

OHIO DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

FHWA REGION	STATE	FEDERAL PROJECT			
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PART	COUNTY	ROUTE	SECTIONS	PROJECT TERMINI		NET LENGTH MILES	TOWNSHIP	CITY	VILLAGE
				BEGIN	END				
1	LOGAN	33	3.44	362+75	337+50	0.48			
				333+70	238+14	1.81			

LOGAN COUNTY
LOG-33-3.44

PLAN NO.

The Standard 19 85 Specifications of the State of Ohio, Department of Transportation, including changes and Supplemental Specifications listed in the plans and proposal shall govern these improvements.

I hereby approve these plans and declare that the making of these improvements will require the closing of the highways to traffic on Parts No. 1 and that detours will be provided by State forces.

- Approved Date 10/11/85 G. Kenneth Capella, P.E.
District Deputy Director of Transportation
- Approved Date _____ Engineer of Bridges
- Approved Date _____ Engineer of Maintenance
- Approved Date _____ Chief Engineer, Operations
- Approved Date _____ Assistant Deputy Director, Program Development
- Approved Date _____ Chief Engineer, Construction
- Approved Date _____ Chief Engineer, Design
- Approved Date _____ Assistant Director, Department of Transportation
- Approved Date _____ Director, Department of Transportation



DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED:

DIVISION ADMINISTRATOR DATE

STANDARD DRAWINGS	DATE	NO.	SUPPLEMENTAL SPECIFICATIONS	DATE
BP-5	1-11-85	847		10-17-83
		947		10-17-83
		1047		10-17-83

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ITEM SPECIAL - THIN-BONDED POLYESTER STYRENE POLYMER CONCRETE OVERLAY

DESCRIPTION: This work shall consist of placing a thin-bonded polyester styrene polymer concrete (PSPC) overlay on a prepared portland cement concrete (PCC) pavement surface in accordance with these specifications and in reasonably close conformity with the lines, grades and typical sections shown in the plans or established by the Engineer.

The overlay system shall consist of a high molecular weight methacrylate resin prime coat followed by the placing of a PSPC overlay. PSPC shall consist of a 100% reactive wax-free, unsaturated isophaltic polyester resin binder and a well graded silica aggregate. Both prime and binder resins shall contain compatible promoter/hardeners for in-situ polymerization. Silica screenings shall be applied to the finished surface prior to the gelling of the resin binder.

MATERIALS

SCREENINGS: Screenings shall consist of silica fine aggregate and shall be clean, dry and free from dirt and other deleterious material such as oils. The percentage composition by weight shall conform to the following gradings:

Sieve Size	Percent Passing
No. 6	95-100
No. 8	75-100
No. 16	30-50
No. 20	0-12
No. 200	0-2

Screenings shall also conform to the following quality requirements:

Tests	Requirements
Loss in Los Angeles Rattler (after 100 revolutions)	703.02 10% Max.
Loss in Los Angeles Rattler (after 500 revolutions)	703.02 40% Max.

The moisture content of the aggregates shall not exceed one-half of the percentage of absorption at the time of applying the cover material to the PSPC surface.

AGGREGATES: Silica aggregate for the PSPC shall conform to the same quality requirements as the screenings and shall be within the following gradings:

COARSE AGGREGATE		FINE AGGREGATE	
Sieve Size	% Passing	Sieve Size	% Passing
1/2"	100	3/8"	100
3/8"	85-100	No. 4	95-100
No. 4	10-30	No. 8	70-100
No. 8	0-10	No. 16	45-80
No. 16	0-5	No. 30	25-60
		No. 50	5-30
		No. 100	1-10
		No. 200	0-4

Fine aggregate to total aggregate ratio shall be 0.50 unless otherwise directed by the Representative or the Engineer.

The moisture content of the aggregates shall not exceed 0.5 of the percent absorption at the time of mixing with the resin.

JOINT SEALANT: Joint sealant shall conform to the requirements of ASTM D-3405.

Each lot of joint sealant shipped to the job site shall be accompanied by a Certificate of Compliance as provided in 101.061, and shall be accompanied with storage and heating instructions and precautions.

PRIME COAT AND POLYESTER STYRENE POLYMER CONCRETE RESINS: The resin Supplier of the prime coat and polymer concrete resins shall be Chagrin Valley Industries, Inc., 45 E. Washington Street, Chagrin Falls, Ohio (216/247-5311).

The Supplier shall furnish recommendations regarding the use of equipment and equipment modifications as well as sources for obtaining modification devices and accessories which have been used in previously performed successful contracts including plans, specifications and source supplier lists.

The Contractor shall arrange to have a Technical Representative of the resin Supplier available (preferably a polymer chemist) on the project for all pre-job conferences and during all phases of the mixing and placing of the PSPC. The Representative shall be familiar with resin formulation and general performance characteristics and shall assist or direct procuring suitable equipment or modifying available equipment for use in blending, mixing, placing and finishing PSPC. The Representative shall also advise on the application of prime coat, blending and mixing of catalyst and polyester/styrene materials and the placing and finishing operations.

The Technical Representative shall advise the Contractor and the Engineer in matters of safety and handling of the materials associated with the PSPC overlay.

The resin characteristics such as Specific Gravity, Stability, Elongation, Tensile Strength, Styrene Content, Silane Coupler, Heat Distortion and Binder Gel Time shall be submitted by the Supplier to the Engineer in accordance with 101.061.

CONSTRUCTION

PCC PAVEMENT SURFACE PREPARATION PCC pavement shall be cleaned with steel shot blasting equipment such as by the "Blastrac" surface preparation system, WHEELABRATOR-FRYE, Inc., Materials Systems Division, 500 S. Byrkit Avenue, Mishawaka Indiana 46544 (219/255-2141) or the "Powerblast" System, GOFF CORP., 1 Pleasant Grove Road, P.O. Box 1607, Seminole, Oklahoma 74868 (405/382-6900) to remove any oil, dirt, rubber, excess joint sealant on pavement surface, and other potentially detrimental material, as determined by the Engineer, would prevent proper bonding or curing of the PSPC overlay. The creation of dust which obstructs the view of motorists, as determined by the Engineer, will not be permitted.

After the shot blasting operation, water may be used to aid in the cleaning, but the surface of the concrete shall be dry for a minimum of 24 hours immediately prior to placing the primer. Equipment shall be fitted with suitable traps, filters, drip pans or other devices to prevent oil, fuel, grease or other deleterious matter from being deposited on the existing PCC pavement. Any area that becomes contaminated shall be cleaned at the Contractor's expense.

Immediately prior to placing the prime coat, the surface shall be further cleaned by compressed air blasting to remove dust and any other loose material. Traffic will not be allowed on that portion of the pavement that has been cleaned. Contamination of the pavement surface by construction equipment or from another source shall be prevented by placement of a clean polyethylene sheet or other approved covering on the surface of the pavement following the air blast cleaning.

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PRIME COAT: The PCC pavement surface shall be visibly dry before the prime coat is applied and the PCC surface shall not be less than 40 degrees F. The rate of application shall be one gallon per 15 to 20 square yards of surface, as directed by the Engineer.

The prime coat resin shall be initiated to a gelled condition. If the hardened prime coat resin becomes contaminated before PSPC placement, the resin shall receive an additional blast cleaning and an additional prime coat of fresh resin shall be applied. If the unhardened prime coat is damaged, it shall be removed and the prime coat shall be reapplied.

Equipment for applying the prime coat shall be a power driven machine capable of producing enough pressure to force the resin through suitable spray nozzles without the use of compressed air for atomization. Pressure pots will not be allowed. The peroxide shall be introduced into the promoted resin stream during the spray application to allow thorough mixing before exiting spray nozzles. A control device shall be provided that will allow peroxide introduction to within 10 percent accuracy. The amount of peroxide shall be controlled by the operator and may be varied from time to time as field conditions warrant.

Flushing out the nozzles may be accomplished with compressed air, solvent or other suitable methods, and shall be done in a manner not to contaminate the primed or unprimed surfaces while flushing into suitable containers for later disposal. Disposal of waste resins and solvents shall conform to the recommendations of the resin manufacturer and the applicable safety codes pertaining to the specific material.

MIXING AND PLACING: Mixing equipment for the PSPC shall be one or more mobile, screw-auger type, continuous mixers (as defined in ASTM C-685) with self-contained separate aggregate, resin, and peroxide compartments. The aggregate shall be accurately metered to within 2 1/2-percent of the specified weight for the aggregate. The promoted resin shall be metered into the aggregate to within 2-percent of the specified volume.

Resin binder shall be a nominal 12-percent by weight of the dry aggregate. The resin percentage shall be approved by the Engineer.

The peroxide shall be injected or introduced to the promoted resin flow prior to mixing with the aggregate in such a manner as to effect thorough blending of promoted resin and peroxide. The peroxide unit shall be capable of injecting from 1/2 to 2 1/2-percent peroxide of the volume of resin within an accuracy of 10-percent. The volume of peroxide may be varied with the permission of the Representative or Engineer from time to time as field conditions warrant. The peroxide unit shall have a flow cut-off sensing unit capable of stopping the mixer or providing sound and visual notice upon loss of peroxide flow below the volume setting.

A manual override shall be provided to allow removal of remaining material prior to hardening in the mixer auger and components. The peroxide metering system, including, but not limited to, tanks and pumps, shall not contain any materials which will deteriorate or react with the peroxides. No less than four each, minimum 5-pound, Class "B" fire extinguishers, in good working order, shall be mounted approximately equidistant around the perimeter of each mixer unit.

The capacity, operating speed, and all mix control constants shall be clearly and prominently mounted on the unit by the manufacturer on a durable metal plate or plates.

Calibration and general mixer operation shall be demonstrated by the Contractor on the project site, prior to anticipated use, to the satisfaction of the Engineer

Periodic calibrations may be required by the Engineer which will be performed by the Contractor, Supplier or Representative periodically during placing operations. Resin binder shall be a nominal 12-percent by weight of the dry aggregate. The exact resin percent shall be determined by the Supplier, based on the materials submitted by the Contractor.

The PSPC shall be placed after the prime coat has reached a hardened condition. Finishing equipment shall be capable of striking off the concrete to the grade established by the Engineer in such a manner to achieve enough compaction to cause resin to flush to the surface. Finishing equipment shall be self-propelled. This equipment shall be sufficiently heavy to avoid rising above the grade. The finishing equipment shall be controlled by a wire pre-set parallel to the finish grade. The finishing machine for the PSPC shall be one of the following, or equal:

1. Gomaco 2500
2. Gomaco 165B

Transverse construction joints shall be finished to a neat vertical face. Additional curing of the sawed joints will not be required.

Upon completion of strike-off and finishing of the PSPC, screenings shall be uniformly broadcast over the surface, prior to gelling of the resin binder, at the rate of 0.4 to 0.8 pounds per square yard.

Screenings shall be applied by the use of a mechanical spreader which will not require personnel or the spreading equipment to contact the ungelled overlay. Excess screenings shall be removed to the satisfaction of the Engineer.

PSPC TEST SLAB: Before PSPC overlay is placed on the primed pavement surface, a full-size test slab shall be placed on a polyethylene bond-breaker to insure that the PSPC mix is workable and the finishing equipment produces a satisfactory overlay surface. Full compensation for placing the test slab shall be paid for at the respective contract unit prices. Removal of PSPC test slab shall be included in the contract price paid per square yard for placing PSPC.

SURFACE SMOOTHNESS: The finished pavement shall meet all requirements of 451.12

SAWING JOINTS: Transverse weakened plane joints shall be sawed through the new concrete overlay directly over all existing transverse joints as per plan. Existing joints shall be well marked by the Contractor prior to placing PSPC overlay to assure proper placement of sawed joints.

All transverse weakened plane joints shall be sawed as soon as the saw can be operated without causing raveling or other damage to the PSPC overlay.

At the Contractor's option, joints may be sawed to the full width with one pass or they may be sawed narrower on the original pass and later widened to the required width. Sawing of longitudinal joints will not be required.

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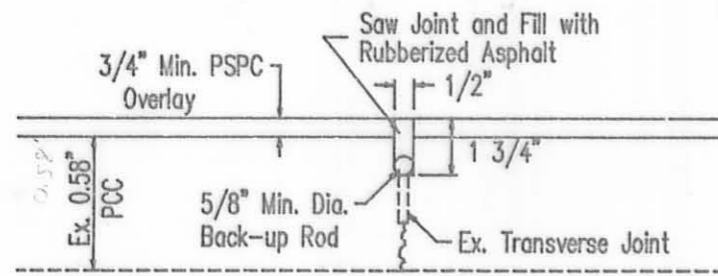
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SEALING TRANSVERSE JOINTS: This work shall consist of placing polyethylene (or other approved materials) backing rods and sealing material in the joint reservoir, as shown on the plans and as directed by the Engineer.

Immediately prior to placing the backing rod and sealant, the joint shall be cleaned by abrasive blast and then cleaned with high pressure air jets to remove all residue and foreign materials from the joint reservoir to the depth shown on the plans. Joint surfaces shall be dry at the time the sealant is applied.

Joint-sealant materials shall be heated and placed in conformance with the manufacturer's written instructions and the details shown on the plans. Joint-sealant materials shall not be placed when the pavement surface temperature is below 40 degrees F.



TRANSVERSE JOINT SEAL DETAIL

OPENING TO TRAFFIC: No traffic or Contractor's equipment will be allowed on the overlay before a period of 4 hours has elapsed after the final finish, unless, as determined by the Engineer, additional time is required to avoid damaging the overlay.

MEASUREMENT AND PAYMENT

PCC PAVEMENT SURFACE PREPARATION: PCC surface preparation will be measured by the square yard. The quantity to be paid for will be determined by multiplying the width by the length of the area prepared. The contract price paid per square yard for PCC pavement surface preparation shall include full compensation for furnishing all labor, materials, tools, and equipment, and incidentals for doing all work involved in PCC surface preparation, as shown in the plans, and as directed by the Engineer.

FURNISH PRIME COAT AND POLYESTER STYRENE POLYMER CONCRETE RESINS: The quantities of resin shall be the actual number of pounds of resin (including promoters/hardeners) used in the prime coat and PSPC in place, completed and measured in accordance with 109.01. The quantities of resin shall be paid for at the contract unit price.

FURNISH SCREENINGS AND AGGREGATES: The quantities of screenings, fine aggregates and coarse aggregates shall be the number of tons by weight measured, furnished and in place, completed and measured in accordance with 109.01. The quantities of screenings and aggregate shall be paid for at the contract unit price.

PLACE PRIME COAT AND POLYESTER STYRENE POLYMER CONCRETE: The area under this item will be the number of square yards completed and accepted in place. The quantity to be paid for will be determined by multiplying the width by the length of the area covered by the thin-bonded PSPC overlay. The contract price paid per square yard for placing the PSPC shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the work involved in placing the PSPC overlay complete in place, including mixing and placing primer, mixing and placing PSPC, and placing screenings. Any necessary corrective grinding shall be accomplished with a concrete planer approved by the Director. Full compensation for placing the prime coat shall be considered as included in the contract price paid per square yard for placing the PSPC and no separate payment will be made therefore.

SAWING AND SEALING TRANSVERSE JOINTS: The sawing and sealing of transverse joints will be measured by the linear foot. The contract price paid per linear foot for sawing and sealing transverse joints shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, including furnishing and placing backing rod, complete in place, as shown on the plans, as specified by these special provisions, and as directed by the Engineer.

Item	Unit	Description
Special	Square Yard	Portland cement concrete pavement surface preparation.
Special	Pound	Furnish prime coat and polyester styrene polymer concrete resins.
Special	Ton	Furnish screenings and aggregates.
Special	Square Yard	Place prime coat and polyester styrene polymer concrete.
Special	Linear Feet	Sawing and sealing transverse joints.

Estimated Quantity Carried To General Summary:

Special	21,336 Lin. Ft.	Sawing and sealing transverse joints.
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DESCRIPTION

This work shall consist of furnishing and applying retroreflective epoxy type pavement marking materials in accordance with the lines and dimensions shown on the plans or as described herein. The Contractor shall furnish all material, labor and equipment necessary for the required pavement preparation and marking application. All pavement markings shall conform with the requirements of Part 3, Ohio Manual of Uniform Traffic Control Devices for Streets and Highways.

Equipment:

The Contractor's pavement marking equipment shall be equipped with an odometer graduated to 1/100 of a mile. The Engineer shall determine the degree of accuracy of the Contractor's odometer and establish an adjustment factor as may be required to accurately determine the pay item quantities. The Engineer shall periodically check the odometer operation to assure maintenance of accurate measurements.

Failure of the odometer to function properly shall be cause to stop the work until the odometer is made to function properly. If measurement of the work has to be performed by the Department, the cost of the Department labor and equipment plus 10 percent shall be deducted from payment due to Contractor for the work. When measuring lane, edge and center line marking, the odometer shall be started at the first marked line and remain in operation until the end of section being marked, where it shall be shut off and the reading of the odometer recorded.

Electrical foot counters shall be provided and installed in the striper. The counters shall individually tabulate the amount of footage applied by each striping gun on the center line, edge line, and lane line carriage whether solid or dashed. The counters shall be the 6 digit type with a reset feature.

The pavement marking equipment shall be equipped with a pressure regulated air jet which shall spray all debris from the pavement in advance of the applicator gun. The air jet shall operate when marking material is being applied and shall be synchronized with marking material application or remain "on" at all times.

The Contractor shall use an accurate dashing mechanism, capable of being easily adjusted, to retrace existing lane or center line markings as specified in the plans or as directed by the Engineer.

The Contractor shall furnish and maintain the radio equipment necessary for 2-way voice communication between the Contractor's striper and the State Inspector at all times during the pavement marking operations.

Provisions for the described special equipment by the Contractor shall be incidental to the application.

MATERIAL

The pavement marking material shall be retroreflectorized two component epoxy material and shall meet the following specifications:

The material shall withstand temperature variation from minus 20 degrees F., to plus 120 degrees F., without deformation or discoloration, and shall maintain its original dimensions and placement, free from tack, chipping or spalling.

White epoxy material shall be free from dirt or tint. Yellow epoxy material shall be "federal yellow" as specified in the National Bureau of Standards, color no. 33538 or Federal Standard 595 within 5.0 National Bureau of Standards units.

The Contractor shall provide storage for all materials and shall transport materials to the site where used. Glass beads shall be kept dry during storage and prior to use.

Material Prequalification and Sampling:

Marking materials shall be of a formulation prequalified by the Bureau of Tests and identified by a manufacturer's code number. Prequalification of marking materials shall require that the material pass a service test in accordance with requirements in supplement 1047.

Pavement marking material furnished under the code number shall have the same composition and physical properties as the material approved by prequalification.

The Bureau of Tests will furnish upon request a list of manufacturers and corresponding code numbers of prequalified marking materials.

Epoxy pavement marking materials prequalified by service test may be tested by the Bureau of Tests to determine formulation similarity to prequalified materials and compliance with physical properties specified herein. Samples of marking materials may be requested from the Contractor or Supplier. In lieu of samples, certified test data furnished by the manufacturer or an independent testing laboratory will, upon approval by the Bureau of Tests, be acceptable. Failure of testing or certified test data to show formulation similarity to prequalified material or compliance with specified physical properties shall be cause for removal of the material from the prequalified list.

Pavement Preparations:

The Contractor shall prepare the pavement in accordance with 621.04.

In addition to the requirements of 621.04, the pavement shall be free of excessive oil and grease residues.

All surfaces shall be cleaned by a jet of compressed air immediately prior to material application. At the time of markings application, the pavement shall be free of dirt, dust, oil, grease, or other contaminants.

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Material Applications:

Lines shall be applied as solid, dashed, or dotted lines, either singly or in combination, as shown on the plans. Dashed lines shall be applied in a 40-foot cycle consisting of a 10-foot dash and a 30-foot gap between dashes, unless otherwise shown on the plans. Dashed lines which are to be applied over plainly visible existing dashed lines shall begin within 6 inches of the beginning of the existing dash, unless otherwise directed by the Engineer. Dotted lines shall be applied in a 6-foot cycle consisting of a 2-foot dot and a 4-foot gap between dots.

The Contractor shall transfer the entire contents of each material container to the striper tanks. Epoxy marking materials as received from the manufacturer shall be applied uniformly to the surface to be marked.

Construction work such as shoulder paving, seeding and mulching shall be scheduled and performed in a manner to avoid damage to applied pavement markings. The material shall be applied at the rate specified in Table 1 to provide a uniform wet film thickness of not less than 15 mils.

TABLE 1

Width of Line, in.	Gallons		Per Mile of Line		
	4	6	8	12	24
Solid line	16	24	32	48	96
Dashed line	4	6	—	—	—
Dotted line	5 1/3	8	—	—	—

Application rates for dashed or dotted lines wider than 6 inches shall be directly proportional to solid line rates.

The application rate for word and symbol markings shall be not less than 1 gallon per 100 square feet of marking surface.

Glass Beads shall be applied to the wet epoxy marking material so that the beads are uniformly embedded and retained in the material and uniformly cover the surface of the marking material to the point where there are loose beads on the surface of the wet line. The rate of application shall not be less than 25 pounds of glass beads per gallon of marking material applied. The Contractor shall furnish personnel who are experienced in the work of application of epoxy pavement marking material.

Markings shall be sharp, well defined, and uniformly retroreflective. Pavement markings shall be free of uneven edges, overspray, or other readily visible defects which, in the opinion of the Engineer, detract from the appearance or function of the pavement markings. The width of line applied shall be the width specified plus or minus 1/4". Fuzzy lines, excessive overspray, or nonuniform application, are unacceptable. Nonretroreflective markings are unacceptable. Markings will also be inspected at night by the Engineer to verify uniform retroreflectivity. Pavement markings which are improperly applied, improperly located, not uniformly retroreflective, or nonretroreflective shall be corrected. Lines applied with insufficient material quantities shall be properly reapplied or shall be subject to acceptance with deduction as provided in Deduction for Epoxy Material Deficiency. Improperly located markings shall be removed at the Contractor's expense, and markings shall be applied in the correct locations at the Contractor's expense, including the furnishing of approved materials.

Pavement markings shall not be placed on existing pavement surfaces that show visible evidence of cracking, chipping, spalling, or failure of underlying base material as determined by the Engineer.

The gaps not marked as a result of template use shall be filled with marking material after template removal.

In the event that this contract includes sections of roadway where plowable prismatic raised pavement markers are installed in the pavement, pavement marking materials shall not be applied to the prismatic reflector unit housed in the casting of a plowable raised pavement marker. The Contractor shall interrupt the application of the pavement marking lines (s) at each raised pavement marker where marking material would otherwise be applied to the marker prismatic reflector. The maximum gap in the marked line at each marker shall be 18 inches. If pavement marking material is applied to a prismatic reflector surface, the Engineer shall suspend the work and the Contractor shall, at his expense, either remove all marking material from the reflector unit by cleaning, or he shall remove and replace in kind the reflector unit, as determined by the Engineer. Work shall resume when the Engineer has determined that the Contractor is capable of interrupting application of the painted lines at raised pavement markers in conformance with these requirements. Line widths shall be maintained as per specification, and the Ohio Manual of Uniform Traffic Control Devices, and as directed herein.

Annotated drawings describing a device developed by the Department to detect and interrupt marking at a plowable raised pavement marker are available from the Bureau of Traffic. This device is compatible with commercial pavement marking application equipment employing electropneumatic valves to control material flow. The Contractor is not required to use this device, however.

Layout and Premarking:

Layout and premarking shall conform to 621.051 with the following additional requirements:

Where existing markings are to be retraced, it shall be the responsibility of the Contractor to verify the location with the Engineer.

In addition to the requirements of 621.051 premarking for auxiliary markings shall be located from schematic forms provided at the pre-construction conference.

Placement Tolerance

Line placement tolerance shall conform to 621.052.

Marking Descriptions:

Markings applied under this specification shall conform to applicable portions of 621 as follows:

Edge Lines	621.06
Lane Lines	621.07
Center Lines	621.08
Channelizing Lines	621.09
Stop Lines and Crosswalk Lines	621.10
Transverse Lines	621.11
Island Marking	621.12
Lane Arrows	621.131
Word on Pavement	621.132
Dotted Lines	621.133
Railroad Symbol Markings	621.121

Where the word "paint" appears in 621, the words "epoxy material" shall be substituted.

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Removal of Pavement Markings:

Pavement marking removal shall comply with 621.134.

Epoxy Material Quantity Measurement:

The quantity of epoxy material or glass beads applied per unit of measurement will be computed by the Engineer at the end of each day's work.

A day's applied mileage of less than 10 miles of edge lines, center lines, lane lines or channelizing lines or a day's applied quantity of less than 5 gallons of marking material used to apply other types of markings may be included in the next day's applied markings for the purpose of computing marking materials and bead application rates.

The Contractor shall cooperate with the Engineer in providing measurements whenever requested. The marking application rate shall be determined by dividing the total gallons used by the appropriate marking length or unit of measure as determined from the foot counter as described in Equipment. Any determination of pay deduction resulting from shortages in marking quantities shall be based on the measurements obtained by this method. The amount of glass beads applied shall be ascertained by the Engineer by observation and from information supplied by the Contractor as to quantity used.

The Contractor shall provide a calibrated measuring device to measure the epoxy material in the striper tanks.

Deduction for Epoxy Material Deficiency:

A tolerance of 6 percent for deficiency of Epoxy material shall be permissible without deductions. If computations reveal that the 6 percent tolerance has been exceeded and an insufficient quantity of either the Epoxy material or glass beads has been applied, the contract unit price shall be reduced in direct portion to the percent of deficiency of that component as compared to that specified herein, up to 20 percent for each material deficient; only the greatest deficiency will be used to compute the deduction.

If the deficiency of any material is 20 percent or more, the work shall be considered unsatisfactory and markings conforming to these specifications and requirements shall be reapplied at full expense to the Contractor, including all labor, equipment and material requirements.

Method of Measurement:

Method of Measurement shall conform to 621.15.

Basis of Payment:

Payment for accepted quantities complete in place will be made at contract prices, or prices adjusted in accordance with Deduction for Epoxy Material Deficiency. Payment shall be full compensation for all materials, labor, incidentals, and equipment for placement of the items.

Item	Unit	Description
621	Mile	Edge lines, epoxy, as per plan
621	Mile	Center lines, epoxy, as per plan
621	Mile or lin. ft.	Channelizing lines, epoxy, as per plan
621	Lin. Ft.	Stop lines, epoxy, as per plan
621	Lin. Ft.	Crosswalk lines, epoxy, as per plan
621	Lin. Ft.	Transverse lines, epoxy, as per plan
621	Sq. Ft.	Island marking, epoxy, as per plan
621	Each	Lane arrows, epoxy, as per plan
621	Each	Word on pavement, 96" in., epoxy, as per plan

Final Acceptance

Final acceptance of approved completed markings shall be May 1, 1986.

Pavement markings which are unacceptable, or become unacceptable prior to final acceptance as determined by the Engineer, for causes such as, but not limited to, improper application, nonuniform retroreflectivity, nonretroreflectivity or loss of adhesion to the pavement, shall be replaced by the Contractor with markings conforming to these specifications and requirements at his expense, without delay or the Contractor may request that the unacceptable work be non-performed. The Contractor will receive no payment for unacceptable work which is non-performed.

Maintenance of Traffic

In addition to the requirements as indicated in the "Ohio Manual of Uniform Traffic Control for Streets and Highways", the following requirements shall apply.

During resurfacing on this project, LOG-33-3.44, U.S.R. 33 shall be closed to traffic from Lincoln Blvd. (Sta. 236+00±) to Stephenson Str. (Sta. 363+00±) for a period not to exceed 21 consecutive calendar days during which time a detour will be provided as shown on sheet no. 1.

On streets which intersect U.S.R. 33, traffic shall be maintained and permitted to cross U.S.R. 33.

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ITEM 614 WORK ZONE PAVEMENT MARKINGS

GENERAL

THE CONTRACTOR SHALL FURNISH, INSTALL, MAINTAIN AND WHEN NECESSARY, REMOVE WORK ZONE RETROREFLECTIVE PAVEMENT MARKINGS ON EXISTING, RECONSTRUCTED, RESURFACED OR TEMPORARY ROADS WITHIN THE WORK LIMITS, IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS.

THE MARKINGS SHALL BE MAINTAINED IN GOOD CONDITION TO PROVIDE DAY AND NIGHT VISIBILITY. THE MARKINGS SHALL BE REPAIRED OR REPLACED AS DIRECTED BY THE ENGINEER TO MAINTAIN REQUIRED VISUAL EFFECTIVENESS AND NIGHT VISIBILITY AT NO ADDITIONAL COST TO THE STATE.

THE CONTRACTOR SHALL, IN ADVANCE OF ANY SECTION OF ROADWAY LACKING OMTCD FULL PATTERN STANDARD DIMENSION EDGE LINE OR CENTER LINE MARKINGS, ERECT A "NO EDGE LINES" (OW-167) SIGN OR "UNMARKED NO PASSING ZONES" (OW-168) SIGN OR BOTH AS MAY BE APPROPRIATE. THESE SIGNS SHALL BE IN PLACE PRIOR TO EXPOSING THE ROADWAY TO TRAFFIC. THESE SIGNS SHALL BE REPEATED EVERY 1 TO 2 MILES AND AT OTHER LOCATIONS AS NECESSARY. THESE SIGNS SHALL BE REMOVED WHEN THEY NO LONGER APPLY. THE COST FOR FURNISHING AND ERECTING AND SUBSEQUENTLY REMOVING THESE SIGNS SHALL BE INCLUDED IN 614 MAINTAINING TRAFFIC, UNLESS SPECIFICALLY ITEMIZED.

TEMPORARY PAVEMENT MARKING MATERIALS

UNLESS OTHERWISE INDICATED ON THE PLANS, TEMPORARY PAVEMENT MARKINGS MAY BE EITHER 621.02 PAINT OR 947.03 TYPE B OR C PERFORMED MATERIAL WHERE PAVEMENT MARKINGS ARE LIABLE TO BE TRACKED EITHER CONVENTIONAL OR FAST-DRYING PAINT MAY BE USED.

PAINT

PAINTED MARKINGS SHALL BE IN ACCORDANCE WITH 621 EXCEPT THAT THE INCREASE OF 25 PERCENT IN THE APPLICATION RATE FOR NEW BITUMINOUS PAVEMENT AND PARAGRAPH 621.14 SHALL NOT APPLY.

TYPE B AND TYPE C PERFORMED MATERIAL

PERFORMED MATERIAL SHALL COMPLY WITH 947.03 EXCEPT THAT NO PERFORMED MATERIAL CONTAINING METAL SHALL BE PLACED ON ANY SURFACE UNLESS IT WILL BE REMOVED LATER BY THE CONTRACTOR. TEMPORARY PAVEMENT MARKINGS OF 947.03 PERFORMED MATERIAL SHALL BE REMOVED PRIOR TO PLACEMENT OF 621 OR 647 SURFACE COURSE MARKINGS AT THAT LOCATION. PERFORMED MATERIAL SHALL BE APPLIED IN ACCORDANCE WITH 847 EXCEPT AS MODIFIED HEREIN.

PLACEMENT

TEMPORARY MARKINGS SHALL BE COMPLETE AND IN PLACE ON ALL PAVEMENT PRIOR TO EXPOSING IT TO TRAFFIC. WHEN TEMPORARY MARKINGS CONFLICT WITH THE TRAFFIC PATTERN, THEY SHALL BE REMOVED BY THE CONTRACTOR IN ACCORDANCE WITH 621.134.

TEMPORARY MARKING CLASSES

CLASS I MARKINGS

CLASS I MARKINGS SHALL BE APPLIED TO THE FULL DIMENSIONS AS DEFINED IN 621 WITH THE FOLLOWING ADDITIONS OR EXCEPTIONS:

- 1) LANE LINES SHALL BE 4-INCHES IN WIDTH.
- 2) TRANSVERSE LINES SHALL BE 4-INCHES IN WIDTH.
- 3) STOP LINES SHALL BE 12 INCHES IN WIDTH.
- 4) CROSS WALK LINES SHALL BE 6-INCHES IN WIDTH.

CLASS II MARKINGS

CLASS II MARKINGS (ABBREVIATED) SHALL BE DEFINED AS FOLLOWS:

CENTER LINES SHALL CONSIST OF SINGLE, YELLOW 4-INCH WIDE BY A MINIMUM OF 48-INCH LONG DASHES SPACED AT A MAXIMUM OF 40-FOOT INTERVALS.

LANE LINES SHALL CONSIST OF WHITE 4-INCH WIDE BY A MINIMUM OF 48-INCH LONG DASHES SPACED AT A MAXIMUM OF 40-FOOT INTERVALS.

GORE MARKINGS SHALL BE TWO CONTINUOUS, WHITE 4-INCH LINES PLACED AT THE THEORETICAL GORE OF AN EXIT RAMP OR DIVERGING ROADWAYS.

THE PAINT APPLICATION RATE SHALL BE NOT LESS THAN 1.6 GALLONS PER MILE FOR LANE LINE AND CENTER LINE AND 16 GALLONS PER MILE FOR GORE MARKINGS.

CONFLICTING EXISTING MARKINGS

THE CONTRACTOR SHALL, PRIOR TO PLACING TEMPORARY MARKINGS, REMOVE ALL CONFLICTING EXISTING MARKINGS VISIBLE TO THE TRAVELING PUBLIC DURING DAYLIGHT OR NIGHTTIME HOURS IN ACCORDANCE WITH 621.134. THE COST FOR REMOVAL OF CONFLICTING MARKINGS SHALL BE INCLUDED IN 614 MAINTAINING TRAFFIC UNLESS SPECIFICALLY ITEMIZED.

THE CONTRACTOR SHALL ALSO REMOVE THE PRISMATIC RETRO-REFLECTOR WITHIN ANY RAISED PAVEMENT MARKER (RPM) WHICH IS IN CONFLICT WITH THE TEMPORARY PAVEMENT MARKINGS. WHEN THE TEMPORARY PAVEMENT MARKINGS ARE REMOVED AND THE RPM IS NO LONGER IN CONFLICT, THE CONTRACTOR SHALL THOROUGHLY CLEAN THE RECESSED REFLECTOR ATTACHMENT AREA OF THE CASTING AND INSTALL A NEW PRISMATIC RETRO-REFLECTOR OF THE SAME KIND AND COLOR. THE COST FOR THIS WORK SHALL BE INCIDENTAL TO THE VARIOUS PAY ITEMS.

INTERIM MARKINGS

WITHIN 21 CALENDAR DAYS AFTER OPENING ANY LENGTH OF PAVEMENT TO TRAFFIC, THE 621 OR 847 PAVEMENT MARKINGS CALLED FOR IN THE PLANS OR EQUIVALENT 614 CLASS I, PAINT MARKINGS SHALL BE APPLIED. THE CONTRACTOR SHALL FURNISH ALL LABOR, EQUIPMENT, AND MATERIAL NECESSARY TO PLACE AND MAINTAIN 614 CLASS I PAINT MARKINGS AS PART OF THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC.

FOR EACH CALENDAR DAY BEYOND 21 DAYS THAT THIS WORK SHALL REMAIN UNCOMPLETED, THE PROVISIONS OF 108.07 WILL BE INVOLVED, EXCEPT THAT BETWEEN NOVEMBER 15 AND APRIL 15 WEATHER CONDITIONS SHALL NOT BE AN ACCEPTABLE REASON FOR EXTENSION.

METHOD OF MEASUREMENT

TEMPORARY PAVEMENT MARKINGS WILL BE MEASURED COMPLETE IN PLACE, BY CLASS AND MATERIAL, IN THE UNITS DESIGNATED. LINE QUANTITIES WILL BE THE LENGTH OF THE COMPLETED STRIPE, INCLUDING GAPS, INTERSECTIONS, AND OTHER SECTIONS OF PAVEMENT NOT NORMALLY MARKED, IN ACCORDANCE WITH 621.15.

TEMPORARY PAVEMENT MARKINGS WILL INCLUDE THE LAYOUT, APPLICATION AND REMOVAL OF THE MARKINGS, WHEN REQUIRED.

BASIS OF PAYMENT

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 PLACEMENT, MAINTENANCE AND NECESSARY REMOVAL OF THE MARKINGS.

ESTIMATED QUANTITIES

ITEM 614 TEMPORARY LANE LINE, CLASS II, # 2.31 MILES

*621 PAINT, 947-03 TYPE B OR 947-03 TYPE C

QUANTITIES CARRIED TO GENERAL SUMMARY

STA. 237+89 TO STA. 333+95 = 9606.0 LIN. FT.

STA. 337+25 TO STA. 363+00 = 2575.0 LIN. FT.

TOTAL = 12181.0 LIN. FT.

OR 2.31 MILES

QUANTITIES			
Calc.	J.A.W.	Chk'd.	J.M.E.
Date	9/85	Date	9/85

GENERAL SUMMARY

ITEM		4	8	10		11				GRAND TOTAL	UNIT	DESCRIPTION
407						1186				1186	GAL	TACK COAT
407						41.51				41.51	TON	COVER AGGREGATE
404						235				235	CU.YD.	ASPHALT CONCRETE, AC-20
SPEC.				35576						35576	SQ.YD.	PORTLAND CEMENT CONC. PAV'T. SURFACE PREPARATION
SPEC.				344731						344731	POUND	FURNISH PRIME COAT & POLYESTER STYRENE POLYMER CONC.
SPEC.				1309						1309	TON	FURNISH SCREENINGS AND AGGREGATES
SPEC.				35576						35576	SQ.YD.	PLACE PRIME COAT & POLYESTER STYRENE POLYMER CONC.
SPEC.		21336								21336	LIN.FT.	SAWING & SEALING TRANSVERSE JOINTS
												FOR TRAFFIC CONTROL SUMMARY SEE SHT. 12
614			2.31							2.31	MILES	TEMPORARY CENTER LINES
624										LUMP	LUMP	MOBILIZATION
614										LUMP	LUMP	MAINTAINING TRAFFIC

GENERAL NOTES

ALIGNMENT AND PROFILE:

THE WORK PROPOSED BY THIS PROJECT IS FOR THE RESURFACING OF THE EXISTING PAVEMENT. THE ALIGNMENT OF THE EXISTING PAVEMENT WILL NOT BE CHANGED, AND THE PROFILE OF THE PROPOSED SURFACE WILL BE SIMILAR TO THAT OF THE EXISTING PAVEMENT EXCEPT THAT IT WILL BE RAISED AN AMOUNT EQUAL TO THE THICKNESS OF THE RESURFACING COURSE OR COURSES SPECIFIED IN THESE PLANS.

TACK COAT:

THE TACK COAT OPERATION SHALL BE AS DETERMINED AT A PRECONSTRUCTION CONFERENCE AS PER 407.05, AND APPLICATION RATES SHALL NOT EXCEED 0.10 GAL. PER SQ. YD.

COVER AGGREGATE:

COVER AGGREGATE SHALL CONFORM TO 703.06.

ITEM 404 - ASPHALT CONCRETE

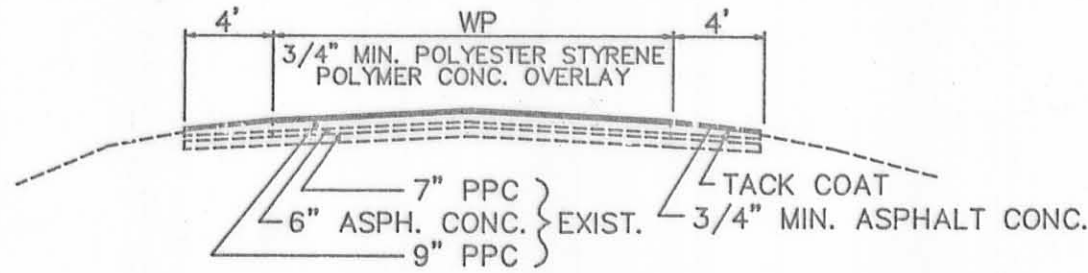
ASPHALT CONCRETE SHALL CONFORM TO 404.02 AND ALL MATERIAL SHALL HAVE 100 PERCENT PASSAGE OF THE 3/8" SIEVE.

ASPHALT CONCRETE

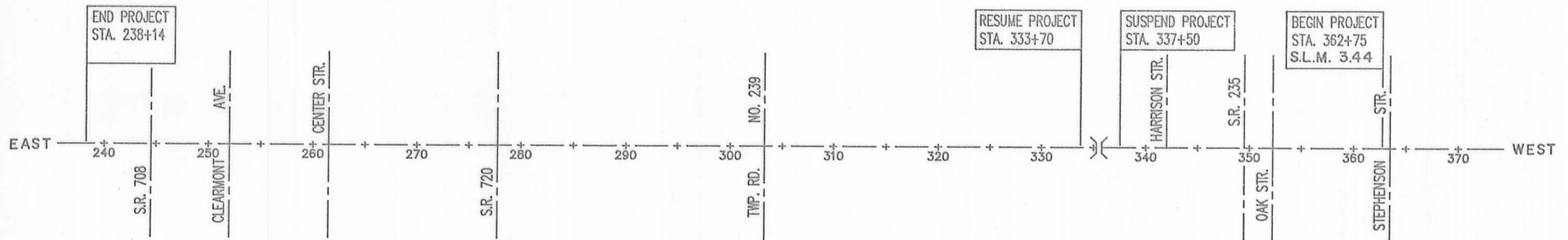
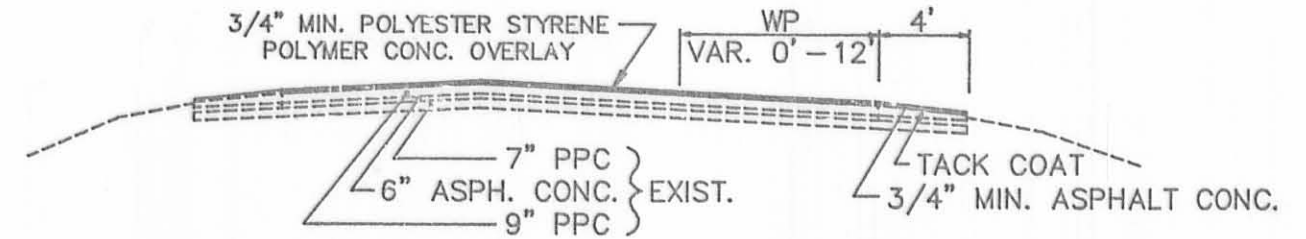
LOGAN COUNTY
LOG-33-3.44

FHWA REGION	STATE	PROJECT
5	OHIO	

TYPICAL 1



TYPICAL 2



PAVEMENT DATA

PART	ROUTE	STATION TO STATION	LENGTH		WP FEET	TYPICAL	EXISTING TYPE PAVEMENT	PAVEMENT AREA SQ. YDS.	PROPOSED PAVEMENT				
			MILES	LIN. FT.					PORTLAND CEMENT CONC. PAV'T SURFACE PREPARATION SQ. YD.	FURNISH PRIME COAT AND POLYMER CONC. RESINS @9.6 #/S.Y. LBS.	FURNISH SCREENINGS AND AGGREGATES @ 73.6 #/S.Y. TON	PLACE PRIME COAT AND POLYMER CONCRETE SQ. YD.	
1	LOG 33	238+14-248+10	0.19	996.0	36	1	452	3984.0	3984.0	38605.0	147	3984.0	
2		248+10-333+70	1.62	8560.0	24	1	↓	22826.7	22826.7	221191.0	840	22826.7	
3		337+50-345+86	0.16	836.0	24	1	↓	2229.3	2229.3	21602.0	82	2229.3	
4		345+86-353+00	0.14	714.0	36	1	↓	2856.0	2856.0	27675.0	105	2856.0	
5		353+00-362+75	0.18	975.0	24	1	↓	2600.0	2600.0	25194.0	96	2600.0	
ADD FG: FLARES FROM 24' TO 36' PAV'T. WIDTH													
6	LOG 33	248+10-253+50	0.10	540.0	6'Avg.	2	452	360.0	360.0	3488.0	15	360.0	
7		340+46-345+86	0.10	540.0	6'Avg.	2	↓	360.0	360.0	3488.0	13	360.0	
8		353+00-358+40	0.10	540.0	6'Avg.	2	↓	360.0	360.0	3488.0	13	360.0	
TOTALS CARRIED TO GENERAL SUMMARY									35576	344731	1309	35576	

FTWA REGION	STATE	PROJECT
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PAVEMENT MARKING SUB-SUMMARY

STATION TO STATION	SDP	4"	4"	4"	4"	4"	8"	24"	24"	24"	WORD (ONLY) ON PAVEMENT 96"	ISLAND MARKING YELLOW	12"
		EDGE LINES WHITE	CENTERLINE BROKEN SINGLE	CENTERLINE SOLID AND BROKEN DOUBLE	CENTERLINE SOLID DOUBLE	CHANNELIZING LINES WHITE	TRANSVERSE LINES YELLOW	STOP LINES	LANE ARROWS	STOP LINES	TRANSVERSE LINES YELLOW	EACH	SQ. FT.
FROM	TO	LN. FT.	LN. FT.	LN. FT.	LN. FT.	LN. FT.	LN. FT.	LN. FT.	LN. FT.	LN. FT.	EACH	SQ. FT.	LN. FT.
U.S.R. 33													
237+89	243+90 L.T.	60'											
237+89	243+90 RT.	66'			1052		120	24	360		1		
S.R. 708	L&R	120						53					
245+19	251+65 L.T.	646											
245+19	251+76 RT.	646			1164		120	24	580		1	10	
CLEARMONT AVE.	L&R	85						34					
252+35	261+32 L.T.	897											
252+35	261+19 RT.	884			888							4	
CENTER STR.	L&R	120						38					104
262+16	277+16 L.T.	150'											
262+16	277+16 RT.	150'	900	600									
S.R. 720	L&R	125						30					
277+97	303+95 L.T.	2598											
277+97	303+95 RT.	2598	1998	600									
TWP. RD. 239	L&R	124						38					
304+76	333+95 L.T.	2919											
304+76	333+95 RT.	2919	2919										
337+25	341+60 L.T.	435											
337+25	348+76 RT.	1151	300	1882			120	24	520		1		
342+35	348+76 L.T.	641											
HARRISON STR.	L.T.	40						16					
S.R. 235	L&R	130						70					72
350+09	351+72 L.T.	163											
350+09	351+89 RT.	180			250		80	24	75		1	57	
OAK STR.	L&R	90											
352+48	363+03 L.T.	105'											
352+56	358+40 RT.	58'			1168				406				
358+40	363+00 RT.	460			460								
TOTALS TO TRAFFIC CONTROL SUMMARY		23,812 L.F. 4.51 Mi.	5,817 L.F.	1,500 L.F. 2.69 MILES	6,864 L.F.	440	1,941	413	4	4	4	128	176

TRAFFIC CONTROL GENERAL SUMMARY

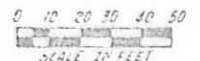
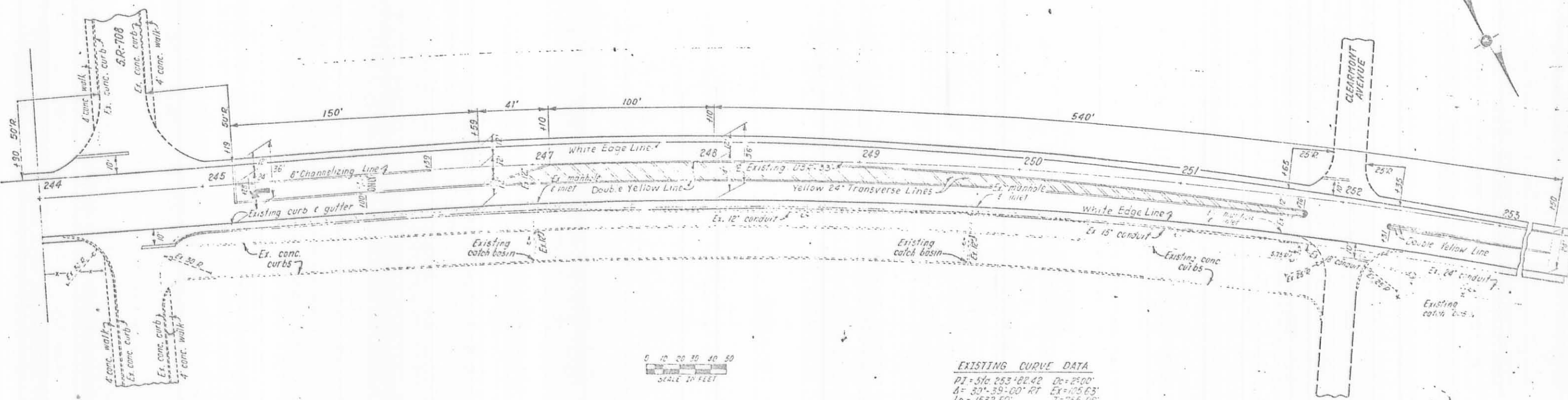
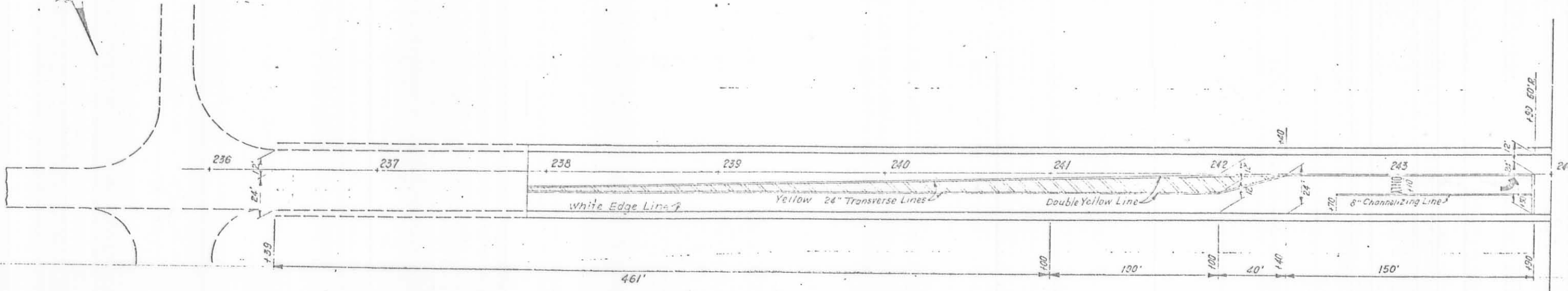
ITEM	DESCRIPTION	UNIT	GRAND TOTAL
621	EDGE LINES, EPOXY, AS PER PLAN	MILES	4.51
621	CENTERLINE, EPOXY, AS PER PLAN	MILES	2.69
621	BROAD TRANSVERSE LINES, EPOXY, AS PER PLAN	LN. FT.	1,941
621	CHANNELIZING LINES, EPOXY, AS PER PLAN	LN. FT.	440
621	STOP LINES, EPOXY, AS PER PLAN	LN. FT.	413
621	LANE ARROWS, EPOXY, AS PER PLAN	EACH	4
621	WORD (ONLY) ON PAVEMENT, 96", EPOXY, AS PER PLAN	EACH	4
621	ISLAND MARKING, EPOXY, AS PER PLAN	SQ. FT.	128
621	CROSSWALK LINES, EPOXY, AS PER PLAN	LN. FT.	176

DATE	2.16.04
BY	C.P.B.
CHECKED	C.P.B.
SCALE	AS SHOWN

COUNTY	STATE	PROJECT
5	OHIO	

LOGAN COUNTY
LOG-33-3.44

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EXISTING CURVE DATA
 PI = Sta. 253+82.42 Dc = 2500'
 Δ = 30°-39'-00" RT Ex = 105.63'
 LC = 1532.50' T = 765.06'
 PC = Sta. 245+97.36 Rc = 2864.79'
 PT = Sta. 261+29.66

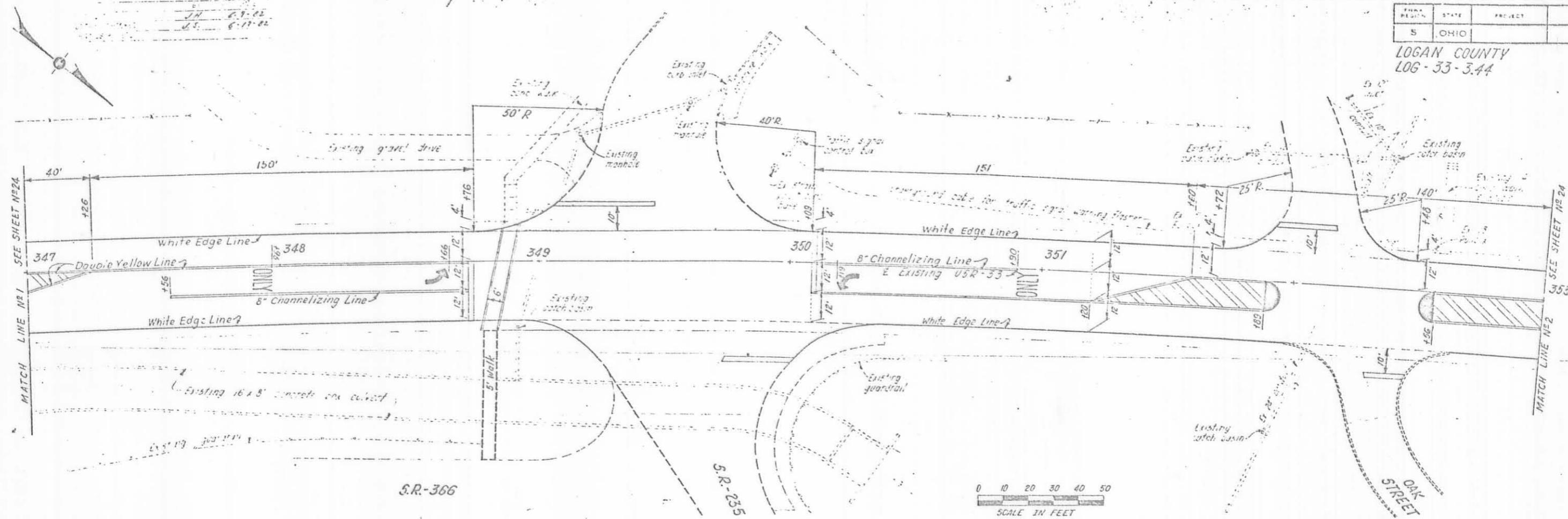
PAVEMENT MARKING FOR S.R.-708 LEFT TURN LANE

J.A. 6-9-42
 G.S. 6-17-42

FED. DIST.	STATE	PROJECT
5	OHIO	

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LOGAN COUNTY
 LOG-33-3.44



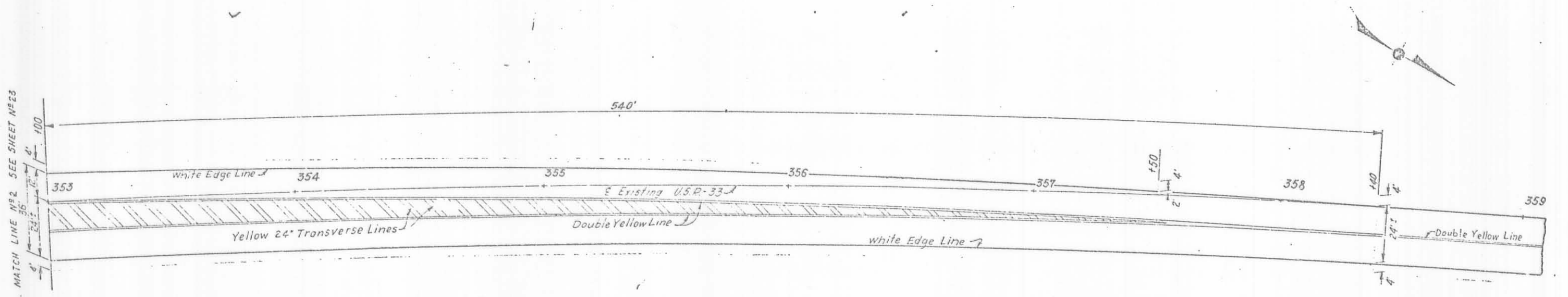
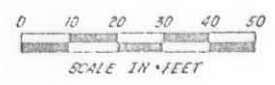
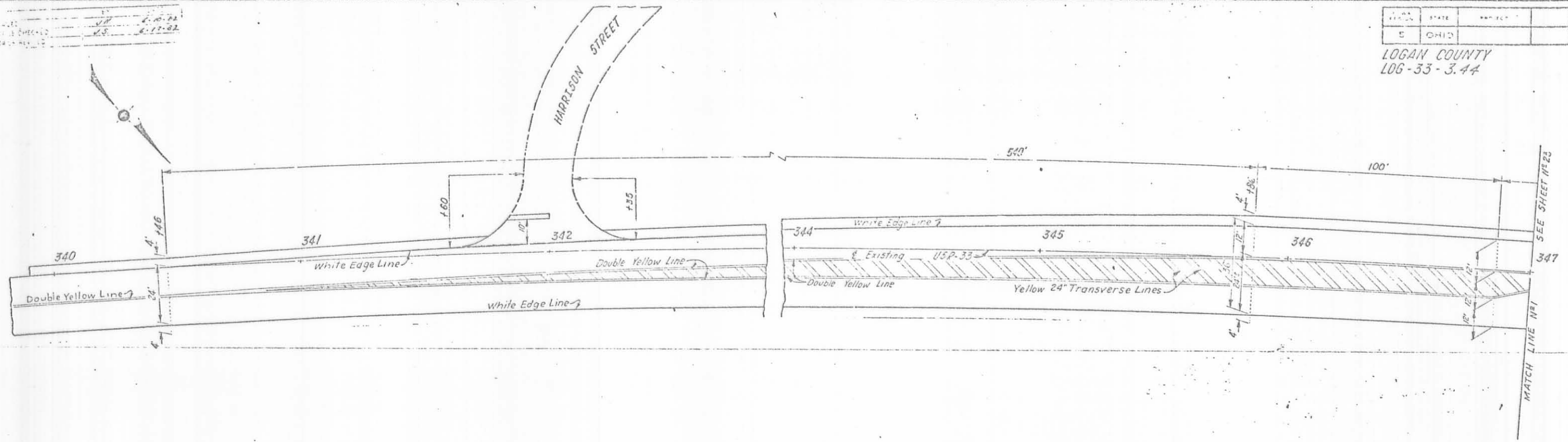
PAVEMENT MARKING FOR SR-235 LEFT TURN LANE

DATE: 1-10-72
 DRAWN BY: J.S.
 CHECKED BY: J.S.
 1-17-72

NO.	STATE	PROJECT
5	OHIO	

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LOGAN COUNTY
 LOG-33-3.44



PAVEMENT MARKING FOR SR-235 LEFT-TURN LANE

MAINTENANCE OF TRAFFIC

LOGAN COUNTY
LOG-33-3.44

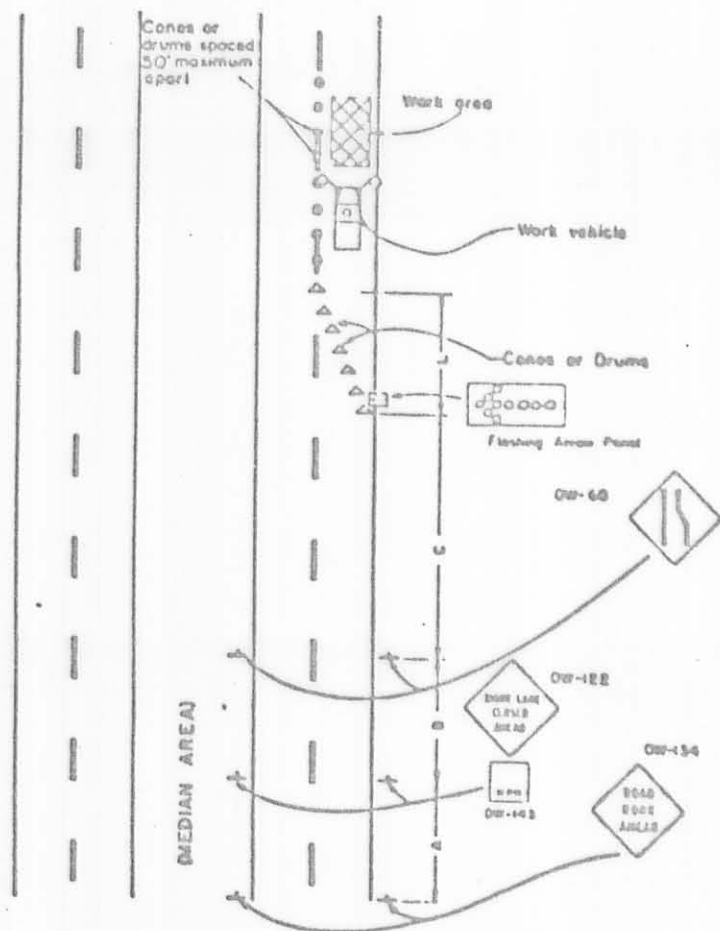
FED. DIVISION	STATE	PROJECT	
5	OHIO		

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PLAN NO. _____

TYPICAL APPLICATIONS OF TRAFFIC CONTROL DEVICES FOR

CLOSING ONE LANE ON A 4-LANE DIVIDED HIGHWAY



NOTE: See Section 16-17 for taper lengths.

DISTANCE	A	B	C
Urban	250'	150'	150'
Major Arterial	300'	150'	150'
Standard	300'	150'	150'

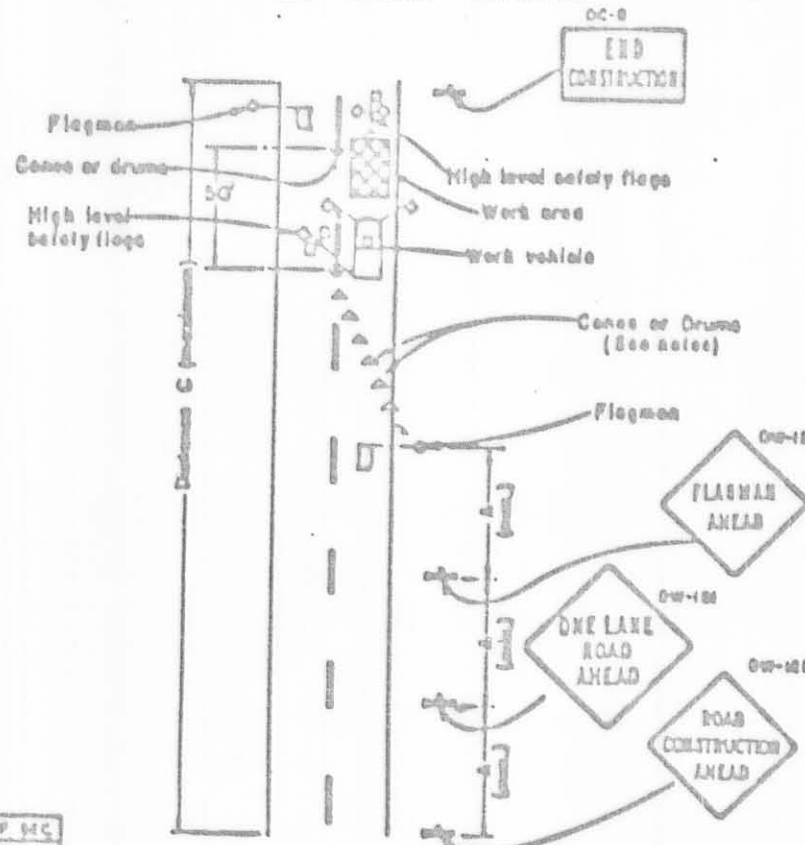
REF. SEC.
16-4

C-21

Cones or drums shall be placed so that the Contractor's workmen and equipment are totally within the channelized area when working.

TYPICAL APPLICATIONS OF TRAFFIC CONTROL DEVICES FOR

STATIONARY OPERATIONS IN ONE LANE



REF. SEC.
16-7
16-8
16-9
16-10

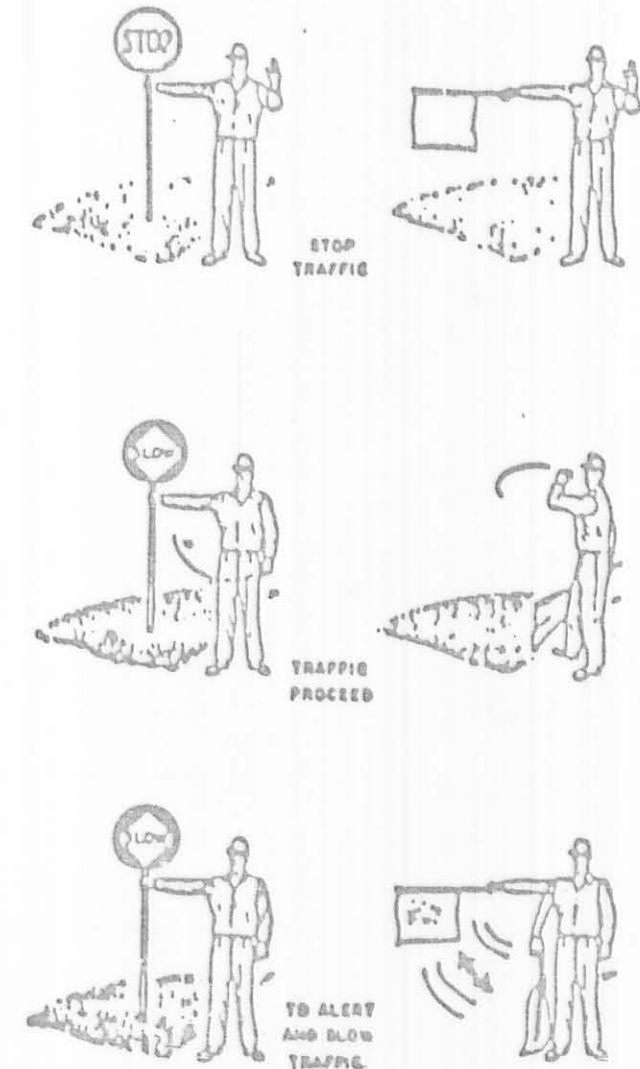
NOTES:

- See Table 7-8 for taper lengths.
- Use the same warning signs on the opposite approach.
- Space the cones at 50' max. on tangent.

TYPE OF ROADWAY	DISTANCES	
	A-M	C-M
Urban	300'	25'
Standard	300'	10'

C-18

PROCEDURES FOR FLAGMAN



REF. SEC.
16-8
16-9

C-10

PAVEMENT MARKING TYPICAL DETAILS

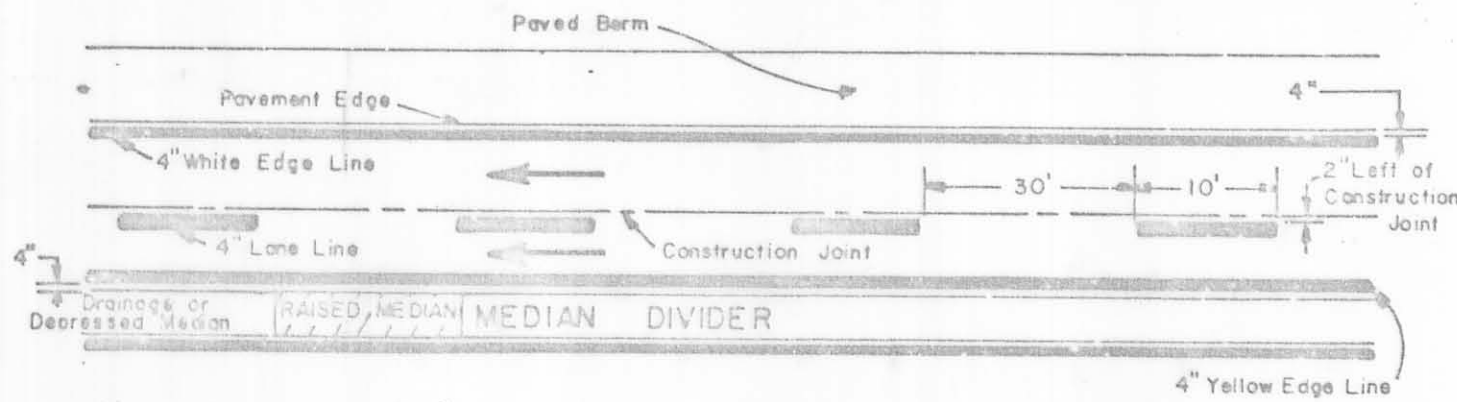
FED. RD. DIV.	STATE	PROJECT	
5	OHIO		

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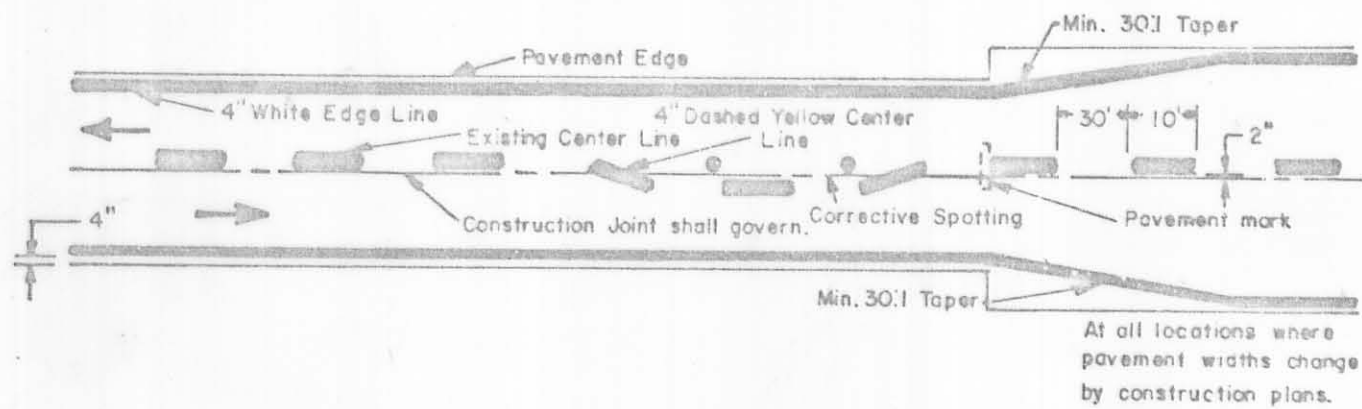
LOGAN COUNTY
LOG-33-3.44

PLAN NO.

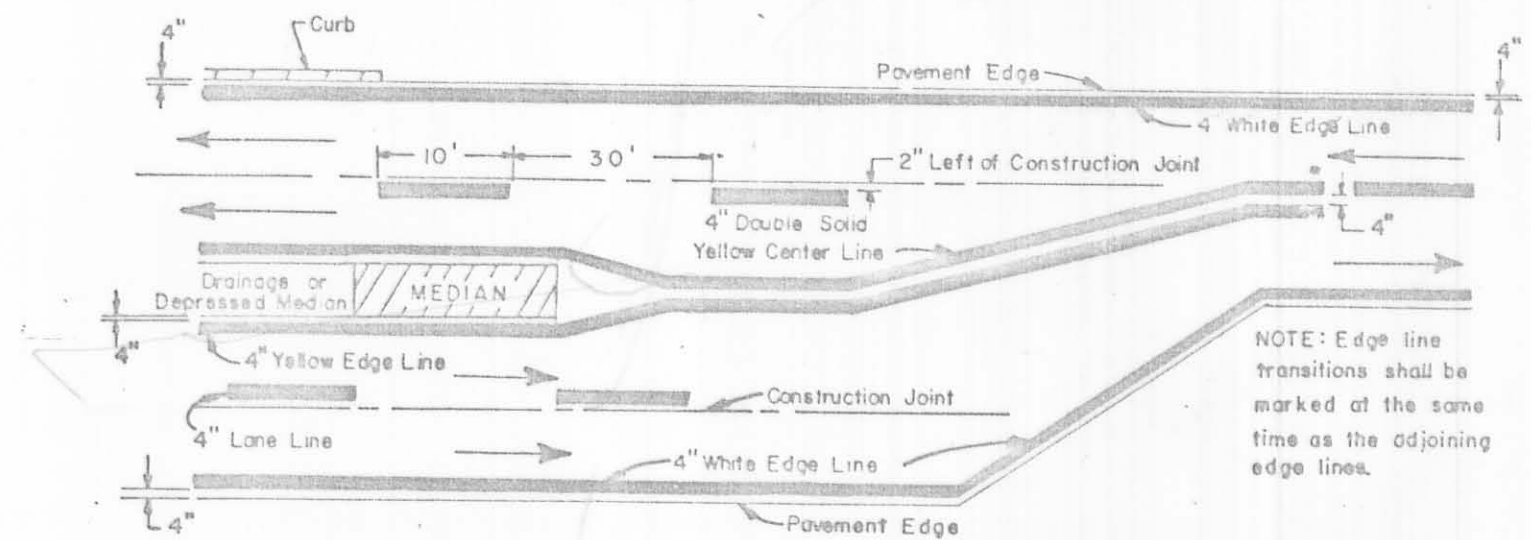
FREEWAY & EXPRESSWAY MAINLINE MARKINGS



TWO LANE MARKINGS



MULTILANE DIVIDED & UNDIVIDED HIGHWAY MARKINGS



NOTE: Edge line transitions shall be marked at the same time as the adjoining edge lines.

NOTES:

1. THE DISTANCE FROM THE PAVEMENT EDGE TO THE NEAR SIDE EDGE OF THE EDGELINE MAY BE INCREASED WITH THE APPROVAL OF THE ENGINEER IN ORDER TO MAINTAIN UNIFORM LANE WIDTH.
2. SEE TC 72.20 FOR PAVEMENT ENTRANCE AND EXIT RAMP TERMINALS.

DEPARTMENT OF TRANSPORTATION	
PAVEMENT MARKING TYPICAL DETAILS	11/80
JDL - CDR.	