through a red light).

In addition to the requirement of CMS 614 and the OMUTCD, a uniformed LEO with an official patrol car (car with top-mounted emergency flashing lights and complete markings of the appropriate law enforcement agency) may be provided for the following traffic control tasks as approved by the Engineer:

- For lane closures: during initial set-up periods, tear down periods, substantial shifts of a closure point or when new lane closure arrangements are initiated for long-term lane closures/shifts (for the first and last day of major changes in traffic control setup).

In general, LEOs should be positioned in advance of and on the same side as the lane restriction or at the point of road closure, and to manually control traffic movements through intersections in work zones.

LEOs should not forgo their traffic control responsibilities to apprehend motorists for routine traffic violations. However, if a motorist's actions are considered to be reckless, then pursuit of the motorist is appropriate.

The LEOs work at the direction of the Contractor. The Contractor is responsible for securing the services of the LEOs with the appropriate agencies and communicating the intentions of the plans with respect to duties of the LEOs. The Engineer shall have final control over the LEOs' duties and placement, and will resolve any issues that may arise between the two parties.

The LEO shall report in to the Contractor prior to the start of the shift, in order to receive instructions regarding specific work assignments during his/her shift. The LEO is expected to stay at the project site for the entire duration of his/her shift. The LEO shall report to the Contractor at the end of his/her shift. Should it be necessary to leave the project site, the LEO shall notify the Engineer. The Contractor shall provide the LEO with a two-way communication device which shall be returned to the Contractor at the end of his/her shift.

LEOs (with patrol car) required by the traffic maintenance tasks above shall be paid for on a unit price (hourly) basis under Item 614, Law Enforcement Officer (With Patrol Car) for Assistance. The following estimated quantities have been carried to the General Summary.

Item 614 – Law Enforcement Officer
With Patrol Car for Assistance..... **100 Hours**

The hours paid shall include any minimum show-up time required by the law enforcement agency involved.

Any additional costs (administrative or otherwise) incurred by the Contractor to obtain the services of an LEO are included with the bid price for Item 614, Law Enforcement Officer with Patrol Car for Assistance.

Item 614 - Worksite Traffic Supervisor

Subject to approval of the Engineer, the Contractor shall employ and identify (someone other than the superintendent) a certified Worksite Traffic Supervisor (WTS) before starting work in the field. The WTS shall be trained in accordance with CMS 614.03, shall have successfully completed ODOT administered WTS testing (and re-testing when applicable) and be listed on the ODOT prequalified WTS roster. Prequalification expires every 5 years. Re-testing shall be successfully repeated every 5 years to remain prequalified.

The name of the prequalified WTS and related 24-hour contact information shall be provided to the Engineer at the preconstruction conference. If the designated WTS will not be available full time (24/7), the Contractor may designate an alternate (secondary) WTS to be available when the primary is off duty; however the primary WTS shall remain the point of contact at all times. Any alternate (secondary) WTS is subject to the same training, prequalification and other requirements outlined within this plan note. At all times the Engineer, or Engineer's representatives, must be informed of who the primary WTS (and secondary WTS, if applicable) is at the current time.

The WTS position has the responsibility of implementing the Traffic Management Plan (TMP), monitoring the safety and mobility of the entire work zone, and correcting Temporary Traffic Control (TTC) deficiencies for the entire work zone. The WTS, and alternate WTS when on duty, shall have sufficient authority to effectively carry out the identified WTS responsibilities and duties. The duties of the WTS are as follows:

1. Be available on a 24-hour per day basis.
2. Be on site for all emergency TTC needs within one hour of notification by police or project staff, and effect corrective measures immediately on existing work zone TTC devices.
3. Attend preconstruction meeting and all project meetings where TTC management is discussed.
4. Be available on site for meetings or discussions with the Engineer upon request.
5. Be aware of all existing and proposed TTC operations of the contractor, subcontractors and suppliers, and ensure coordination occurs between them to eliminate conflicting temporary and/or permanent traffic control.
6. Coordinate project activities with all Law Enforcement Officers (LEOs). The WTS shall also be the main contact person with the LEOs while LEOs are on the project.
7. Coordinate and facilitate meetings with ODOT personnel, LEOs and other applicable entities before each plan phase switch to discuss work zone TTC for implementing the phase switch. Submit a written detail of MOT operations and schedule of events to implement the switch between phase plans to the Engineer 5 calendar days prior to this meeting.
8. Be present, on site for, and involved with, each TTC set up/take down and each phase change in accordance with CMS 614.03.
9. On a continual basis ensure that the TTC zone and all related devices are installed, maintained, and removed in compliance with the contract documents.
10. On a continual basis, facilitate corrective action(s) necessary to bring deficient TTC zones and all related devices into compliance with contract documents in the timeframe determined by the Engineer.

11. Inspect, evaluate, propose necessary modifications to, and document the effectiveness of, the TTC devices and traffic operations on a DAILY BASIS (7 days a week). In addition, perform one weekly night inspection of the work zone setup for daytime work operations; and one daytime inspection per week for nighttime projects. This shall include (but not be limited to) documentation on the following project events:

- a. Initial TTC setup (day and night review).
- b. Daily TTC setup and removal.
- c. When construction staging causes a change in the TTC setup.
- d. Crash occurrences within the construction area and within the influence area(s) approaching the work zone.
- e. Removal of TTC devices at the end of a phase or project.
- f. All other emergency TTC needs.

12. Complete the Department approved Long Term Inspection form (CA-D-8) after each inspection as required in #11 and submit it to the Engineer the following work day. These reports shall include a checklist of all TTC maintenance items to be reviewed. A copy of the form will be provided at the pre-construction meeting. Any deficiencies observed shall be noted, along with recommended or completed corrective actions and the dates by which such corrections were, or will be, completed. A copy of the current CA-D-8 document can be found on the Office of Construction Administration's Inspection Forms website

13. Have copies of the ODOT Temporary Traffic Control Manual and contract documents available at all times on the project.

14. The Department will deduct:
 - A. The prorated daily amount of Item 614 Maintaining Traffic for any day in which the WTS fails to perform the duties set forth above. The prorated daily amount will be equal to the original bid amount for Item 614 Maintaining Traffic divided by the difference between the original completion date and the first day of work, in calendar days.
 - B. 1% of the original bid amount for Item 614 Maintaining Traffic for any day that a TTC issue is identified in the field and is not corrected in the given timeframe per the Engineer. Deduction B shall not apply to situations covered by Deduction C.
 - C. 1% of the original bid amount for Item 614 Maintaining Traffic for any day that a lane or ramp is blocked (fully or partially) without TTC, as determined by the Engineer. This deduction shall be in addition to any other disincentives established for unauthorized lane use.

For days in which more than one deduction listed above occur, the highest deduction amount will apply.

If three or more total days result in TTC issues described in Deduction B or C above, the primary WTS shall be immediately removed from the work in accordance with CMS 108.05. Upon removal the Engineer shall notify ODOT Central Office (WTSPrequalification@dot.ohio.gov) to register a removal against the statewide prequalification for the primary WTS. Three removals shall cause statewide disqualification for any previously prequalified WTS.

Payment for the above requirements, responsibilities, and duties shall be included in the lump sum price bid for Item 614, Maintaining Traffic.

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Item 630 – Signing Misc.: Additional Signs, Ground Mounted, As Directed by the Engineer

When additional signing is needed to maintain traffic, the Contractor shall furnish the sign or signs as directed by the Engineer. These signs shall be ground mounted and meet all the specifications of the plan, proposal and current year CMS.

This item of work shall be used to provide signs that are beyond the requirements of the signage that is detailed in the Standard Construction Drawings and the OMUTCD.

Payment for this item shall include, but not be limited to, the cost to furnish and erect the sign, including driving posts or other approved methods of sign support, maintaining the sign and removal of the sign. The following estimated quantity has been carried to the General Summary for use as directed by the Engineer:

Item 630 – Signing Misc.: Additional Signs, Ground Mounted, As Directed by the Engineer..... **100 Sq Ft**

Covering of Ground-Mounted Signs--General

When required by other items or incidentally to Item 614 – Maintaining Traffic, cover existing ground-mounted signs with plywood or OSB blanks (1/2” minimum thickness) covering 80% of the sign area and all of the sign legend. The use of low quality materials such as duct tape and black plastic is not permitted.

Item 614 Maintaining Traffic – Work Zone Speed Zone Signs for Freeway Resurfacings

The following Work Zone Speed Zone (WZSZ) Speed Limit Revision(s) have been approved for use on this project when work zone conditions and factors are met as described below:

WZSZ Revision Number	County & Route	Direction
WZ-65243	Cuyahoga IR-422	EB & WB

Potential WZSZ locations shall have an original (pre-construction) posted speed limit of 55 mph or greater, a qualifying work zone condition of at least 0.5 mile in length, an expected work duration of at least three hours, and a work zone condition in place that reduces the existing functionality of the travel lanes or shoulders (i.e., lane closure, lane shift, crossover, contraflow and/or shoulder closure). The length of the work zone condition is measured from the beginning of the taper for the subject work zone condition impacting the travel lanes and/or shoulder to the end of the downstream taper, where drivers are returned to typical alignment. An expected work duration of at least three hours is required to balance the additional exposure created by installing and removing WZSZ signing with the time needed to complete the work.

If the work zone meets these minimum criteria, it shall be analyzed further using Table 1 below to determine if and when it qualifies for a speed limit reduction. Depending on the original posted speed limit, the type of temporary traffic control used, and whether or not workers are present, a warranted WZSZ will vary in the approved speed limit to be posted over time.

C&MS Item 614, Paragraph 614.02(B), indicates that two directions of a divided highway are considered separate highway sections. Therefore, if the work on a multi-lane divided highway is limited to only one direction, a speed limit reduction in the direction of the work does not automatically constitute a speed limit reduction in the opposite direction. Each direction shall be analyzed independently from each other.

All WZSZs fluctuate between two approved reduced speed limits or between an approved reduced speed limit and the original posted speed limit. Only one of two signing strategies shall be used to implement a WZSZ. WZSZs using DSL Sign Assemblies shall be in accordance with this note, Approved List, Supplemental Specifications (SS) 808 and 908, and Traffic SCD MT-104.10.

Only one warranted speed limit applies at any one time; speed limit reductions are not cumulative. WZSZs shall not be used for Moving/Mobile activities, as defined in OMUTCD Part 6.

When looking up the warranted work zone speed limits, always use the original, preconstruction, posted speed limit. Do not use a prior or current work zone speed limit as a look up value in the table. Positive Protection is generally regarded as portable barrier or other rigid barrier in use along the work area within the subject warranted work zone condition.

Without Positive Protection is generally regarded as using drums, cones, shadow vehicle, etc., along the work area within the subject warranted work zone condition. Workers are considered as being present when on-site, working within the subject warranted work zone condition. When the work zone condition reducing the existing functionality of the travel lanes or shoulders is removed, the speed limit displayed shall return to the original posted speed limit.

Table 1: Warranted Work Zone Speed Limits (MPH) for Work Zones on High-Speed (55 mph or greater) Multi-Lane Highways

<u>Original Posted Speed Limit</u>	<u>WITH Positive Protection</u>		<u>WITHOUT Positive Protection</u>	
	<u>Workers Present</u>	<u>Workers NOT Present</u>	<u>Workers Present</u>	<u>Workers NOT Present</u>
70	60	65	55	65
65	55	60	50	60
60	55	60	50	60
55	50	55	45	55

The following estimated quantity has been carried to the General Summary.

Item 808, Digital Speed Limit (DSL) Sign Assembly **45 Sign Mnth**
Assuming 15 DSL Sign Assemblies for 3 Months

Item 614 – Work Zone Increased Penalties Sign

R11-H5A-48 signs shall be furnished, erected, and maintained in good condition and/or replaced as necessary and subsequently removed by the Contractor. Signs shall be mounted at the appropriate offsets and elevations as prescribed by the Ohio Manual of Uniform Traffic Control Devices. They shall be maintained on supports meeting current safety criteria.

The signs may be erected or uncovered no more than four hours before the actual start of work. The signs shall be removed or covered no later than four hours following restoration of all lanes to traffic with no restricts, or sooner as directed by the Engineer. Temporary sign covering and uncovering due to temporary lane restorations shall be guided by the four hour limitations stated above. Such lane restorations should be expected to remain in effect for 30 or more consecutive calendar days, such as during winter shut-downs.

The R11-H5a-48 signs shall be mounted on 2 No. 3 posts when located within clear zones.

The Contractor may use signs and supports in used, but good, condition provided the signs meet current ODOT specifications. Sign faces shall be retroreflectorized with Type G sheeting complying with the requirements of C&MS 730.19.

Work Zone Increased Penalties signs and supports will be measured as the number of sign installations, including the sign and necessary supports. If a sign and support combination is removed and re-erected at another location as directed by the Engineer, it shall be considered another unit.

Payment for accepted quantities, complete, in place will be made at the contract unit price. Payment shall be full compensation for all materials, labor, incidentals and equipment for furnishing, erecting, maintaining, covering during suspension of work, and removal of the sign and support.

Item 614 - Work Zone Increased Penalties Sign **15 Each**

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General Summary	
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<h1 style="margin: 0;">General Summary</h1>	
	
DESIGNER JDA	
REVIEWER EJK 08/27/21	
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STATION TO STATION	LENGTH	BEGIN WIDTH	ENDING WIDTH	AVERAGE WIDTH	AREA	254 PAVEMENT PLANING, ASPHALT CONCRETE, AS PER PLAN, 1.5"	407 NON-TRACKING TACK COAT	442 ANTI-SEGREGATION EQUIPMENT	442 ASPHALT CONCRETE SURFACE COURSE, 12.5 MM, TYPE A (446), AS PER PLAN, PG76-22M, 1.5"	442 ASPHALT CONCRETE SURFACE COURSE, 12.5 MM, TYPE A (447), AS PER PLAN, PG76-22M, 1.5"	872 VOID REDUCING ASPHALT MEMBRANE (VRAM)
	FT.	FT.	FT.	FT.	SY	SY	GAL	CY	CY	CY	FT
I.R. 422 Eastbound											
724+58.90 724+80.84	21.94	CADD AREA			143	143	12	4		6	
724+80.84 728+72.15	391.31	77.2	57.15	67.2	2921	2921	248	96		122	
728+72.15 733+30.42	458.27	57.15	48	52.6	2677	2677	228	82		112	
728+72.15 738+32.69	960.54	48	38	43.0	4589	4589	390	129		192	
738+32.69 764+08.06	2575.37	38	38	38.0	10874	10874	924	286		454	
BRIDGE CUY-422-1468											
767+00.59 832+14.71	6514.12	38	38	38.0	27504	27504	2338	724		1146	
BRIDGE CUY-422-1597											
834+45.91 835+54.42	108.51	41.17	50.00	45.6	550	550	47	16		23	
835+54.42 840+51.12	496.70	50.00	54.00	52.0	2870	2870	244	87		120	
840+51.12 842+86.89	235.77	54.00	80.30	67.2	1759	1759	150	58		74	
842+86.89 847+50.66	463.77	38.00	38.00	38.0	1958	1958	166	52		82	
BRIDGE CUY-422-1627											
850+29.86 858+40.43	810.57	38.00	38.00	38.0	3422	3422	291	90		143	
858+40.43 861+59.08	318.65	74	65	69.5	2461	2461	209	82		103	
861+59.08 862+96.50	137.42	65	61.48	63.2	966	966	82	31		41	
862+96.50 867+59.03	462.53	61.48	50	55.7	2865	2865	244	89		120	
867+59.03 871+48.10	389.07	50	38	44.0	1902	1902	162	54		80	
871+48.10 924+85.11	5337.01	38	38	38.0	22534	22534	1915	593		939	
924+85.11 925+81.04	95.93	38	50	44.0	469	469	40	13		20	
925+81.04 929+76.45	395.41	50	50	50.0	2197	2197	187	66		92	
929+76.45 930+97.53	121.08	50	53.26	51.6	695	695	59	21		29	
930+97.53 933+14.69	217.16	53.26	75.6	64.4	1555	1555	132	51		65	
933+14.69 940+96.91	782.22	38	38	38.0	3303	3303	281	87		138	
BRIDGE CUY-175-1804											
943+16.33 950+23.69	707.36	38	38	38.0	2987	2987	254	79		125	
950+23.69 951+66.15	142.46	45	35.7	40.4	639	639	54	17		27	
951+66.15 952+59.71	93.56	63.5	61.39	62.4	649	649	55	21		28	
952+59.71 952+64.17	4.46	17	17	17.0	8	8	1	0		1	

STATION TO STATION	LENGTH	BEGIN WIDTH	ENDING WIDTH	AVERAGE WIDTH	AREA	254 PAVEMENT PLANING, ASPHALT CONCRETE, 1.5"	407 NON-TRACKING TACK COAT	442 ANTI-SEGREGATION EQUIPMENT	442 ASPHALT CONCRETE SURFACE COURSE, 12.5 MM, TYPE A (446), AS PER PLAN, PG76-22M, 1.5"	442 ASPHALT CONCRETE SURFACE COURSE, 12.5 MM, TYPE A (447), AS PER PLAN, PG76-22M, 1.5"	872 VOID REDUCING ASPHALT MEMBRANE (VRAM)	
	FT.	FT.	FT.	FT.	SQ. YD.	SY	GAL	CY	CY	CY	FT	
I.R. 422 Westbound												
724+27.32 725+22.13	94.81	48.4	48	48.2	508	508	43	15		22		
725+22.13 729+56.47	434.34	48	48	48.0	2316	2316	197	68		97		
729+56.47 730+55.97	99.50	48	38	43.0	475	475	40	13		20		
730+55.97 765+02.13	3446.16	38	38	38.0	14550	14550	1237	383		607		
BRIDGE CUY-422-1468												
768+13.67 825+49.41	5735.74	38	38	38.0	24218	24218	2059	637		1010		
825+49.41 832+66.46	717.05	38.00	52.40	45.2	3601	3601	306	104		151		
BRIDGE CUY-422-1597												
834+74.78 835+97.85	123.07	57.22	61.10	59.2	809	809	69	26		34		
835+97.85 837+67.52	169.67	61.10	71.30	66.2	1248	1248	106	41		52		
837+67.52 847+07.29	939.77	38	53.70	45.9	4788	4788	407	139		200		
BRIDGE CUY-422-1627												
850+08.54 850+73.37	64.83	67.30	78.50	72.9	525	525	45	18		22		
850+73.37 858+54.75	781.38	38	38	38.0	3299	3299	280	87		138		
858+54.75 860+71.67	216.92	68	50	59.0	1422	1422	121	45		60		
860+71.67 865+40.85	469.18	50	50	50.0	2607	2607	222	78		109		
865+40.85 866+40.08	99.23	50	38	44.0	485	485	41	14		21		
866+40.08 922+73.95	5633.87	38	38	38.0	23787	23787	2022	626		992		
922+73.95 930+27.30	753.35	38	59	48.5	4060	4060	345	120		170		
930+27.30 931+93.15	165.85	59	63	61.0	1124	1124	96	36		47		
931+93.15 934+07.18	214.03	63	72.6	67.8	1612	1612	137	53		68		
934+07.18 934+87.32	80.14	38	38	38.0	338	338	29	9		15		
934+87.32 940+84.15	596.83	38	53.7	45.9	3041	3041	258	88		127		
BRIDGE CUY-175-1804												
943+09.58 943+84.52	74.94	58.6	60.5	59.6	496	496	42	16		21		
943+84.52 945+08.95	124.43	605	70	337.5	4666	4666	397	186		195		
945+08.95 952+22.40	713.45	38	38	38.0	3012	3012	256	79		126		
952+22.40 953+60.22	137.82	74.5	56.7	65.6	1005	1005	85	33		42		
					</							

[illegible]

Pavement Subsummary

SHEET NO.	PLAN SPLIT NO.	STATION TO STATION		LENGTH	807	807	807	807	646	646	646	807		646		850	850	850	850		621	621	621
					WET REFLECTIVE EPOXY PAVEMENT MARKING, EDGE LINE, 6", WHITE	WET REFLECTIVE EPOXY PAVEMENT MARKING, EDGE LINE, 6", YELLOW	WET REFLECTIVE EPOXY PAVEMENT MARKING, LANE LINE, 6"	WET REFLECTIVE EPOXY PAVEMENT MARKING, CHANNELIZING LINE, 12"	STOP LINE	CROSSWALK LINE, 12"	CHEVRON MARKING	WET REFLECTIVE EPOXY PAVEMENT MARKING, DOTTED LINE, 6"		LANE ARROW		GROOVING FOR 6" RECESSED PAVEMENT MARKING, (ASPHALT)	GROOVING FOR 12" RECESSED PAVEMENT MARKING, (ASPHALT)	GROOVING FOR 6" RECESSED PAVEMENT MARKING, (CONCRETE)	GROOVING FOR 12" RECESSED PAVEMENT MARKING, (CONCRETE)		RPM (WHITE)	RPM (WHITE/RED)	RPM (YELLOW/RED)
				FT	FT	FT	FT	FT	FT	FT	FT	FT		EACH		FT	FT	FT	FT		EACH	EACH	EACH
		I.R. 422 Eastbound																					
	1	724+48.12	725+54.55	106.43	107	107	107	213								321	213				2	6	
	1	725+54.55	728+15.29	260.74	261	261	261	522								783	522				4	14	
	1	728+15.29	738+33.39	1018.10	1019	1019	1019					1019				4076					13		
	1	738+33.39	763+64.24	2530.85	2531	2531	2531									7593					32		
		BRIDGE CUY-422-1468																					
	1	763+64.24	766+77.67	313.43	314	314	314											942			4		
	1	766+77.67	831+97.09	6519.42	6520	6520	6520									19560					82		
		BRIDGE CUY-422-1597																					
	1	831+97.09	834+29.89	232.80	233	233	233											699			3		
	1	834+29.89	840+51.36	621.47	622	622	622					622				2488					8		
	1	840+51.36	842+86.30	234.94	235	235	235	470								705	470				3	12	
	1	842+86.30	847+66.67	480.37	481	481	481									1443					7		
		BRIDGE CUY-422-1627																					
	1	847+66.67	850+49.84	283.17	284	284	284											852			4		
	1	850+49.84	858+45.76	795.92	796	796	796									2388					10		
	1	858+45.76	862+98.38	452.62	453	453	453	906								1359	906				6	23	
	1	862+98.38	871+48.02	849.64	850	850	850					850				3400					11		
	1	871+48.02	924+86.04	5338.02	5339	5339	5339									16017					67		
	1	924+86.04	930+99.11	613.07	614	614	614					614				2456					8		
	1	930+99.11	933+16.50	217.39	218	218	218	435								654	435				3	11	
	1	933+16.50	940+97.00	780.50	781	781	781									2343					10		
		BRIDGE CUY-175-1804																					
	1	940+97.00	943+17.58	220.58	221	221	221											663			3		
	1	943+17.58	950+23.71	706.13	707	707	707									2121					9		
	1	950+23.71	953+59.92	336.21	337	337	337	673								1011	673				5	17	
		I.R. 422 Westbound																					
	1	724+27.38	730+55.97	628.59	629	629	629					629				2516					8		
	1	730+55.97	764+84.53	3428.56	3,429	3,429	3,429									10287					43		
	1	764+84.53	767+97.54	313.01	314	314	314											942			4		
	1	767+97.54	825+49.41	5751.87	5752	5752	5,752									17256					72		
	1	825+49.41	832+56.70	707.29	708	708	708					708				2832					9		
		BRIDGE CUY-422-1597																					
	1	832+56.70	834+92.84	236.14	237	237	237					237						948			3		
	1	834+92.84	835+19.71	26.87	27	27	27					27				108					1		
	1	835+19.71	837+67.52	247.81	248	248	248	496								744	496				4	13	
	1	837+67.52	846+83.45	915.93	916	916	916	1832				916				3664	1832				12	46	
		BRIDGE CUY-422-1627																					
	1	846+83.45	848+46.34	162.89	163	163	163					163						652			3		
	1	848+46.34	849+87.21	140.87	141	141	141	282								423	282		282		2	8	
	1	849+87.21	850+73.82	86.61	87	87	87	174								261	174				2	5	
	1	850+73.82	858+53.27	779.45	780	780	780									2340					10		
	1	858+53.27	860+71.73	218.46	219	219	219	437								657	437				3	11	
	1	860+71.73	866+37.19	565.46	566	566	566					566				2264					8		
SUBTOTALS					37139	37139	37139	6440				6351				112070	6440	5698	282		478	166	
TOTALS CARRIED TO GENERAL SUMMARY					14.07 MI		7.04 MI	6440				6351				21.23 MI	6440	1.08 MI	282		644		

Pavement Marking Subsummary

DESIGN AGENCY



DESIGNER

JDA

REVIEWER

EJK 08/27/21

PROJECT ID

99537

SHEET

19

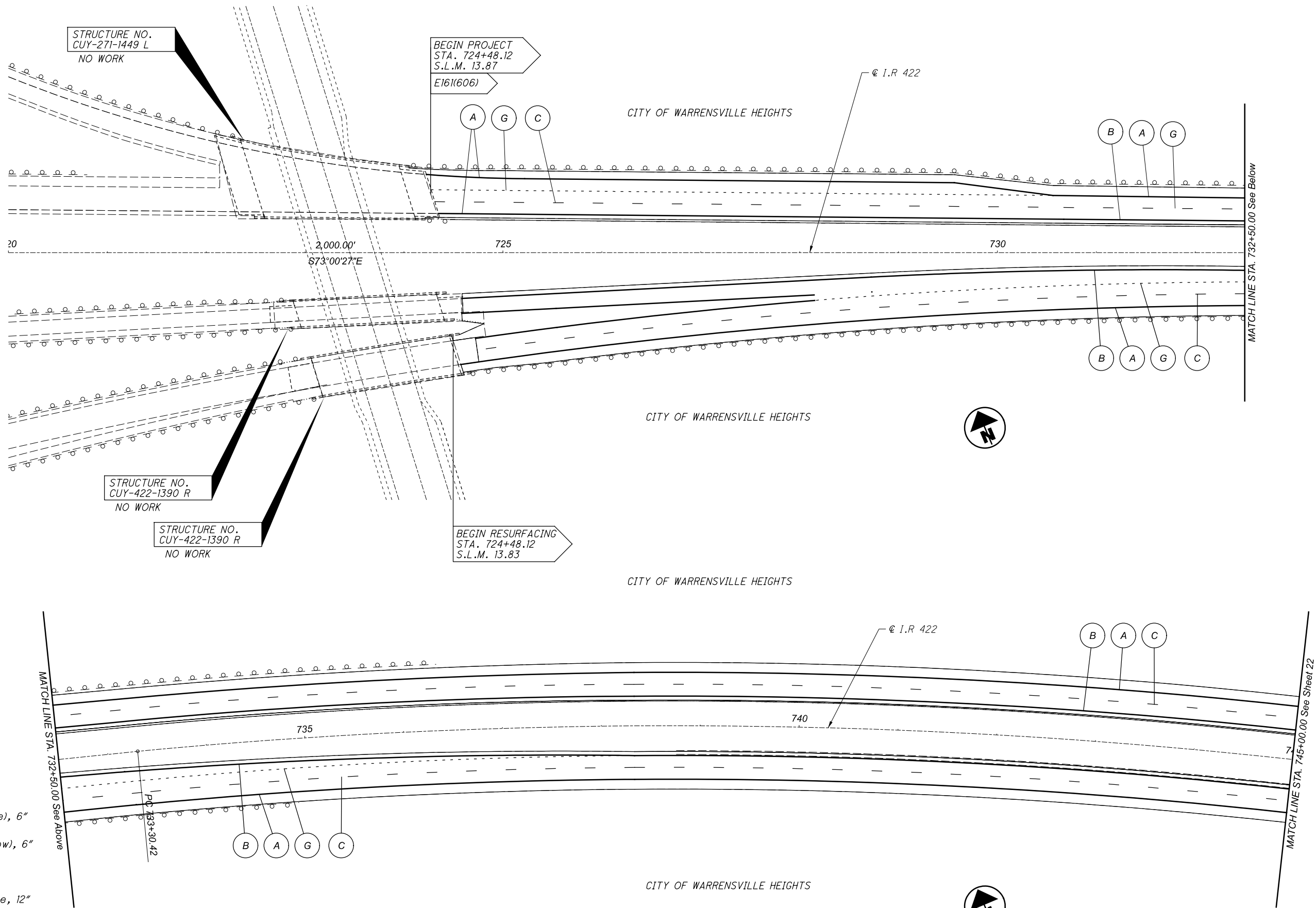
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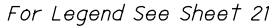
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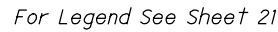
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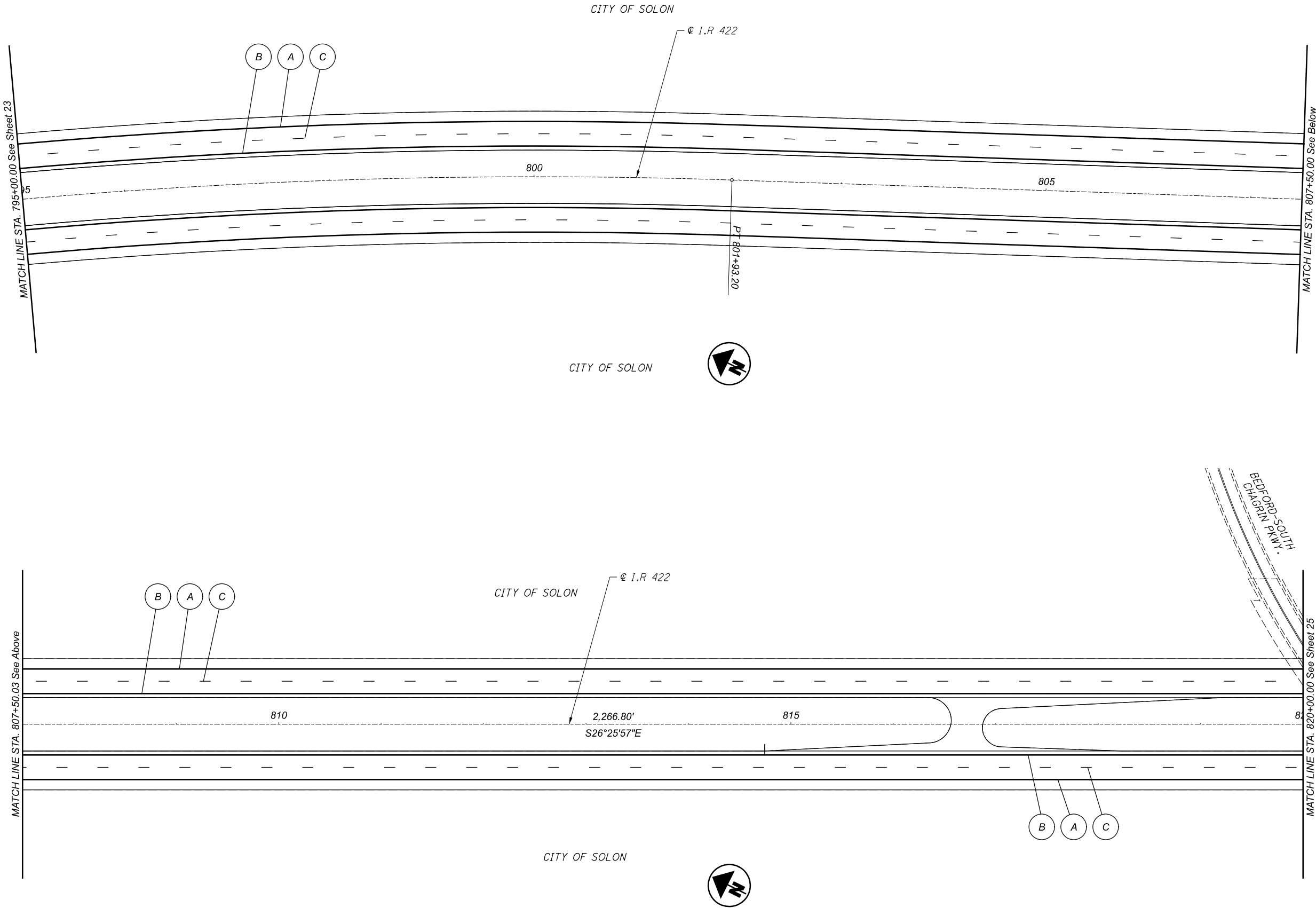
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<div style="text-align: center;"> REVIEWER EJK 08/27/21 </div>	
<div style="text-align: center;"> PROJECT ID 99537 </div>	
SHEET 20	TOTAL 31

- Legend**
- A Edge Line (White), 6"
 - B Edge Line (Yellow), 6"
 - C Lane Line
 - D Channelizing Line, 12"
 - E Stop Line
 - F Chevron Marking
 - G Dotted Line, 6" (3' Dash, 9' Gap)
 - Lane Arrow









DESIGN AGENCY

DESIGNER

JDA

REVIEWER

EJK 08/27/21

PROJECT ID

99537

SHEET

24

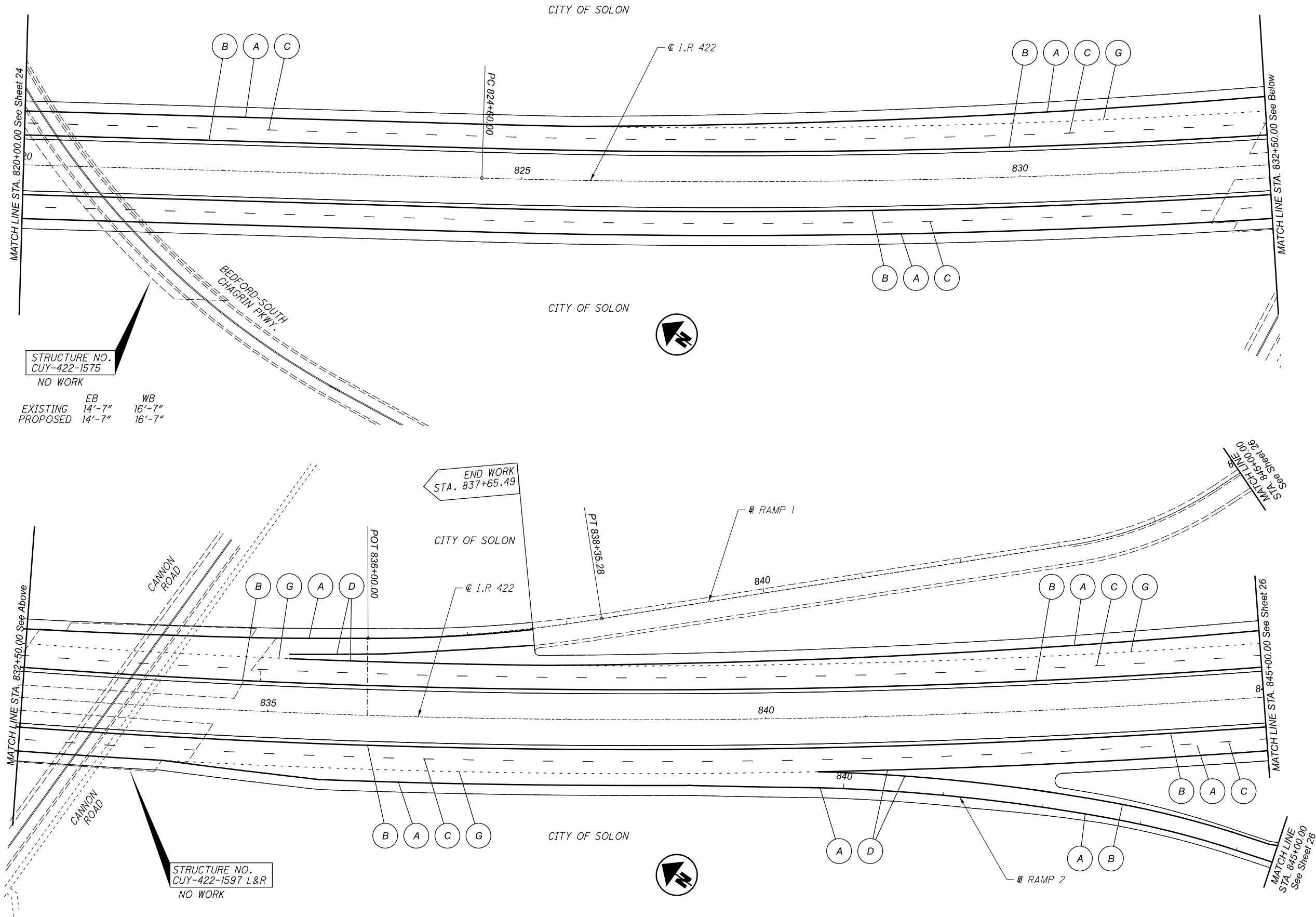
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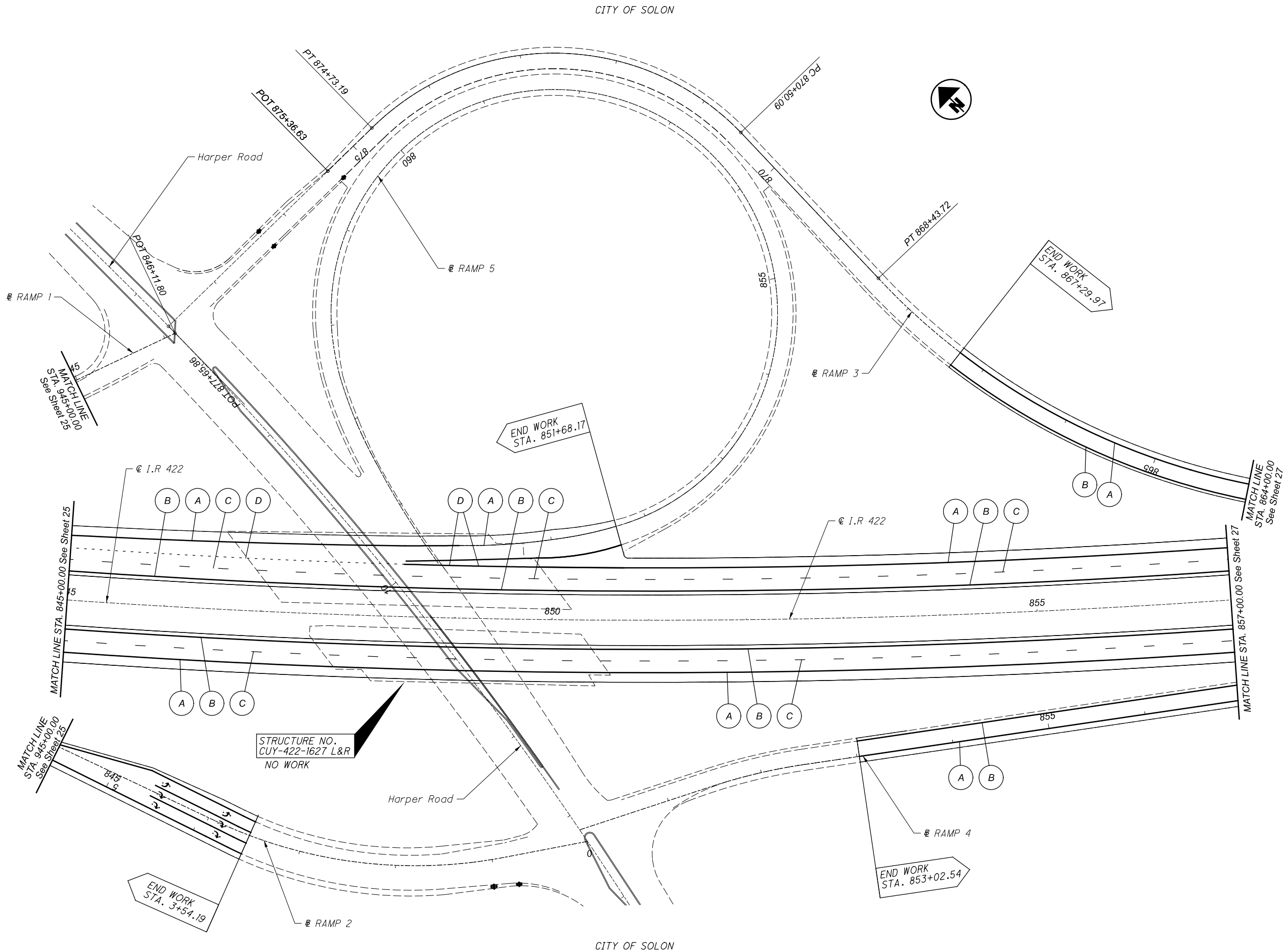
31

General Plan

Sta. 795+00.00 to Sta. 820+00.00

HORIZONTAL SCALE IN FEET





HORIZONTAL
SCALE IN FEET
0 25 50 100

General Plan
Sta. 845+00.00 to Sta. 857+00.00

DESIGN AGENCY

DESIGNER
JDA

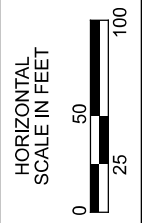
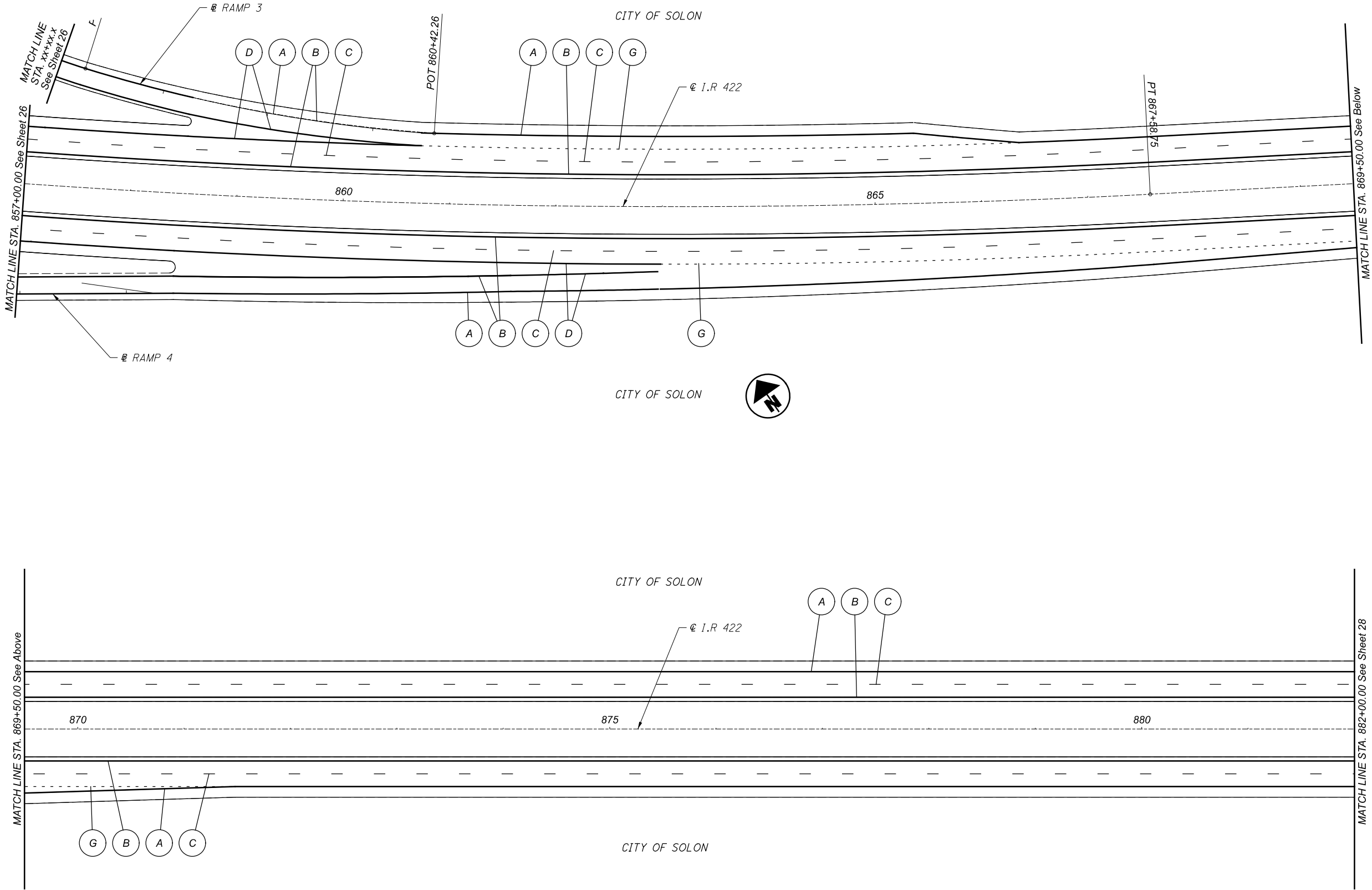
REVIEWER
EJK 08/27/21

PROJECT ID
99537

SHEET
26

TOTAL
31

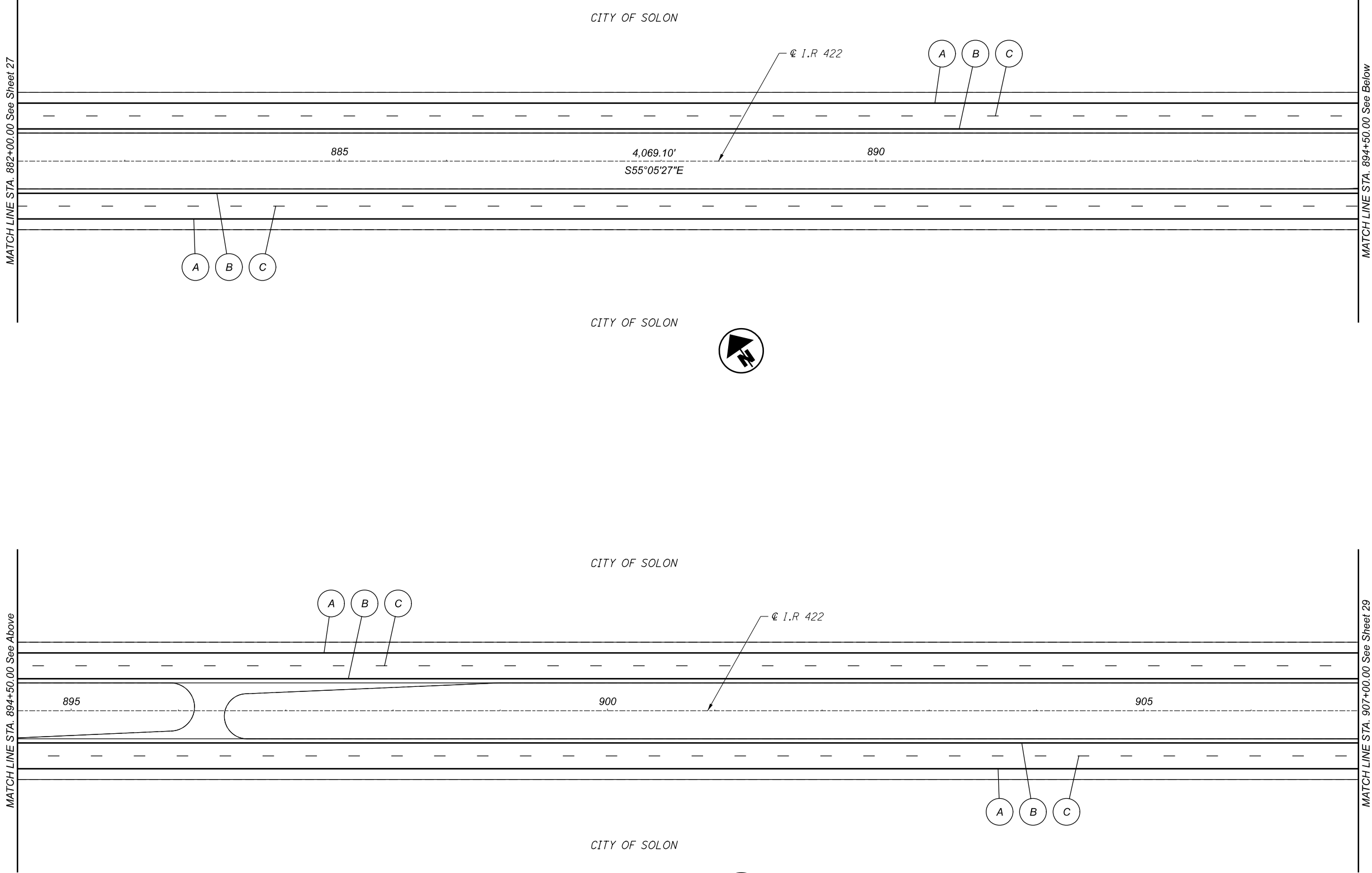
For Legend See Sheet 21



General Plan
Sta. 857+00.00 to Sta. 882+00.00

DESIGN AGENCY	
DESIGNER	
JDA	
REVIEWER	
EJK 08/27/21	
PROJECT ID	
99537	
SHEET	TOTAL
27	31

For Legend See Sheet 21



For Legend See Sheet 21

DESIGN AGENCY

DESIGNER

JDA

REVIEWER

EJK 08/27/21

PROJECT ID

99537

SHEET

28

TOTAL

31

General Plan

Sta. 882+00.00 to Sta. 907+00.00

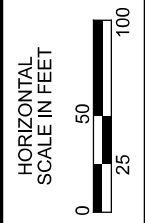
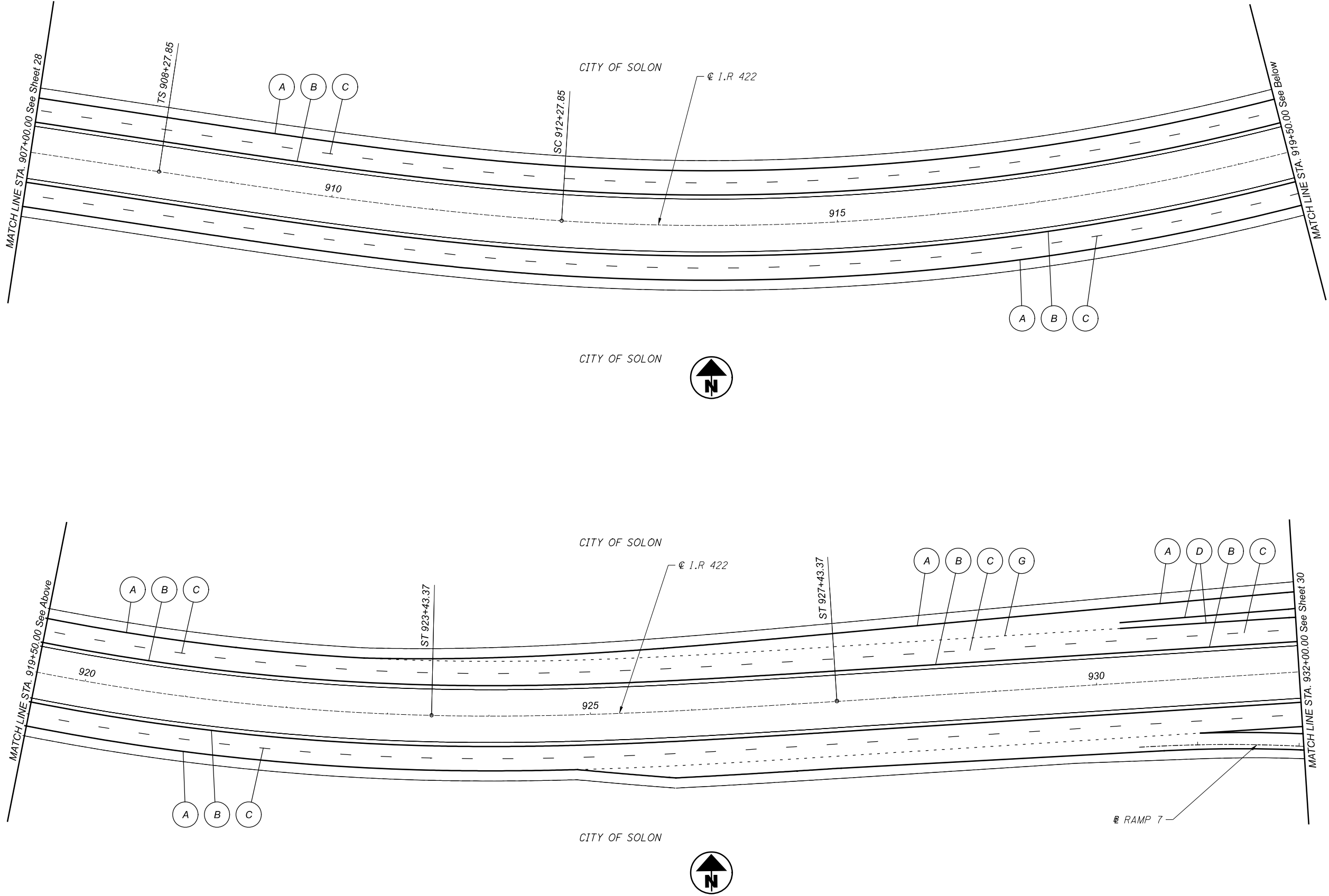
HORIZONTAL SCALE IN FEET

0

25

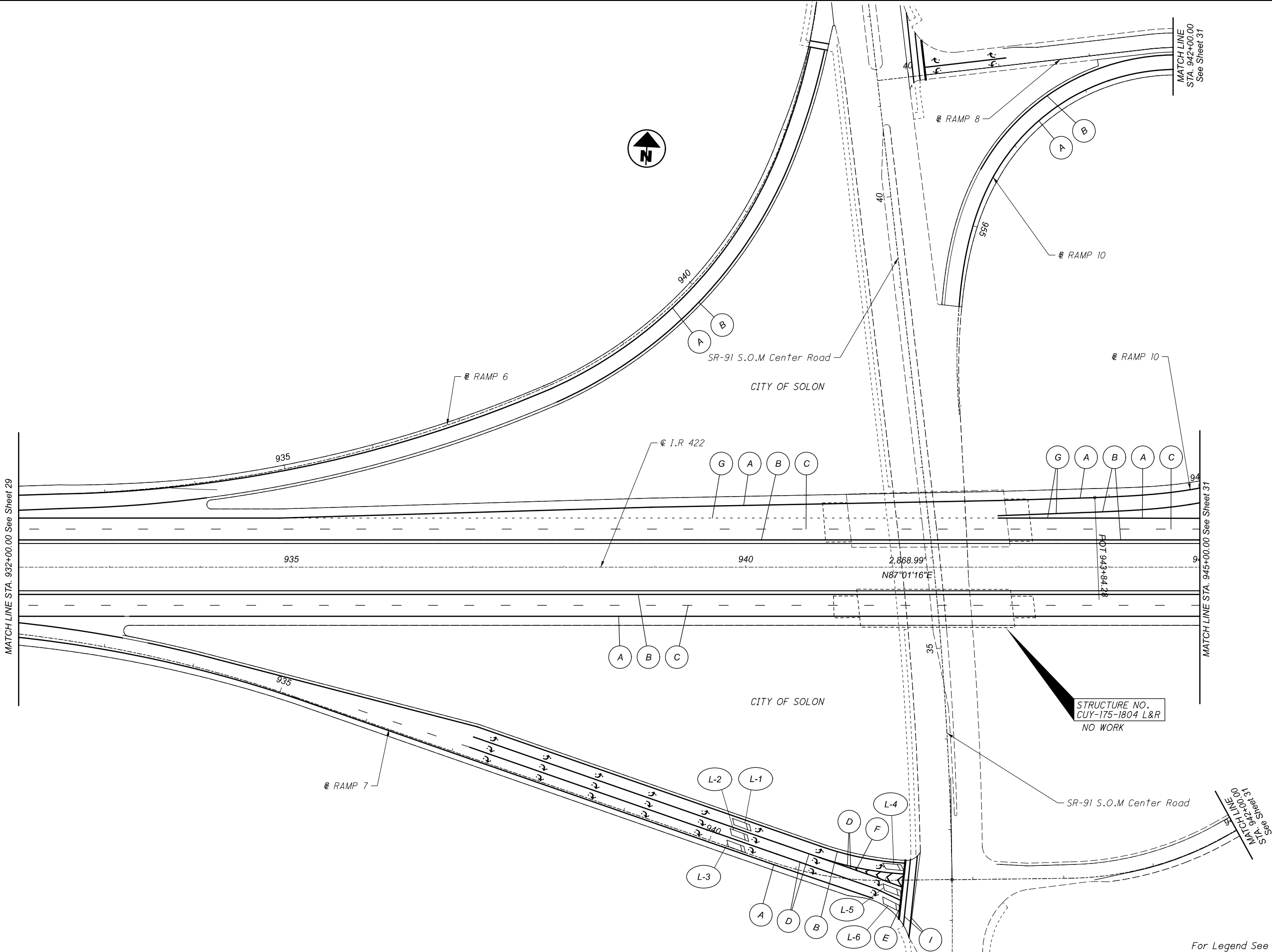
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100



General Plan
Sta. 907+00.00 to Sta. 932+00.00

DESIGN AGENCY	
DESIGNER	
JDA	
REVIEWER	
EJK 08/27/21	
PROJECT ID	
99537	
SHEET	TOTAL
29	31



General Plan

Sta. 932+00.00 to Sta. 945+00.00

DESIGN AGENCY

DESIGNER

JDA

REVIEWER

EJK 08/27/21

PROJECT ID

99537

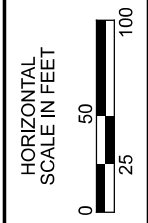
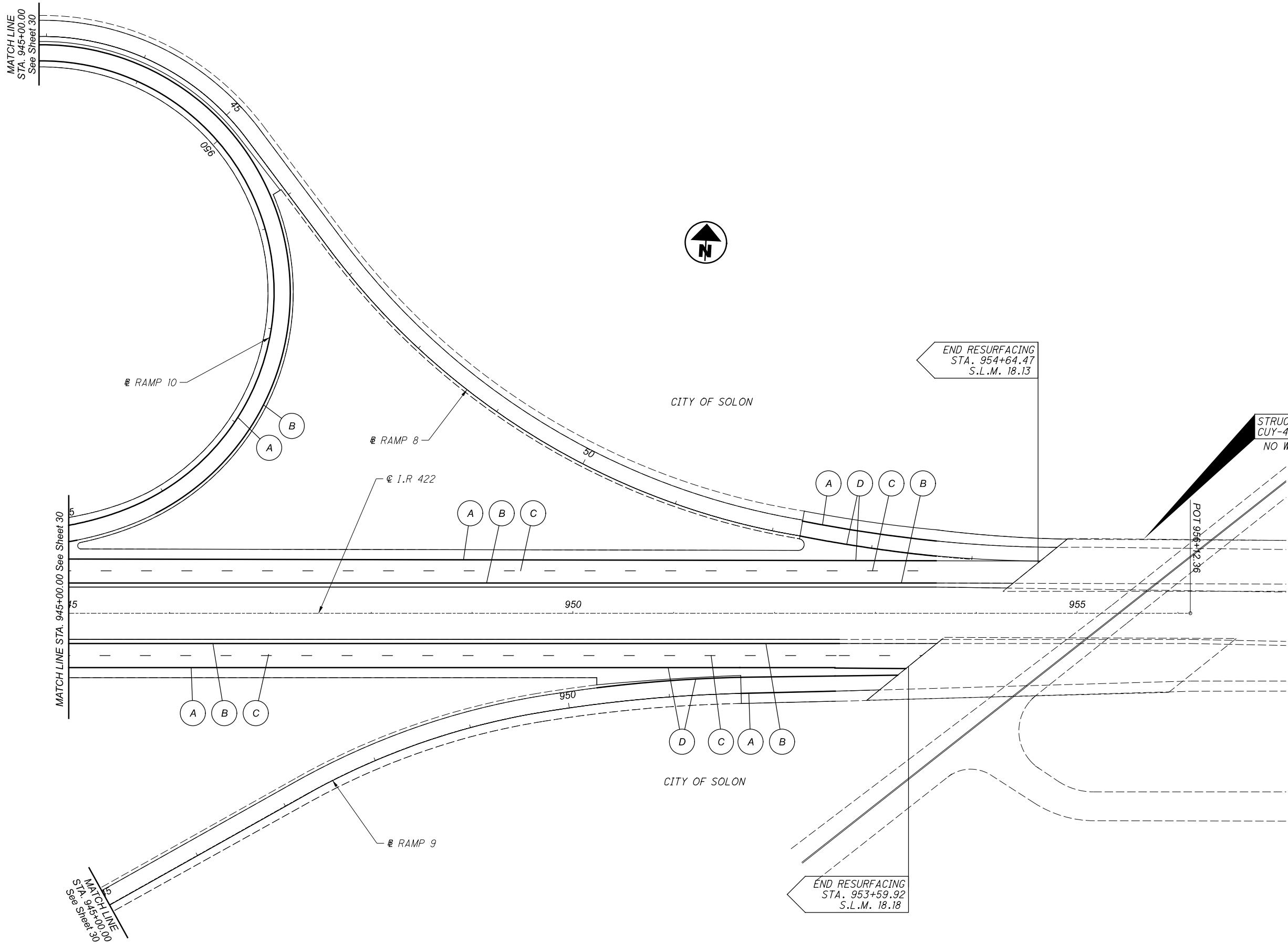
SHEET

30

TOTAL

31

HORIZONTAL SCALE IN FEET



General Plan
Sta. 945+00.00 to End Project

DESIGN AGENCY	
DESIGNER	JDA
REVIEWER	EJK 08/27/21
PROJECT ID	99537
SHEET	TOTAL
31	31

For Legend See Sheet 21

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION 400
PAVER MOUNTED THERMAL PROFILING

March 16, 2022

- 400.01 Description
- 400.02 Equipment
- 400.03 Thermal Profile Data Collection
- 400.04 Thermal Profile Analysis Software
- 400.05 Calculations Submittals
- 400.06 Basis of Payment

400.01 Description. This work consists of obtaining thermal profiles to identify the presence of any thermal segregation of an un-compacted mat of hot mix asphalt. This method includes procedures for determining thermal profile using a paver-mounted thermal imaging system.

400.02 Equipment. Provide a Paver Mounted Thermal Profiler (PMTP) system as follows:

A. PMTP System Supplier. Use a thermal equipment supplier that can provide a qualified representative for on-site technical assistance during the initial setup, pre-construction verification, and data management and processing, as needed, during the Project to maintain equipment within specifications and requirements.

B. PMTP System Software. Provide the Engineer with access to the cloud storage and cloud computing before the start of paving requiring the PMTP method until ninety (90) days after final acceptance of all work.

Use PMTP software, and cloud computing and storage, capable of collecting, mapping, retaining, and analyzing the mat temperature readings during placement and exporting thermal profile data meeting the requirements of this provision and supporting the following features:

- (1) Filtering by surface temperature reading location (items 8 through N of Table 400.02-3).
- (2) Display through a map/graph:
 - (2.1) Surface temperature readings across the required width and with respect to a user defined subplot length,
 - (2.2) Paver speed and
 - (2.3) Paver stops (location and duration).
- (3) Provide the paving length and duration.

C. PMTP System

1. System Requirements. Use a PMTP system that functions independently from the paving crew during normal paving operations but requires an operator to initiate the start of data collection. After initializing the equipment, no operator attendance is required for continuous data collection.

Ensure that the power consumption of all installed equipment does not exceed the capacity of the equipment providing operating power. Complete discharge of this system shall not impact the vehicle’s regular electrical system.

Provide the Engineer with PMTP System(s) calibrated and installed according to Manufacturer’s recommendations.

Ensure the PMTP System meets the requirements of Table 400.02-1 and is instrumented with the following:

TABLE 400.02-1 PMTP SYSTEM REQUIREMENTS

Parameter	Requirement
Longitudinal and Lateral Surface Temperature Readings	≤ 1-ft (300-mm) intervals at all paving speeds Tolerance: ± 1 in (25 mm)
Surface Temperature Readings Total Measurement Width	Traffic / Required Auxiliary lane(s) paved in one (1) pass.
Surface Temperature Readings	Range: 32°F (0°C) to 480°F (250°C) Accuracy: ± 3.6°F (2°C) or ± 2.0% of the sensor reading, whichever is greater.
GNSS	Accuracy ≤ ± 4 feet (1.2 m) in the X and Y Direction

- (1) Modem, or Wi-Fi, for transferring data to cloud storage.
- (2) Onboard Documentation System – Use an onboard documentation system with a minimum of the following capabilities:
 - (2.1) Display (in real-time) a map of the surface temperature readings, total distance, paver speed and location in terms of station and/or GNSS coordinates.
 - (2.2) Report the surface temperature readings and GNSS status.
 - (2.3) Provide real-time statistical summaries of the surface temperature readings.
 - (2.4) Have the ability to manually export data using a removable media device.
 - (2.5) Allows the operator to define the lot currently being placed per Tables 400.03-1 and 400.03-2.

2. Thermal Profiling Data. Provide thermal profiling data in a file format compatible with Veta. Veta accepts the following file formats: .log, .paveproj, .csv, or .tds. Ensure the PMTP date/time stamp is reflective of the local time zone for both mapped and exported data. Encrypt the data logged in the results files to prevent tampering or manipulation.

Veta is a software that stores, maps and analyzes geospatial data resulting from PMTP. This software can perform standardized data processing, analysis, and reporting to provide project summary results from various PMTP manufacturers. In particular, the software can provide statistics, histograms, correlations for these measurements, document coverage area and evaluates the uniformity of the PMTP measurements.

Include the information in Table 400.02-2 in the header of each data file or section. Include the fields in Table 400.02-3 with each data point.

TABLE 400.02-2 REQUIRED INFORMATION IN DATA HEADERS

Item No.	Description	Example Data included in Header
1	State Project Number, Highway and/or Section	Highway 77
2	Machine Trade Name	ABC Company
3	Machine ID	1234AC78
4	Lateral Spacing between surface temperature measurements (in)	12
5	Longitudinal Spacing between surface temperature measurements (inch)	12
6	Vertical Distance between the temperature sensor(s) and asphalt pavement mat (inch)	120
7	Reporting resolution for independent surface temperature data – in the paver moving direction (inch)	13
8	Number of lateral surface temperature measurements/sensors	12
9	Number of surface temperature measurement data blocks	5000

TABLE 400.02-3 REQUIRED FIELDS FOR EACH DATA BLOCK

Item No.	Date Field Name	Data Format Examples
1	Date Stamp (YYYYMMDD)	20080701
2	Time Stamp (HHMMSS.S -military format)	090504.0 (9 hr 5 min. 4.0 s.)
3	Longitude (decimal degrees, with at least 6 significant digits)	94.859204
4	Latitude (decimal degrees, with at least 6 significant digits)	45.227773
5	Distance (feet)	1
6	Direction heading (degree angle, clockwise from the north); or calculated value, in Veta, using values from the other data blocks, ft/min	45
7	Speed (feet per minute or inches per minute)	30.0
8	Surface temperature Reading/Location 1 (°F)*	290
9	Surface temperature Reading/Location 2 (°F)*	295
...
N	Surface temperature Reading/Location N (°F)*	300

* Surface temperature readings/locations are numbered from 1 to N, left to right, in the direction of paving.

3. PMTP System Setup on Paver(s). Instrument all pavers that are paving the traffic and required auxiliary lanes with the PMTP System. The PMTP system is not required on secondary pavers. Secondary pavers are those pavers that are not used for paving of traffic lanes, but are used for paving of shoulders, ramps, intersecting streets, etc.

Ensure the installed PMTP System takes measurements within 10 ft (3 m) of the trailing edge of the screed plate. Ensure that brackets and/or other obstructions, used for pavement smoothness, that are located in the measurement area do not affect more than two (2) surface temperature readings recorded in the lateral direction (items number 8 through N in Table 400.02-3).

Verify that the surface temperature readings and the GNSS are working within the requirements of this specification prior to the first day of paving and when requested by the Engineer.

400.03 Thermal Profile Data Collection.

A. Lot Establishment. A lot is defined as all asphalt paving for a given day, lift, material type and centerline offsets.

Distinctly identify the lots for thermal profile measurements using the standardized format per Tables 400.03-1 and 400.03-2. Ensure that the lot designations are digitally stored with the associated thermal profile measurements.

The GNSS coordinates contain the date component of the lot designation, and therefore, it is not included in the standardized naming convention.

TABLE 400.03-1 STANDARDIZED NAMING CONVENTION FOR THERMAL PROFILE LOTS

Standardized Format	Example
ROUTE-MATL-L#-XXX-XXX-DT	(e.g., I70-442-IC-19.0mm-L3-12L-CL-NB)

TABLE 400.03-2 STANDARDIZED ABBREVIATIONS FOR THERMAL PROFILE LOTS

Abbreviation	Definition		
ROUTE	ROUTE DESIGNATION. Replace “ROUTE” with the route system, as designated by the following acronyms or short form, immediately followed by the route number (e.g., I70).		
	Acronym or Short Form	Full Name or Meaning	
	IR	Interstate Highway	
	US	US Highway	
	SR	State Route	
	CR	County Road	
	TR	Township Route	
MATL	MATERIAL/ SURFACE TYPE. The material/surface type is designated by the following acronyms or short form:		
	Acronym or Short Form	Specification	Full Name or Meaning
	301	301	Asphalt Base
	302	302	Asphalt Base
	424A	424	Fine Graded Polymer Type A
	424B	424	Fine Graded Polymer Type B
	443-SMA	443	Stone Matrix Asphalt
	441-SC-T1	441	Type 1
	441-IC-T2	441	Type 2
	442-SC-9.5mm	442	9.5mm Surface Course
	442-SC-12.5mm	442	12.5mm Surface Course
	442-IC-9.5mm	442	9.5mm Intermediate Course
	442-IC-12.5mm	442	12.5mm Intermediate Course
	442-IC-19.0mm	442	19.0mm Intermediate Course
L#	LIFT NUMBER. The lift number is designated by the following acronym or short form and are numbered from the surface down:		
	Acronym or Short Form	Full Name or Meaning	
	L1	Lift 1	
	L2	Lift 2	
	L3	Lift 3	
	
	Ln	Lift n	

XXX-XXX	<p>CENTERLINE OFFSET. The location of the left and right edge of the production area with respect to the centerline, facing in the direction of increasing stationing. Stationing typically increases from West to East and South to North. On divided sections, the inside edge of pavement is treated as the Center Line. Each character of the abbreviation is defined as the following:</p> <div><div><div>XX</div><div>(a)</div></div><div><div>X</div><div>(b)</div></div><div><div>XX</div><div>(c)</div></div><div><div>X</div><div>(d)</div></div></div> <div><div>(a)</div><div>The offset distance (in feet rounded to the whole number) from the centerline to the left edge of the production area (e.g., CL, 12, 24). CL reflects the Center Line.</div></div> <div><div>(b)</div><div>R or L, to reflect Right (R) or Left (L) of Centerline, in the direction of increasing station numbering.</div></div> <div><div>(c)</div><div>The offset distance (in feet rounded to the whole number) from the centerline to the right edge of the production area (e.g., CL, 12, 24). CL reflects the Center Line.</div></div> <div><div>(d)</div><div>R or L, to reflect Right (R) or Left (L) of Centerline, in the direction of increasing station numbering.</div></div>										
DT	<p>DIRECTION OF TRAVEL. The direction of travel is designated by the following acronyms or short form:</p> <table><tr><td>Acronym or Short Form</td><td>Full Name or Meaning</td></tr><tr><td>NB</td><td>North Bound</td></tr><tr><td>SB</td><td>South Bound</td></tr><tr><td>EB</td><td>East Bound</td></tr><tr><td>WB</td><td>West Bound</td></tr></table>	Acronym or Short Form	Full Name or Meaning	NB	North Bound	SB	South Bound	EB	East Bound	WB	West Bound
Acronym or Short Form	Full Name or Meaning										
NB	North Bound										
SB	South Bound										
EB	East Bound										
WB	West Bound										

B. Sublot Establishment Using Veta. Once established, the Engineer will divide the lot into 150 linear ft (45 linear m) sublots. Partial sublots will be prorated by length.

C. Thermal Profile Measurements. Collect thermal profiles on **100 percent of each lift** of trafficked lanes:

Thermal profiles are not required on auxiliary lane tapers, ramps less than 1500ft, shoulders, cross-overs, non-continuous turn lanes, acceleration/deceleration lanes less than 1500ft and intersecting streets.

Ensure that the PMTP system is not capturing measurements outside of the traffic and required auxiliary lanes, as 100 percent of the recorded data is used in the thermal segregation analysis. Turn the data collection and recording off when not collecting thermal profile measurements.

D. PMTP System Failure. System Failure occurs when the PMTP system does not collect and/or store data per the requirements of this provision and/or the paver becomes inoperable.

Immediately notify the Engineer when PMTP system failure occurs and immediately after resolution of the issues. Additionally, provide the Engineer with a written notification of the dates of PMTP system failure, along with a brief description detailing the PMTP system failure and the paving areas affected by this failure. Do not proceed with placement the next working day without a functioning PMTP system.

400.04 Submittals. Thermal Profiling Data Submittal. Store the thermal profiling data internally until transfer of data. Transfer the thermal profiling data directly from the PMTP to Cloud Storage within 15-minute intervals, or at least once per day when there is limited cellular coverage. Notify the Engineer when cellular coverage is limited or not available. Transfer the thermal profiling data directly to the Engineer at the end of daily paving when cellular coverage is not available.

400.05 Calculations by ODOT

A. Thermal Segregation

1. Surface Temperature Readings. The Department will evaluate thermal segregation using 100 percent of the recorded data for each sublot. The following surface temperature readings will be excluded from each sublot:
- (1) Surface temperature readings less than 180°F (80°C); and

(2) Surface temperature readings within 2 ft (0.5 m) prior to and 8 ft (2.5 m) after paver stops that are greater than 1 minute in length.

B. Thermal Coverage. The Department will calculate thermal coverage for each lift per Equation 400.05-3.

1. Thermal Profile Lot Length

Equation 400.05-1: Thermal Profile Lot Length = $\sum_{i=1}^n Sublot\ Length_i$

Where:

Thermal Profile Lot Length = the total linear length of the surface temperature readings used for the thermal segregation analysis for the given lot, ft (reported to the nearest whole number);

n = the total number of sublots; and

Sublot Length = the linear length of sublot *i*, ft (reported to the nearest whole number).

2. Thermal Profile Lift Length

Equation 400.05-2: Thermal Profile Lift Length = $\sum_{i=1}^n (Thermal\ Profile\ Lot\ Length)_i$

Where:

Thermal Profile Lift Length = the total linear length of the surface temperature readings used for the thermal segregation analysis for the entire lift, ft (reported to the nearest whole number);

n = the total number of lots for the entire *lift*; and

$(Thermal\ Profile\ Lot\ Length)_i$ = the total *linear* length of the surface temperature readings used for the thermal segregation analysis for the given lot *i* and lift as calculated by Veta, ft (reported to the nearest whole number). (See Equation 400.05-1)

3. Thermal Coverage

Equation 400.05-3: Thermal Coverage = $\left(\frac{Thermal\ Profile\ Lift\ Length}{LM \times 5280}\right) \times 100$

Where:

Thermal Coverage = % (reported to the nearest whole number);

Thermal Profile Lift Length = see Equation 400.05-2, ft (reported to the nearest whole number); and

Lane Miles (LM) = Total number of lane miles for the given lift requiring thermal profiling, miles (reported to the hundredth).

400.06 Basis of Payment. Interruptions in the availability of VRS Network and/or satellite signals to operate this system will not result in any reduction to the daily thermal coverage or adjustment to the “Basis of Payment” for any construction items or to Contract time.

Monetary Deductions for thermal coverage will be assessed per Lift per Table 400.6-1.

Table 400.6-1 Monetary Deduction for Thermal Coverage (TC)	
Thermal Coverage (Percent)	Total Monetary Deduction Per Lift
70 percent or greater	No Monetary Deduction
less than 70	<div>Total Monetary Deduction = $(20 \times TC - \\$1400) \times (LM)$</div> <div>where:</div> <div>TC = Thermal Coverage, see Equation 400.05-3 and</div> <div>LM = Lane Miles, see Equation 400.05-3.</div>

The Department will pay for accepted work at the contract prices as follows:

Item	Unit	Description
690E98400	Lump Sum	Paver Mounted Thermal Profiling