

May 30, 1997
 Page 1

DESIGN EXECUTIVE SUMMARY

County FRANKLIN Item No. 5-056.00
 Federal Project No. 000NH 00644 070 UPN FD43 037 0064 053-058
 Project Description: I-64 From US 127 to US 60

Roadway Classification:

Local _____ Collector _____ Arterial _____
 Interstate X Rural _____ Urban _____
 ADT (current) 29,000 ADT (2020) 52,400 DHV (2020) 5,800
 Posted Speed Limit: 55 (rural) _____ 35 (urban) _____
 Other (specify) 65mph
 Selected Design Speed 110km/h

_____ Concurrence in a reduced design speed to be obtained from Director of Design
 _____ Exception to design speed criteria will have to be obtained from FHWA

Proposed
 70 ft pavement
 12 ft shoulders
 18 ft ditches
 60 ft bridges
 63 ft EB (footnote)
 1640 ft radius
 590 ft SSD

DESIGN CRITERIA	REQUIRED	UTILIZED	EXISTING
Number of Lanes <i>Note 1</i>	<u>6</u>	<u>6</u>	<u>4</u>
Pavement Width	<u>21.6m</u>	<u>21.6m</u>	<u>14.4m</u>
Shoulder Width, Slope	<u>3.6m @ 4%</u>	<u>3.6m @ 4%</u>	<u>3.6m @ 4%</u>
Ditch Width, Slope	<u>5.4m @ 1:6</u>	<u>5.4m @ 1:6</u>	<u>2.4m @ 1:4</u>
Bridge Width <i>Note 2</i>	<u>18.0m ea. Direction</u>	<u>18.0m ea. Direction</u>	<u>9.1m ea. Direction</u>
Earth Cut Slope	<u>1:4</u>	<u>1:4</u>	<u>1:4</u>
Fill Slope	<u>1:2</u>	<u>1:2</u>	<u>1:2</u>
Minimum Radius (<i>c_{max} = 8.0%</i>)	<u>500m</u>	<u>700m</u>	<u>700m</u>
Maximum Grade	<u>4.0%</u>	<u>4.0%</u>	<u>4.0%</u>
Minimum Sight Distance	<u>180m</u>	<u>208m</u>	<u>229m</u>

Note 1. An additional lane is added in the eastbound direction for a truck climbing lane.
Note 2. Existing Eastbound bridge at US 60 to be widened to 19.1 meters.

DESIGN EXECUTIVE SUMMARY

Access Control Type Fully Controlled Access

Environmental Action Categorical Exclusion Approval Date 12-Aug-95

Existing Pavement Depths 100mm DGA on Rock Subgrade or 150mm DGA on Soil Subgrade with 250mm PCC Pavement

- Attachments:
- (1) Provide map showing project location
 - (2) Discussion of all considered alternates, including Do Nothing, and a brief description of maintenance of traffic schemes
 - (3) 8 1/2" x 11" Typical Section

Submitted By: *Shirley D. Smith* 4/28/97
District Preconstruction Engineer *Date*

Recommended By: *Adae James* 5-2-97
Location Engineer *Date*

Approved By: *David Kratt* 5/12/97
Acting T. E. B. M. for Location *Date*

Comments:

GEOMETRIC APPROVAL GRANTED BY:

John B. Sacksteder 5/12/97
Director, Division of Design *Date*

for *J. L. Pilling* MAY 30 1997
 Division Administrator *Date*
 Federal Highway Administration



Commonwealth of Kentucky
Transportation Cabinet
Frankfort, Kentucky 40622

James C. Codell, III
Secretary of Transportation

Paul E. Patton
Governor

T. Kevin Flanery
Deputy Secretary

May 14, 1997

Mr. Jesse Story
Division Administrator
Federal Highway Administration
P. O. Box 536
Frankfort, Kentucky 40602

Dear Mr. Story:

SUBJECT: Franklin County
000NH 00644 070
FD43 037 0064 053-058 017 D
I-64 from US 127 to US 60
Item No. 5-56.00

Transmitted are the original and one copy of the Design Executive Summary for your review and approval of the geometrics for this project. Please return the original to this office.

Sincerely yours,

J. M. Yowell, P.E.
State Highway Engineer

John B. Sacksteder

BY: John Sacksteder, P.E.,
Director, Division of Highway Design

Examined and Approved
MAY 30 1997

Date
J. K. Pilling
DIVISION ADMINISTRATOR

Attachment:

cc: Charles Raymer
FHWA File

RECEIVED	
Ky. Division	
MAY 18 1997	
To	Int.
DA	
ADA	
HPG	
HPJ	
BR	
R/W	
ENV	
HPT	
AM	
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STATE	

DESIGN EXECUTIVE SUMMARY NARRATIVE

This section of I-64 in Franklin County lies in a rural area with severely rolling terrain between the interchange with US 127 on the west and the interchange with US 60 on the east. The alternatives for this section were studied within the boundaries of the existing right of way. This section has a constant-width median at each end of the project with bifurcated roadways in the middle with separation ranging from 55 meters to as much as 152 meters. Within this section, there are bridges over Cedar Run Creek at KY 420, Johnson Road and the Kentucky River and Glenss Creek Road. The bridge at Hanley Lane is over I-64 and bridge widening is required at I-64 eastbound over US 60.

180-500 ft

Do-Nothing Alternate

The existing section consists of two - 24 foot roadways with 3 foot paved shoulders on the left side and 10 foot paved shoulders on the right side of each roadway, and eight foot ditches. This section is also through deep rock cuts on both sides that were not pre-split when constructed. This typical section does not meet current design criteria for 110 km/h roadways with required shoulder widths and clear zones. The existing bridges do not provide full-width shoulders. This alternate does not provide three lanes in each direction and a truck climbing lane in the eastbound roadway to meet current or future traffic forecasts in the capacity analysis for these roadways. These conditions combine to form an undesirable existing facility.

70
mph

Alternate No. 1

This alternate would provide a new six-lane roadway with a uniform median barrier throughout the project limits with a truck climbing lane in the eastbound roadway, east of the Kentucky River to approximately 400 meters east of the Hanley Lane bridge. Complete new structures would be needed at all four bridge locations; KY 420, Johnson Road, Kentucky River, and Hanley Lane. The vertical alignment on this alternate is similar to the grades on the existing roadways. This alternate would require more excavation and leave more waste material than all other Alternates except No. 1A. Maintenance of traffic could be accommodated on the existing roadways, except at the project termini where some construction staging would be required in order to maintain two lanes of traffic in each direction.

1300 ft

Alternate No. 1A

This alternate is basically the same as alternate No. 1, however, it utilizes an 18.3 meter (60 foot) depressed median throughout the current bifurcated section. It would require more excavation and waste material than Alternate 1.

Alternate No. 2

This alternate widened the existing roadway to provide an additional lane in each direction. The widening requires that the existing horizontal and vertical geometry would be retained. The alignment would be shifted to provide for maintenance of traffic and a fall bench in the existing rock cuts. Widening or replacing the bridges is required with this alternate.

Alternate No. 3

This alternate is a mixture of Alternates 1 and 2. The westbound roadway would be as discussed with Alternate No. 2. The existing roadway would be widened and shifted to provide for maintenance of traffic and a fall bench. The eastbound roadway would be similar to Alternate No. 1. It would be separated from the existing eastbound roadway and flattened to improve the grade up from the Kentucky River. The eastbound alignment would require new bridge construction.

Preferred Alternate

This alternate is a product of the study of the preceding alternates and contains elements of each. This alternate consists of reconstructing the roadways to provide a third lane on the inside of the existing roadways in both eastbound and westbound directions and the addition of an eastbound truck climbing lane up the hill from the Kentucky River. The vertical alignment on this alternate is similar to the grades on the existing roadways except that the grade of the eastbound roadway across the Kentucky River approximately to Hanley Lane will be flattened from a 3.78% grade to a 3.52% grade. The flattening of this grade improves operation and reduces the length of the Truck Climbing Lane for this section of the eastbound roadway.

18 ft

The existing rock cut slopes on this portion of I-64 were not presplit and create continuous ditch maintenance from rock fall. A 5.5 meter fall bench, between the existing rock face and the edge of the clear zone, was recommended by the geotechnical division. This 5.5 meter offset located the horizontal alignments so that widening the existing bridges is impractical. The alignments were then shifted further to facilitate bridge footing construction.

The project team, at the FHWA's request, addressed the possibility of widening the existing bridges and roadways. The alignments would have to be located at or near their current location to facilitate the widening. This alternative would not allow sufficient room for the fall bench, requiring presplitting of the existing rock slopes and additional right of way along I-64. The alignment would increase the difficulty and expense of maintaining traffic.

This section of Interstate is approximately 35 years old and the bridges have utilized a significant portion of their useful life and become outdated due to changes in design criteria for loading conditions. The Kentucky River bridges, the most expensive on the project, are non-redundant load path structures. A bridge inspection report from 1988 indicated that in general, "the quality of all welds on the structures were very poor, and that some cracks were found in construction welds between the tips of the horizontal and vertical stiffeners. A lack of fusion, undercutting, and pitting of welds was found at several locations." The cost to replace these bridges is estimated at \$18,847,371. The cost to widen these bridges is estimated at \$17,523,157. The difference in costs is \$1,324,214 which is approximately two percent of the total project cost. Widening these bridges does not increase the life span of the bridges nor does it correct the non-redundant load path of the structure. The total amount for widening these bridges does not include the additional cost of right of way or blasting excavation to correct the outside cut slopes throughout the project. The existing bridges were built in 1963 with HS20 design standards which does not meet current HS25 design standards. After considerable discussion, the project team decided not to pursue this alternative.

US 127 Interchange

2950 ft

The project would begin approximately 900 meters west of the terminus of the westbound ramp from US 127 to I-64. This is the point where the 3 lane westbound section would complete the taper to the existing two lane section. The eastbound added lane would begin near the intersection with US 127, and would require the eastbound ramp terminal from US 127 to I-64 to be realigned to meet the lane shift of the eastbound roadway of I-64.

US 60 Interchange

4200 ft

The project will terminate approximately 1290 meters east of the existing eastbound ramp gore area from US 60 to I-64. This is the point where the 3 lane eastbound section would complete the taper to the existing two lane section. The existing ramp terminal does not meet the current design standards for this classification of road and would be reconstructed. The taper for the westbound added lane would begin at the west end of the westbound bridge over US 60. The eastbound I-64 to U.S. 60 ramp would be widened to provide dual left turns.

Conceptual Maintenance of Traffic

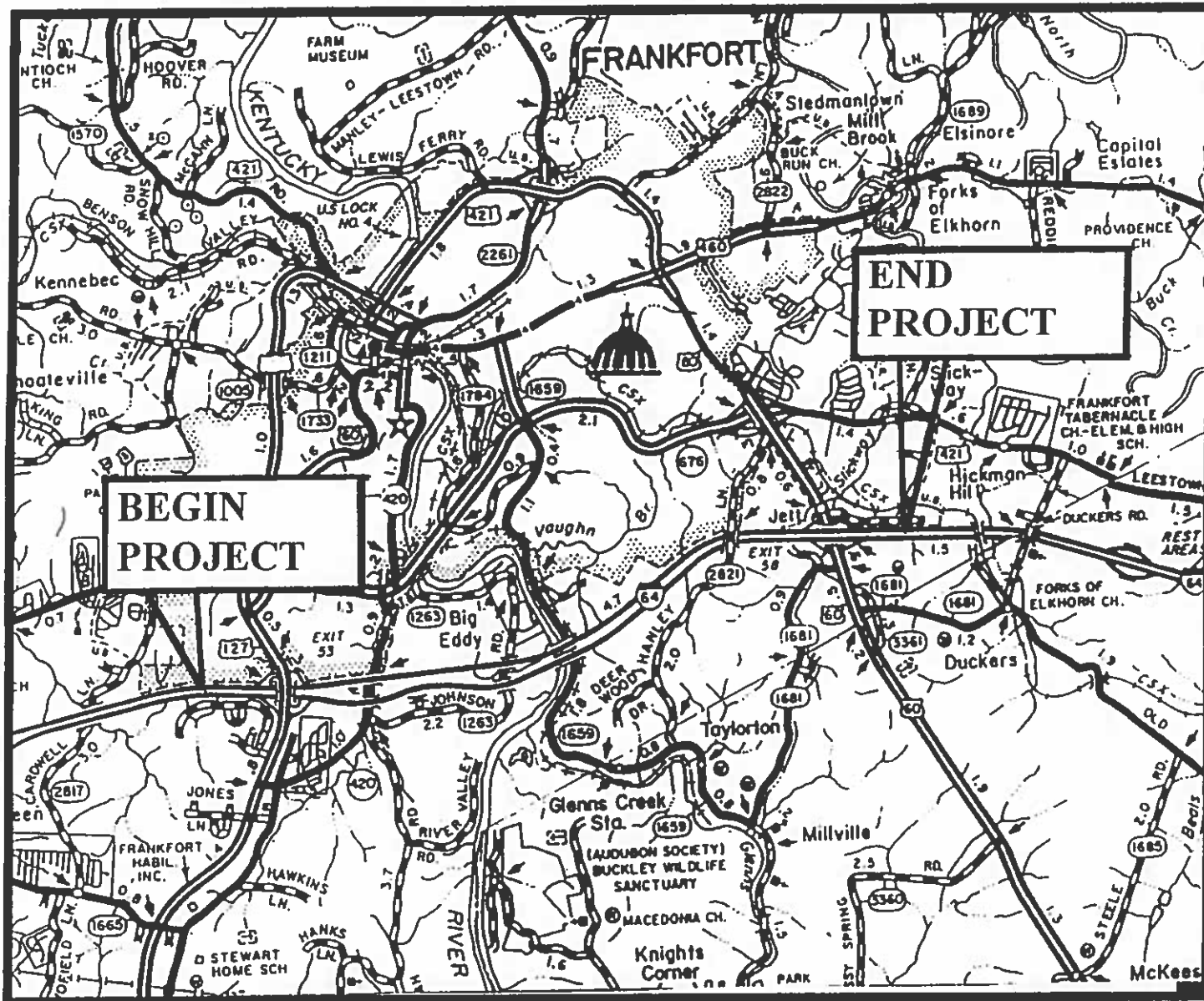
The bifurcated alignments were shifted toward the median sufficiently to maintain two lanes of traffic on the existing roadways while constructing part-width ultimate roadways.

The original phasing plan would have shifted traffic to the new part-width roadways while completing the facilities.

After studying several maintenance of traffic options, however, the most favorable is to build the part-width westbound lanes while maintaining traffic on the existing roadways. Eastbound traffic would then be shifted to the part-width westbound lanes using crossovers at each end of the project. Temporary concrete barrier walls would be required due to the proximity of the opposing eastbound and westbound traffic. Some temporary drainage structures would be required during construction to prevent ponding between the roadways.

With all traffic on the westbound side of the bifurcated roadway, the entire eastbound roadway can be reconstructed without affecting traffic. This method will also allow for the replacement of any drainage structures required for the eastbound roadway. It also eliminates some constructability concerns associated with the flattening of the eastbound grade up from the Kentucky River.

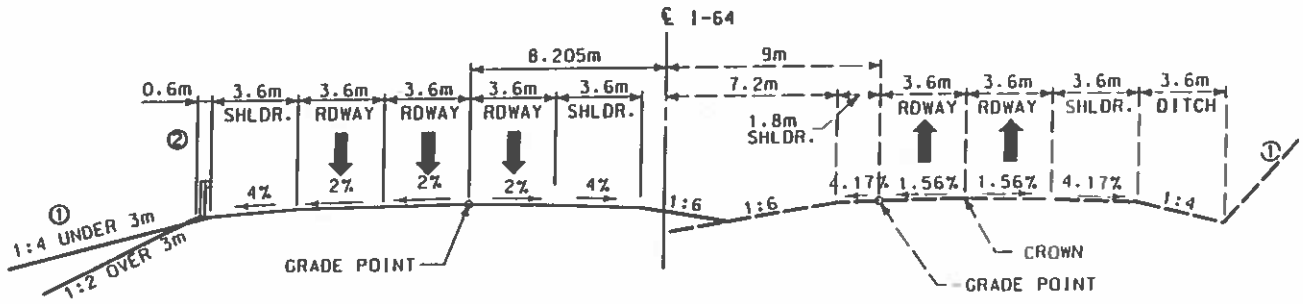
At the existing depressed median locations (each end of the project) traffic can be moved to the new inside shoulder and lane while the two outside lanes are being reconstructed. Some additional part-width construction is required at ramps and ramp terminals. Temporary barrier walls will be used to separate the traffic from construction activities.



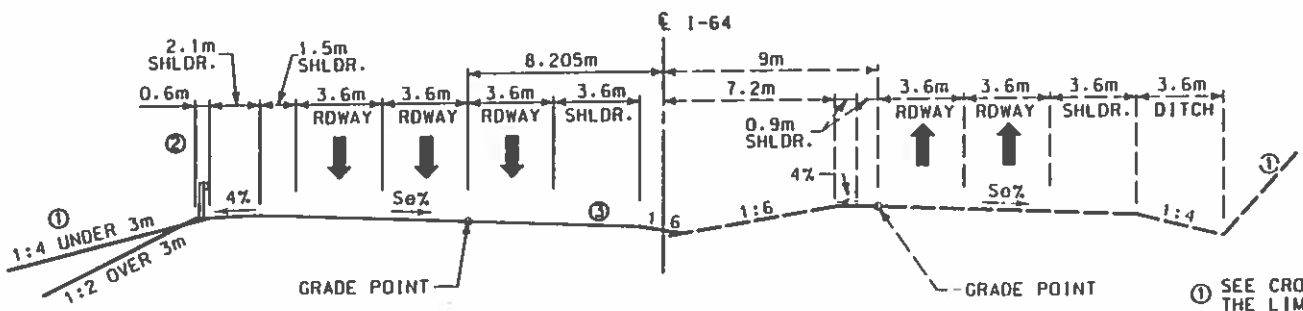
GRAPHIC SCALE IN MILES

TYPICAL SECTIONS

STA. 99+160 TO STA. 101+025.860 BK.



NORMAL SECTION
WITH DEPRESSED MEDIAN



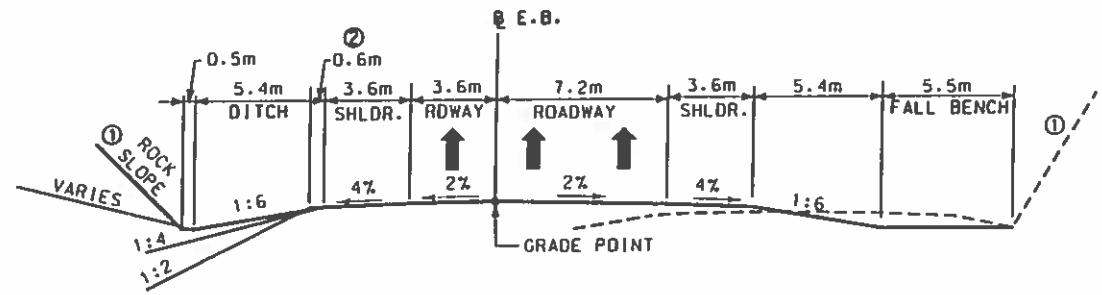
SUPERELEVATED SECTION
WITH DEPRESSED MEDIAN

- ① SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE SHOULDERS.
- ② SHOULDERS SHALL BE WIDENED .6m WHERE GUARDRAIL IS REQUIRED.
- ③ SUPERELEVATED SHOULDERS SHALL BE CONSTRUCTED TO STANDARD SUPERELEVATION EXCEPT NOT FLATTER THAN 4.0%.

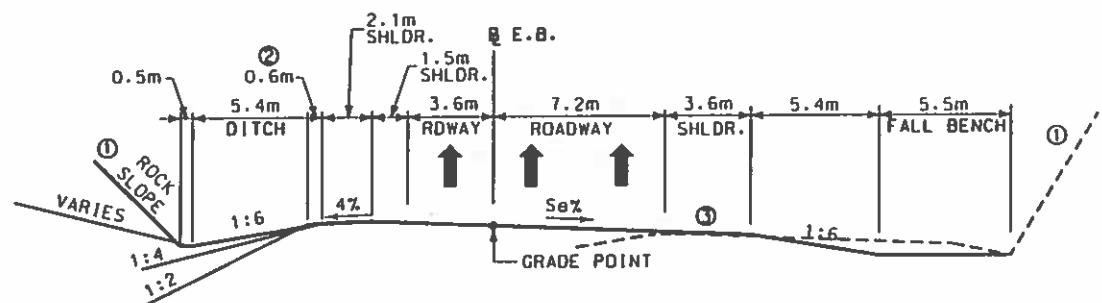
TYPICAL SECTIONS

EASTBOUND LANES

STA. 101+025.860 TO STA. 104+936.647
 STA. 107+730.000 TO STA. 107+846.939



Normal Section Eastbound Lane
without Truck Climbing Lane



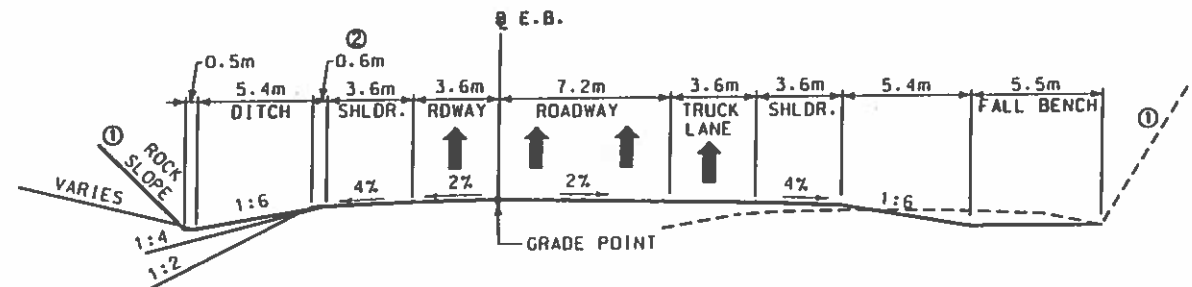
Superelevated Section Eastbound Lane
without Truck Climbing Lane

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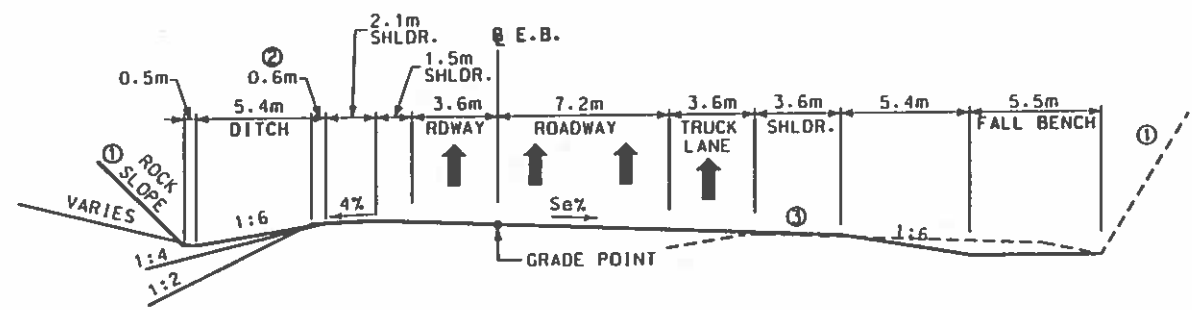
TYPICAL SECTIONS

EASTBOUND LANES

STA. 104+936.647 TO STA. 107+730



Normal Section Eastbound Lane
with Truck Climbing Lane



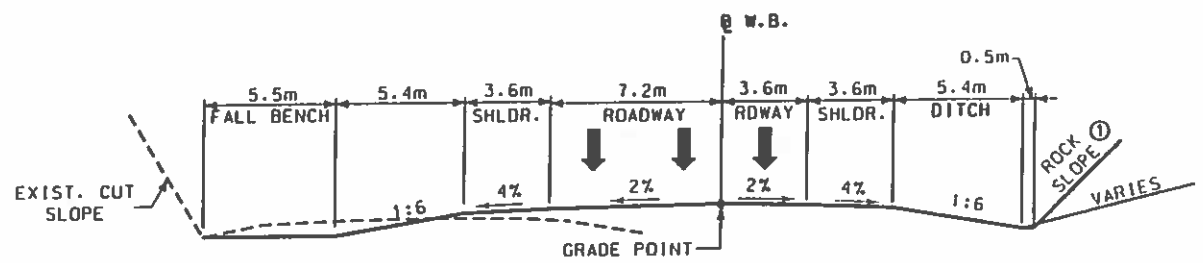
Superelevated Section Eastbound Lane
with Truck Climbing Lane

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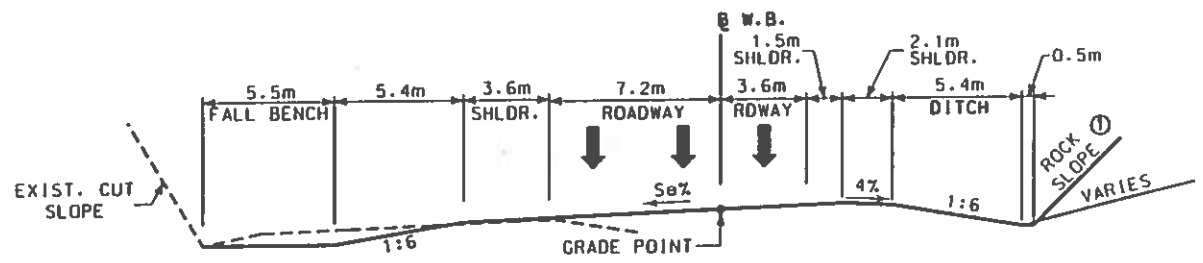
TYPICAL SECTIONS

WESTBOUND LANES

STA. 101+025.869 TO STA. 107+804.901



Normal Section Westbound Lane



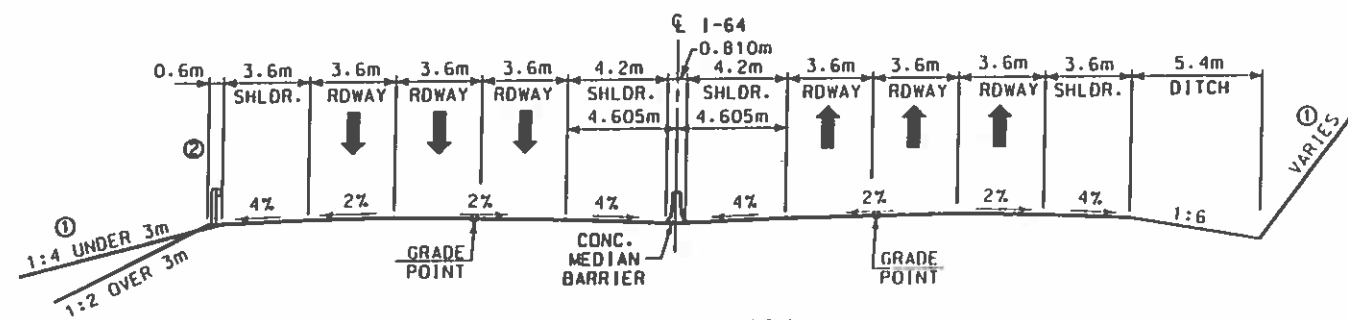
Superelevated Section Westbound Lane

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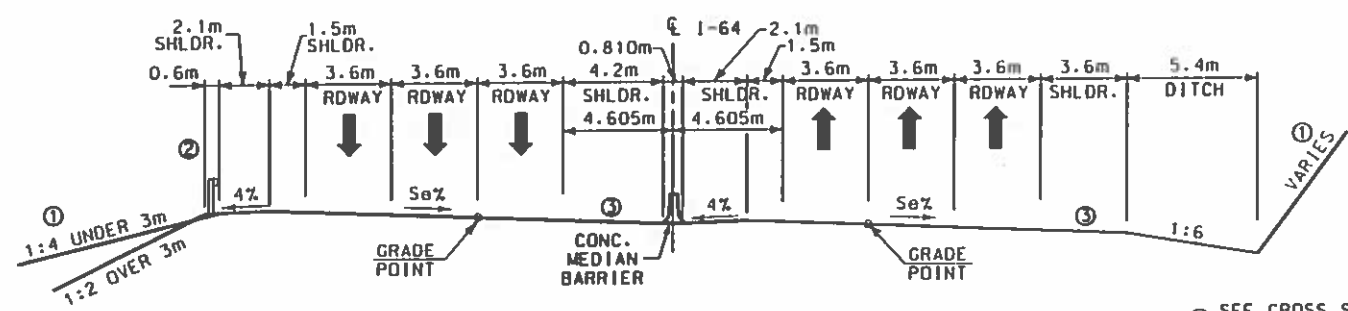
TYPICAL SECTIONS

STA. 107+846.939 TO STA. 108+570

County	WY	WY	WY	WY
Federal No.				
From Rev.	5-256-00			



NORMAL SECTION
WITH MEDIAN BARRIER



SUPERELEVATED SECTION
WITH MEDIAN BARRIER

- ① SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE SHOULDERS.
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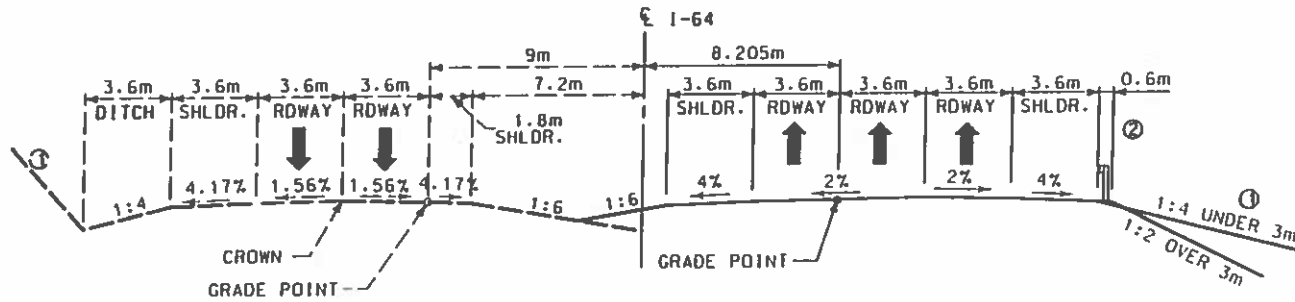
SHEET 12 OF 12

COUNTY	CD	SECTION	DATE	SCALE
FRANKLIN				

From No. 5-604-00

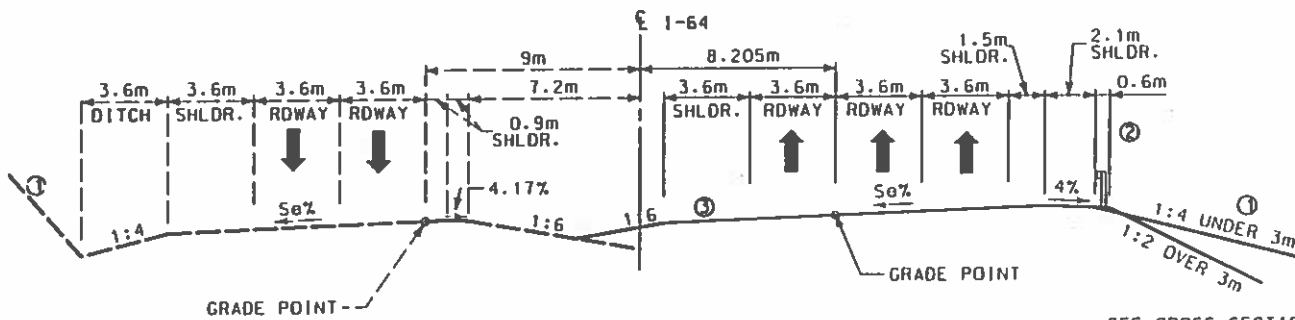
TYPICAL SECTIONS

STA. 108+675 TO STA. 110+320



NORMAL SECTION WITH DEPRESSED MEDIAN

SEE DETAIL SHEET FOR SPECIAL TRANSITION FROM STA. ____+____ TO STA. ____+____

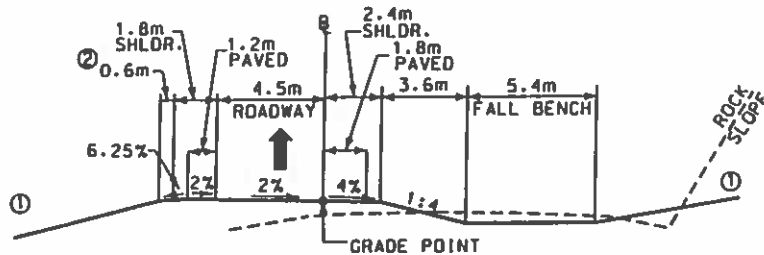


SUPERELEVATED SECTION WITH DEPRESSED MEDIAN

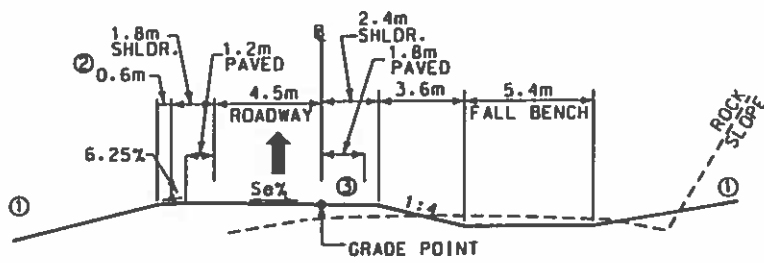
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TYPICAL SECTIONS

U.S. 127 RAMPS



Normal Section U.S. 127 RAMP



Superelevated Section U.S. 127 RAMP

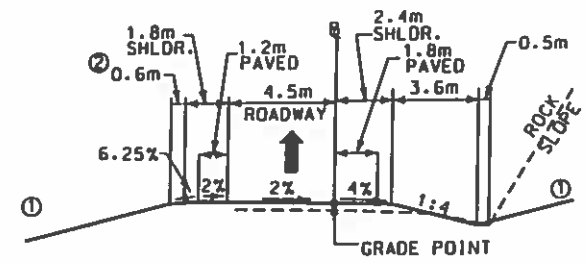
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11/04 Rev. 5-05A-00

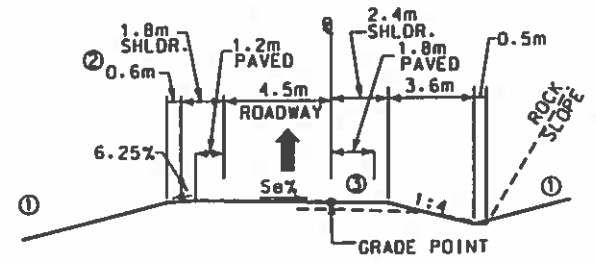
DATE	BY	CHKD	APP'D	TITLE
FORM 10				
1/16/64				

TYPICAL SECTIONS

U.S. 60 RAMPS



Normal Section U.S. 60 RAMP



Superelevated Section U.S. 60 RAMP

- ① SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE SHOULDERS.
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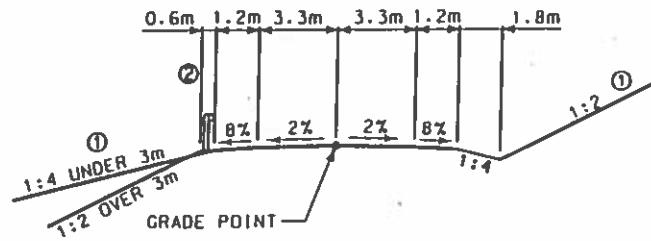
1/16/64

TYPICAL SECTIONS

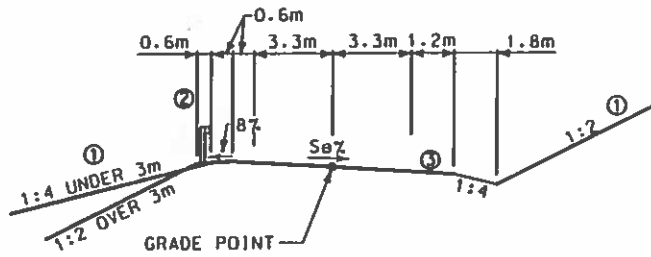
HANLEY LANE

COUNTY	DATE	SCALE	NO.
FRANKLIN			

Form No. 1-654-03

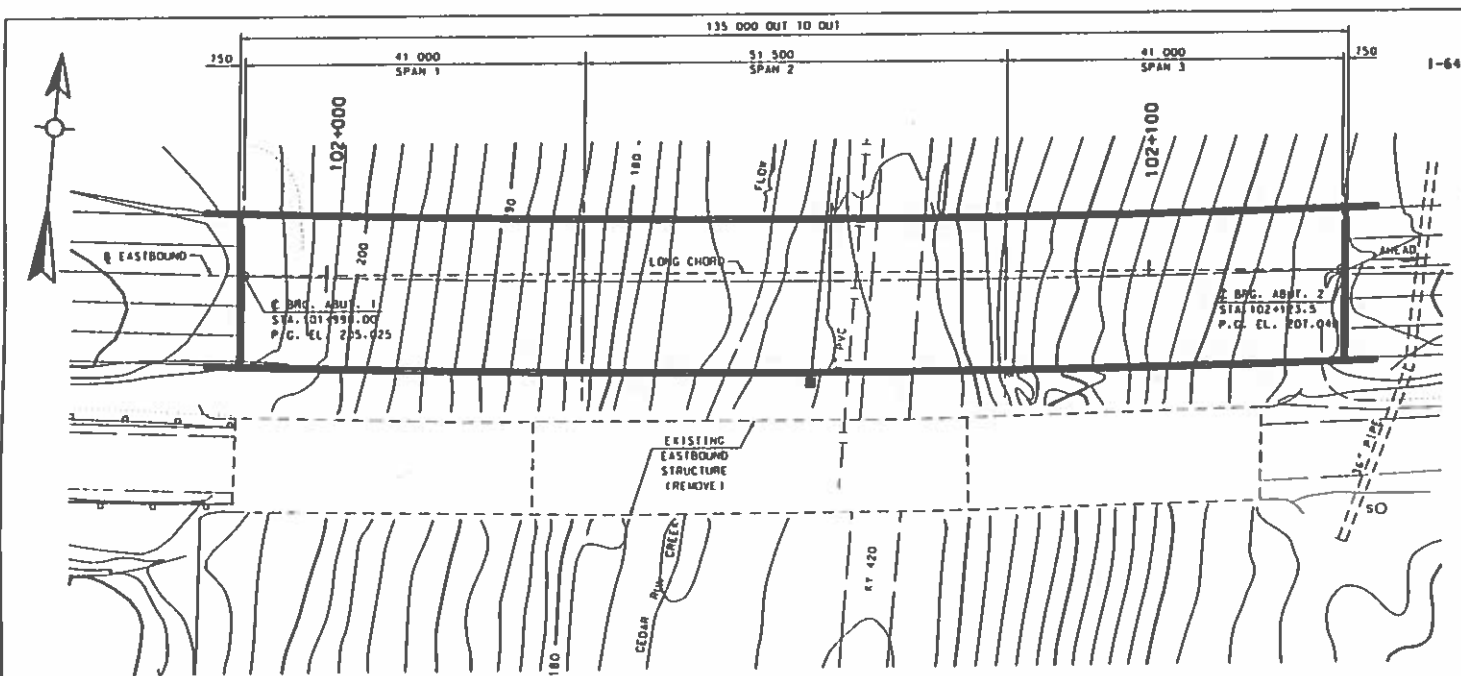


NORMAL SECTION



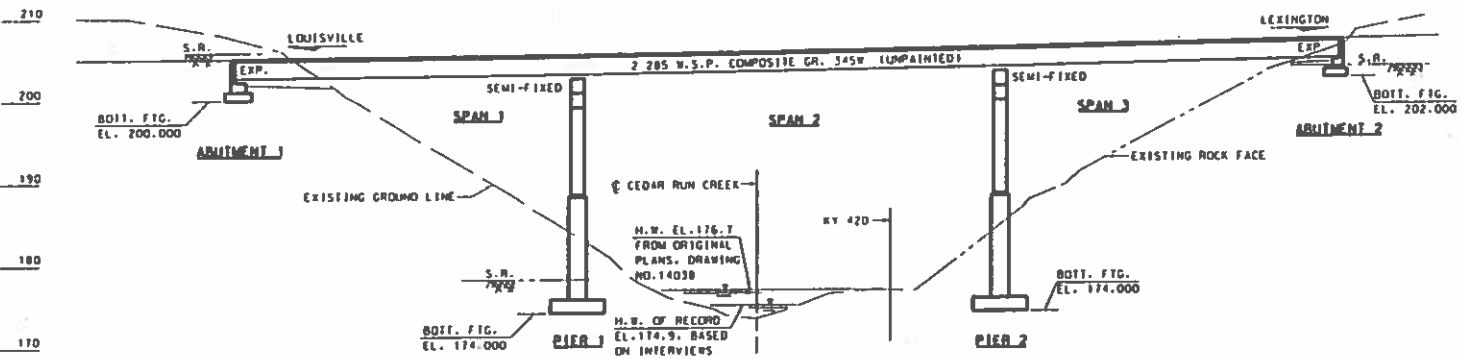
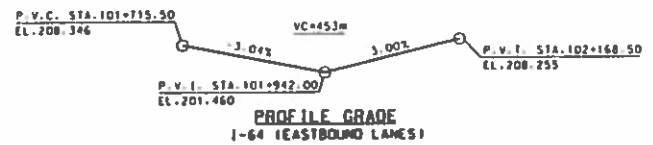
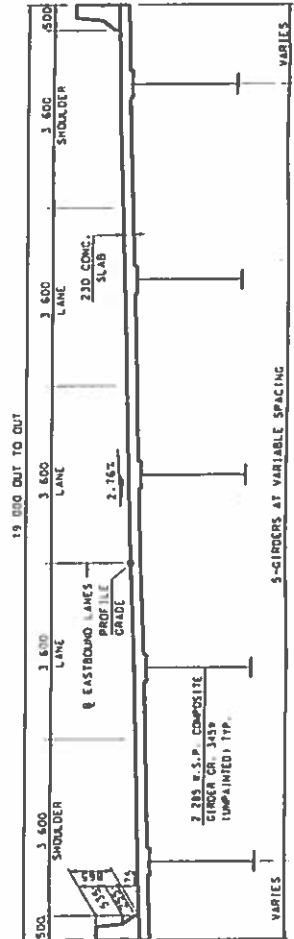
SUPERELEVATED SECTION

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- ③ SUPERELEVATED SHOULDERS SHALL BE CONSTRUCTED TO STANDARD SUPERELEVATION EXCEPT NOT FLATTER THAN 8.0%.



CURVE DATA
1-64 (EASTBOUND LANES)

P.I. 101+894.129
D = 18°51'44" LT.
R = 2200.000m
Ts = 415.468m
Ls = 100.000m
Lc = 674.262m
f = 1°18'08"
L.T. = 66.680m
S.T. = 33.335m
Es = 2.767
RUNOFF = 100.000m
RUNOUT = 72.464m



SECTION ALONG BASELINE INTERSTATE 64 EASTBOUND LANES PRELIMINARY LAYOUT

RELOC. 1-64 EB OVER RY 420 @ CEDAR RUN CRK. SHEET

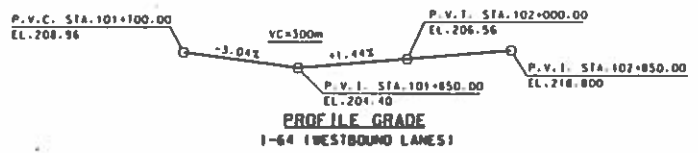
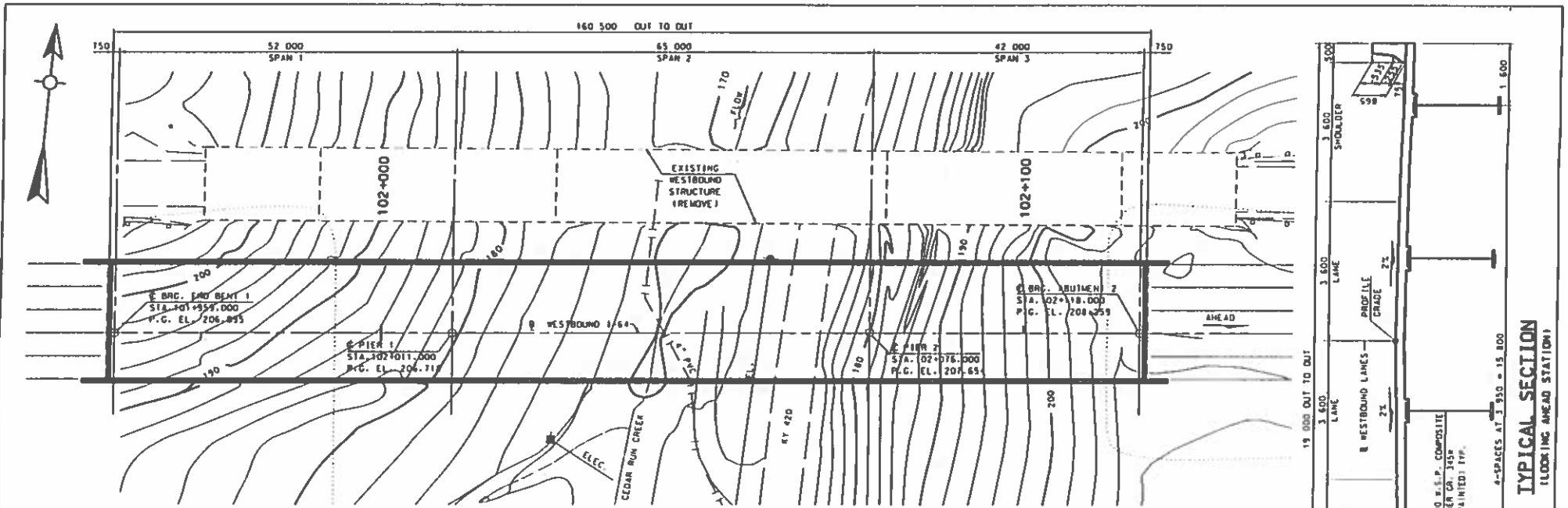
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

FRANKFORD COUNTY OF

FRANKLIN
LOUISVILLE-LEXINGTON-CATLETTSBURG ROAD

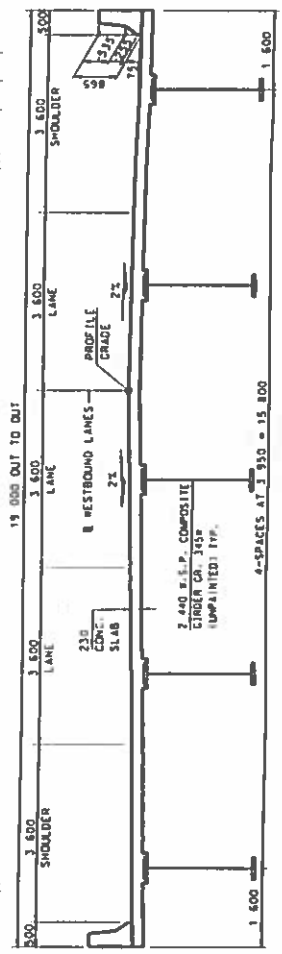
STATION 102+056.75 TO 88 P.E. PROJECT NO.

CONSTRUCTION PROJECT NO. MAINTENANCE PROJECT NO. DRAWING NO.

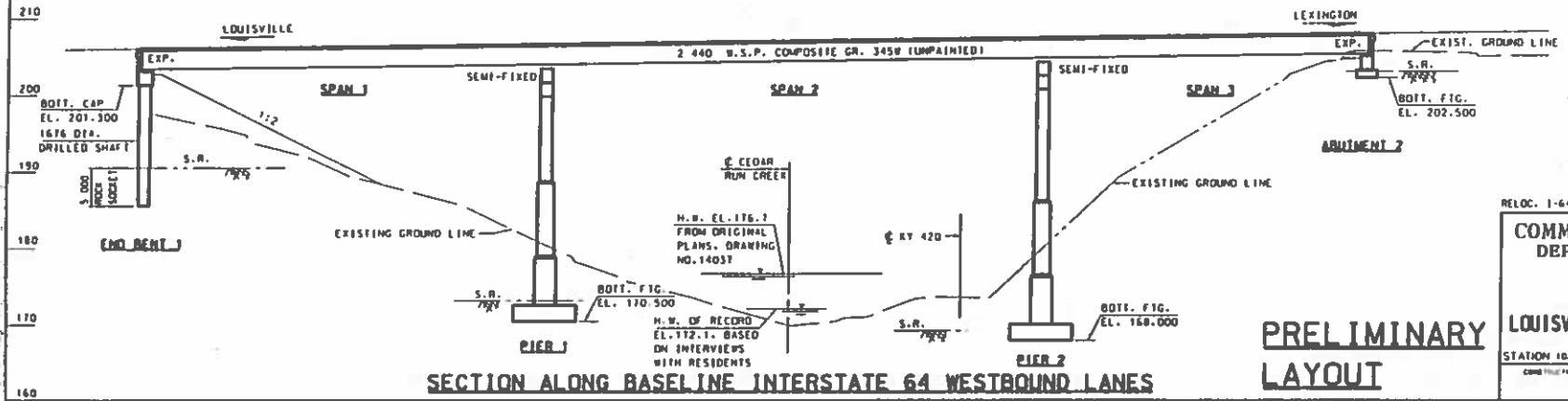


PLAN

PROFILE GRADE
1-64 (WESTBOUND LANES)



TYPICAL SECTION
(LOOKING AHEAD STATION)



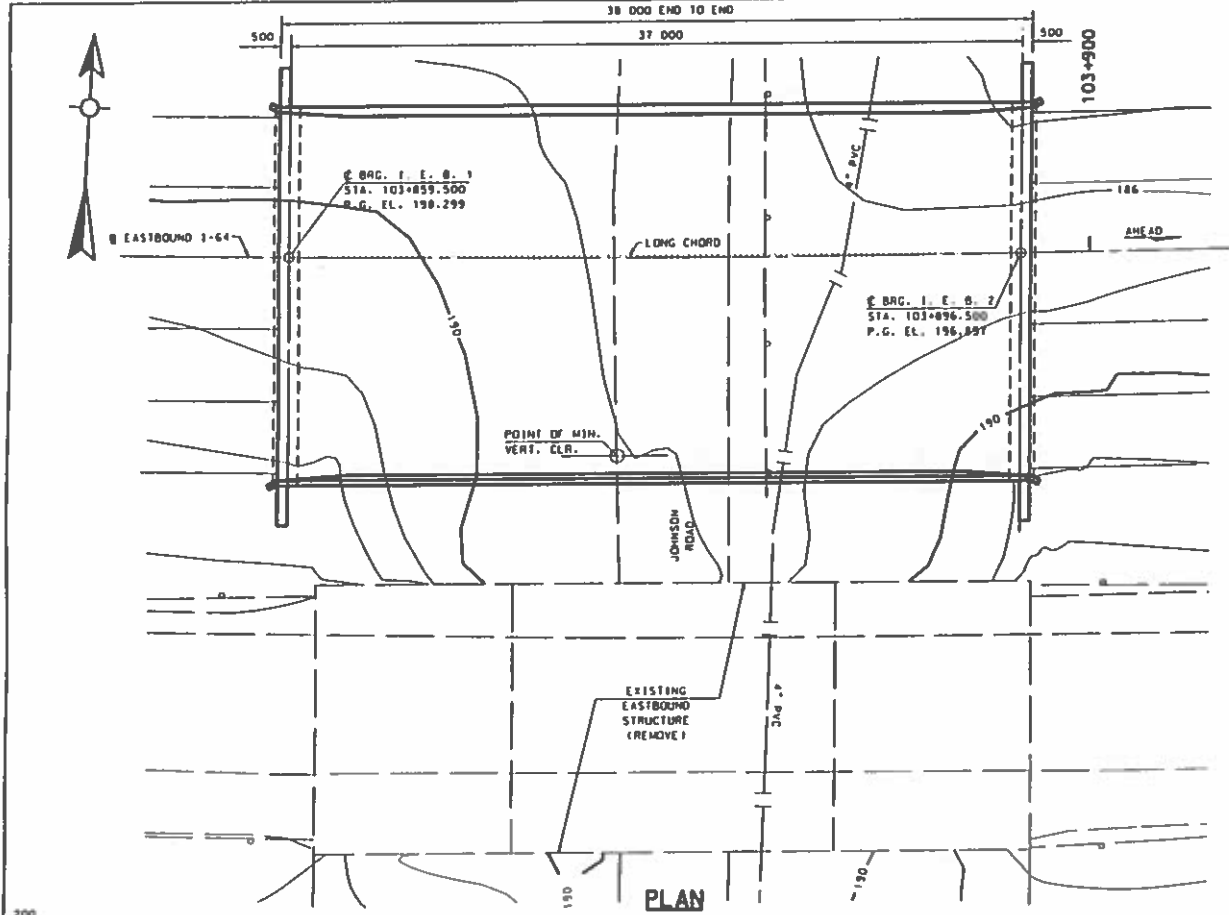
SECTION ALONG BASELINE INTERSTATE 64 WESTBOUND LANES

PRELIMINARY
LAYOUT

RELOC. 1-64 WB OYER KY 420 & CEDAR RUN CRK. SHEET

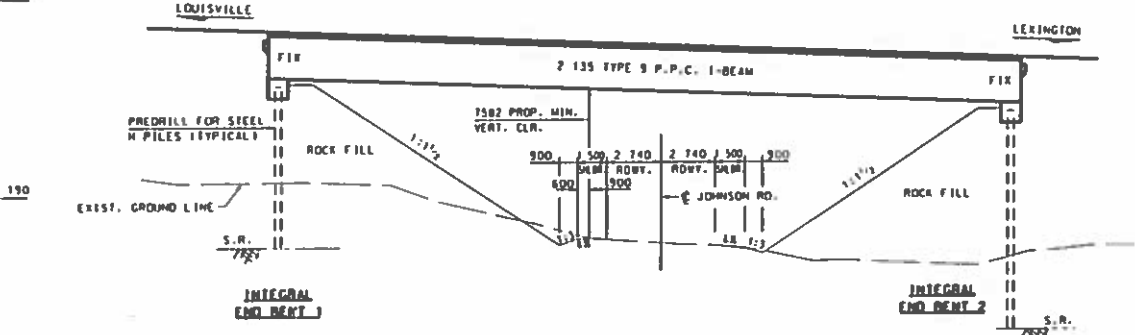
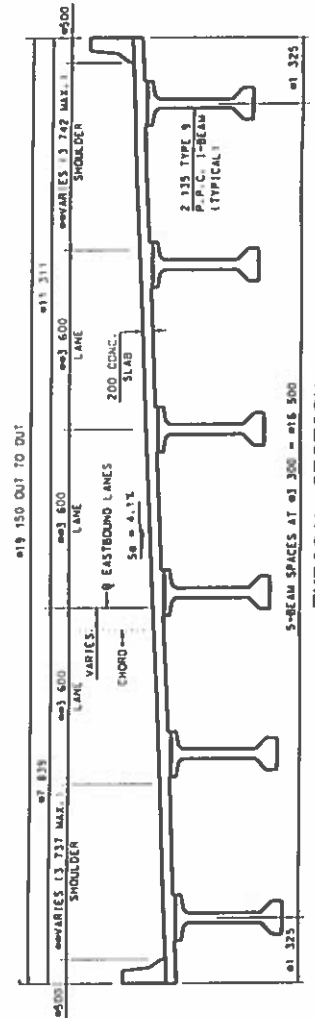
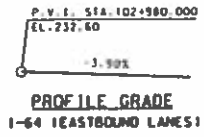
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
FRANKFORD COUNTY OF
FRANKLIN
LOUISVILLE-LEXINGTON-CATLETTSBURG ROAD

STATION 102+043.75 & WB P.E. PROJECT NO.
CONTRACT PROJECT NO. DIVISION PROJECT NO. DRAWING NO.



CURVE DATA
 1-64 (EASTBOUND LANES)

P.I. 103+813.437
 D = 25°28'02" LT.
 R = 1400.000m
 Ts = 366.430m
 Ls = 100.000m
 Lc = 522.273m
 P = 2°02'42"
 L.T. = 66.671m
 S.T. = 33.337m
 Eo = 35.605m
 e = 4.1%
 RUNOFF = 100.000m
 RUNDLT = 48.780m

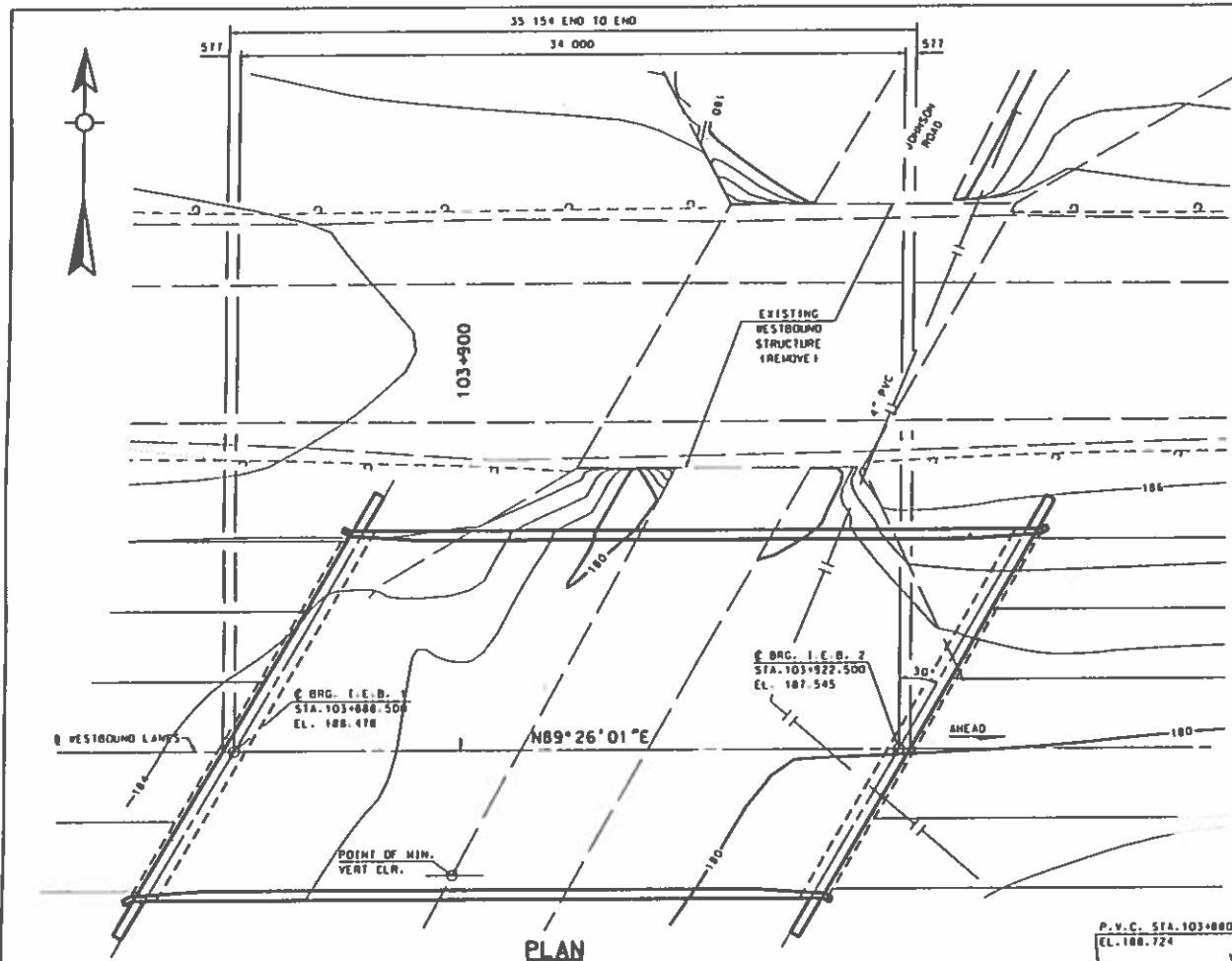


- NOTATIONS**
- ⊥ - DENOTES MEASURED PERPENDICULAR TO CHORD
 - ⊙ - DENOTES MEASURED RADIAL TO E EASTBOUND LANES

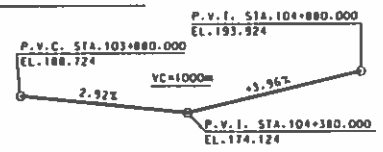
RELOCATED I-64 EB OVER JOHNSON ROAD SHEET

COMMONWEALTH OF KENTUCKY
 DEPARTMENT OF HIGHWAYS
 FRANKFORT
 COUNTY OF
FRANKLIN
 LOUISVILLE-LEXINGTON-CATLETTSBURG
 ROAD
 STATION STA. 103+070.119 TO 60 P. E. PROJECT NO.

PRELIMINARY LAYOUT

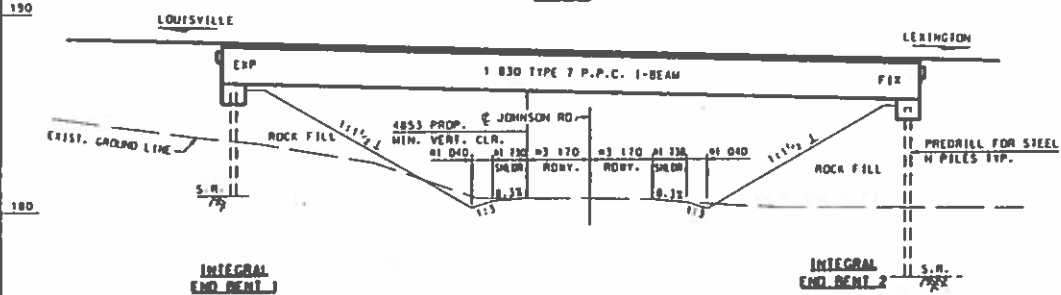
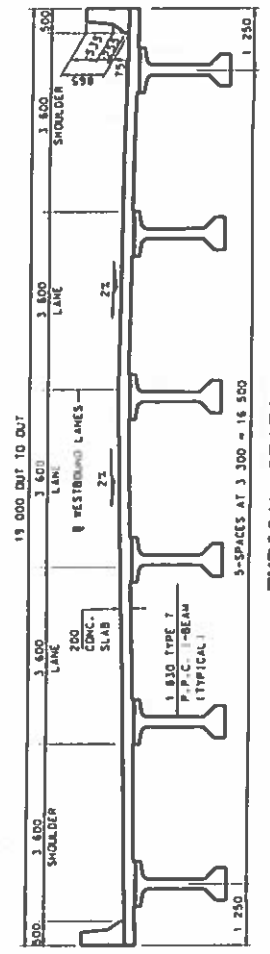


PLAN



PROFILE GRADE
1-64 WESTBOUND LANES

NOTATIONS
- - INDICATES MEASURED ALONG 30° SKEW

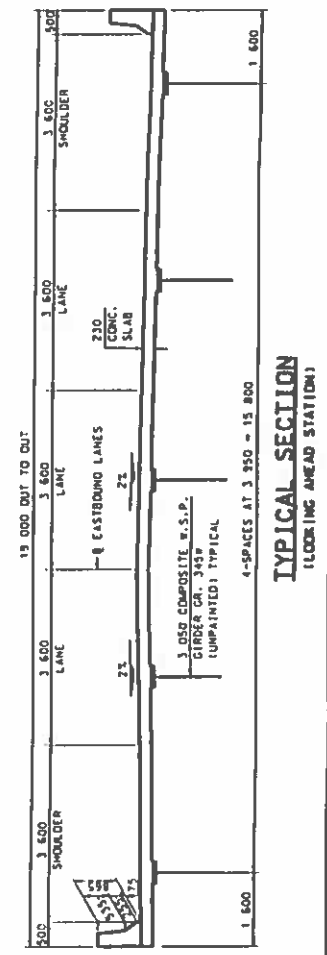
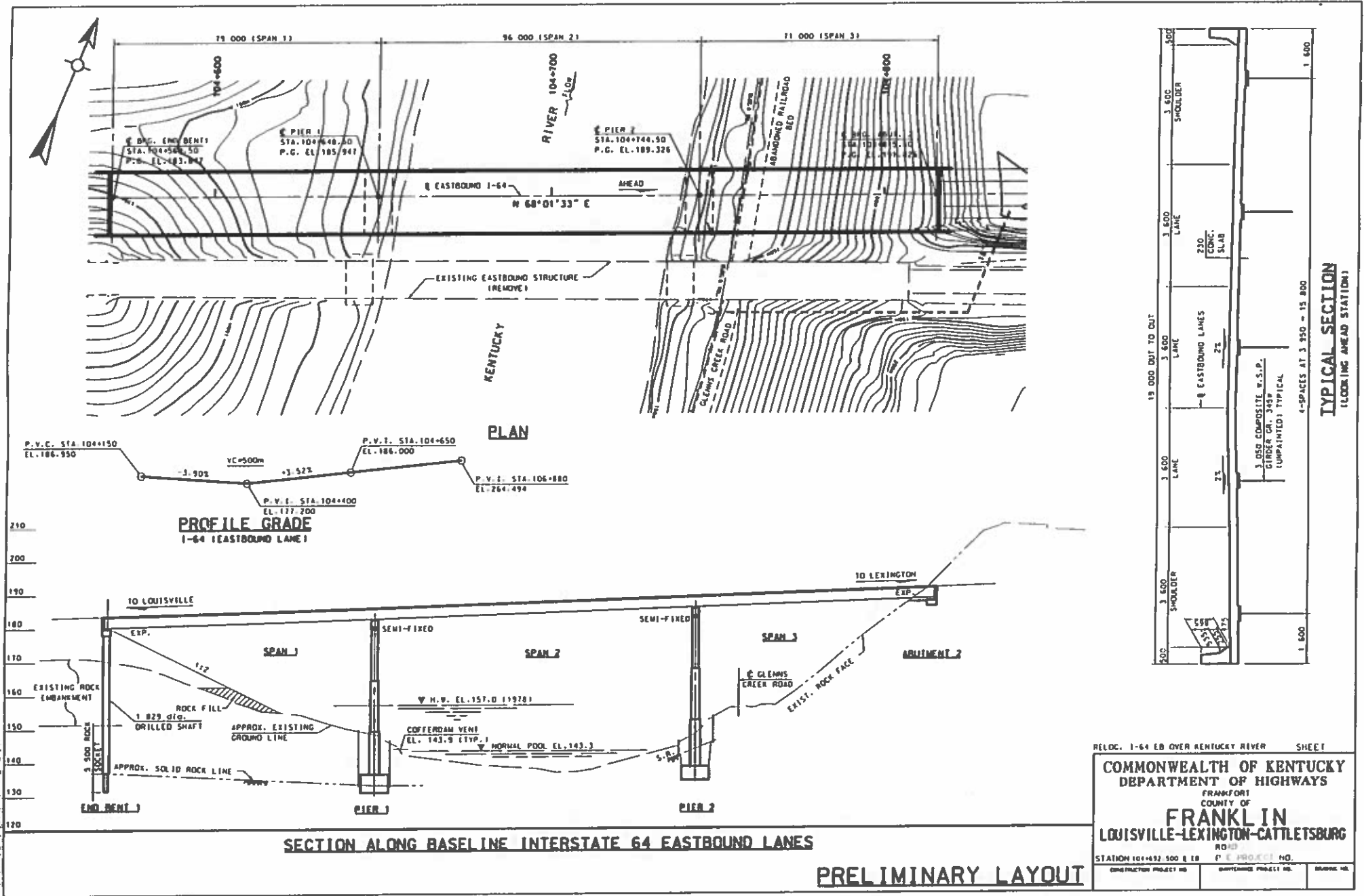


SECTION ALONG BASELINE INTERSTATE 64 WESTBOUND LANES

PRELIMINARY LAYOUT

RELOC. 1-64 WB OVER JOHNSON ROAD SHEET

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
FRANKFORT
COUNTY OF
FRANKLIN
LOUISVILLE-LEXINGTON-CATTLETSBURG
ROAD
STATIONS 104+300.315 @ WB P.E. PROJECT NO.
CONSTRUCTION PROJECT NO. DATE/ISSUE PROJECT NO. DRAWN BY



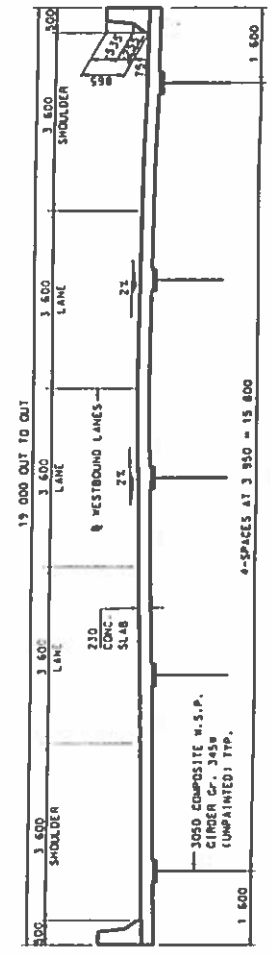
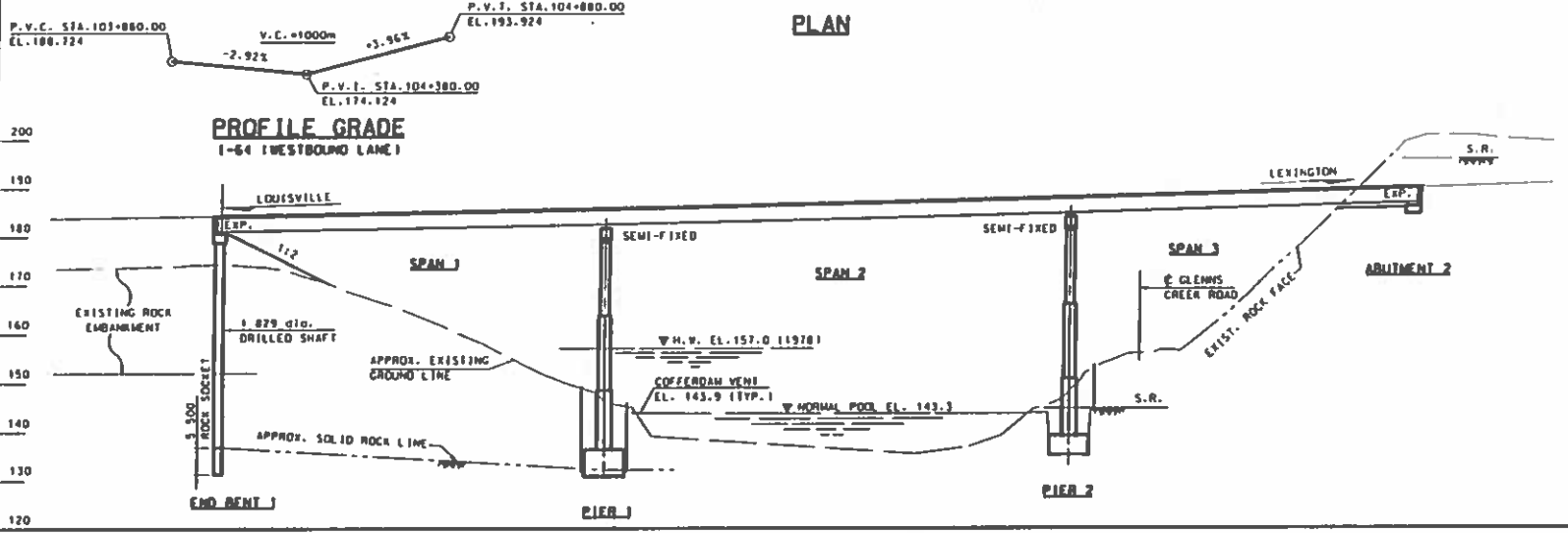
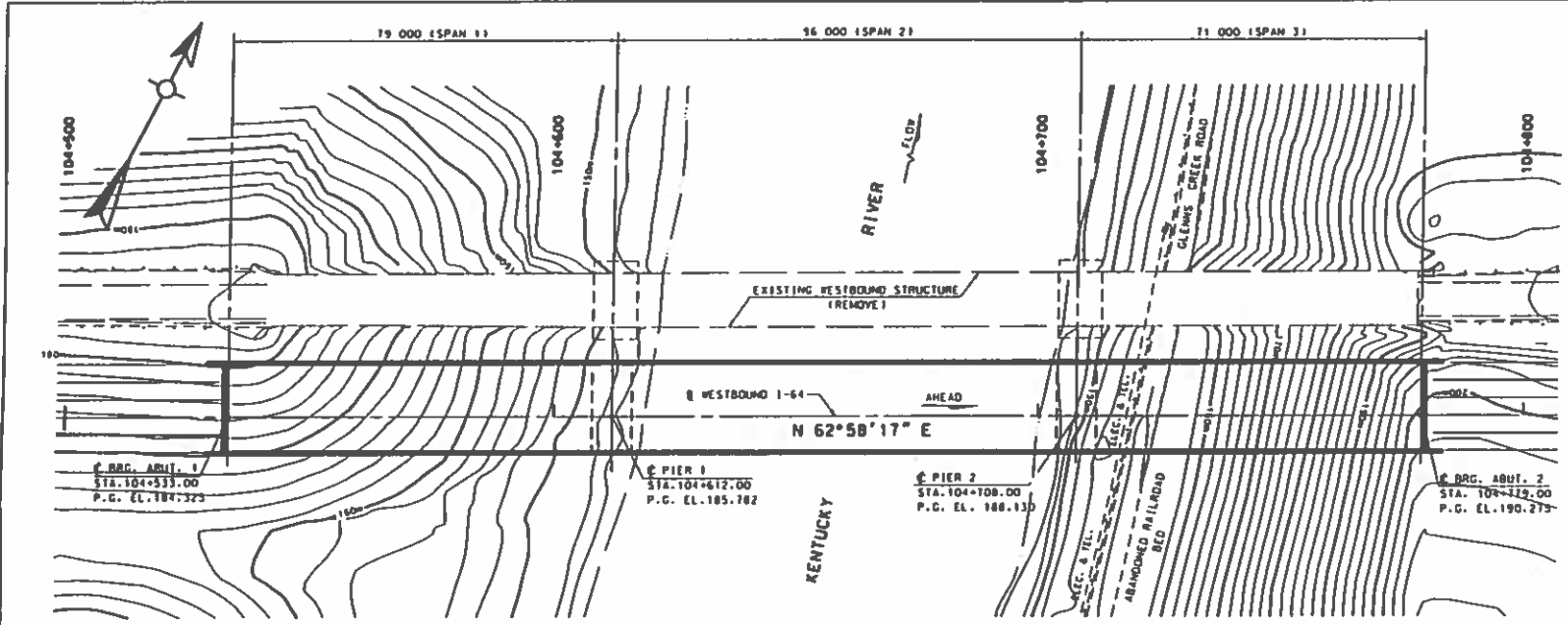
RELOC. I-64 EB OVER KENTUCKY RIVER SHEET

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
FRANKLIN COUNTY OF
FRANKLIN
LOUISVILLE-LEXINGTON-CATLETTSBURG
ROAD

STATION 104+492.500 & 18 P.C. PROJECT NO.

CONSTRUCTION PROJECT NO. DATE/ISSUE PROJECT NO. DRAWING NO.

PRELIMINARY LAYOUT



SECTION ALONG BASELINE INTERSTATE 64 WESTBOUND LANES

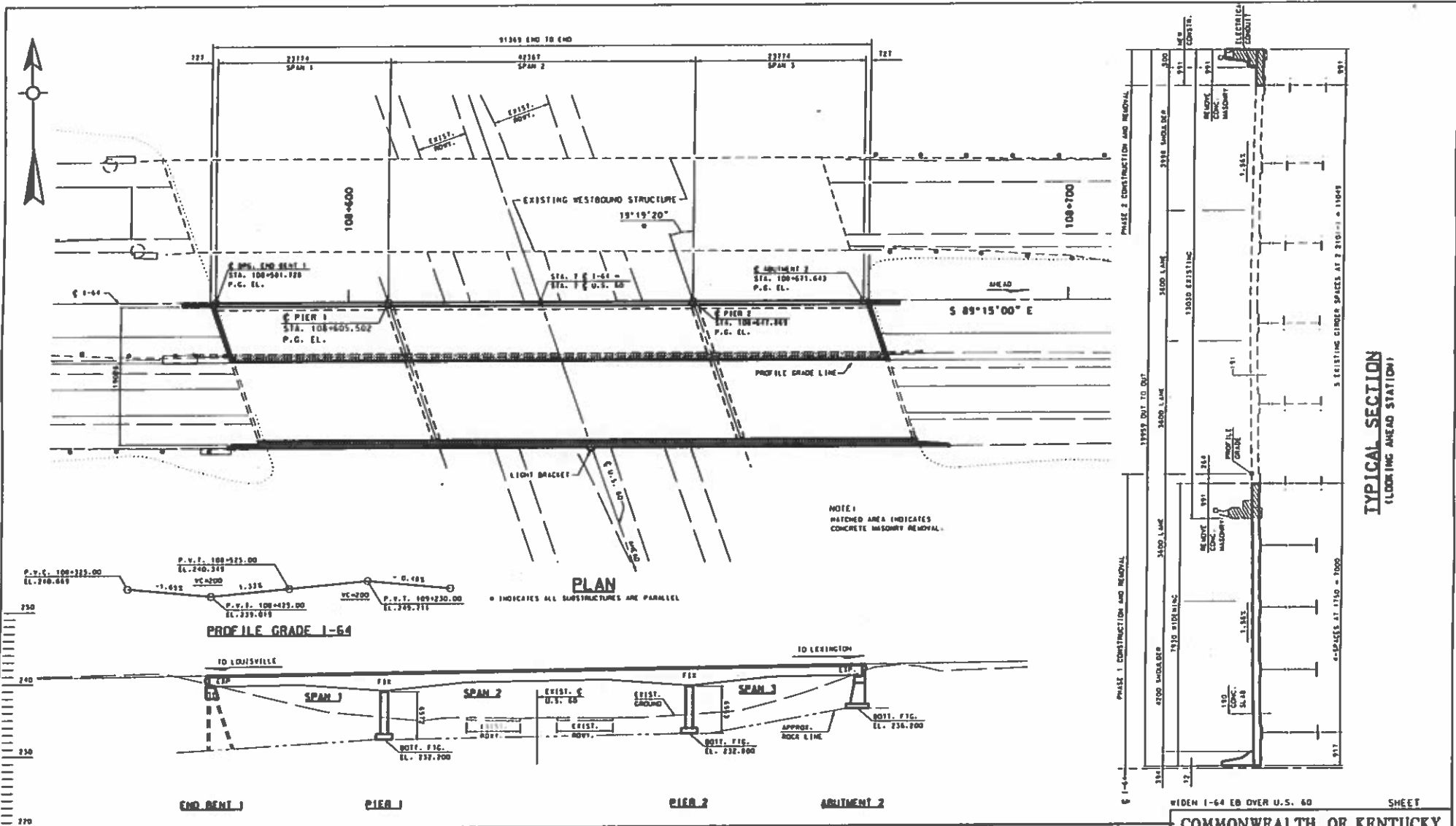
PRELIMINARY LAYOUT

RELOC. I-64 WB OVER KENTUCKY RIVER SHEET

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
FRANKFORT
COUNTY OF
FRANKLIN
LOUISVILLE-LEXINGTON-CATTLETSBURG
ROAD

STATION 104+556.00 @ WB P. E. PROJECT NO. DRAWING NO.

CONSTRUCTION PROJECT NO. MAINTENANCE PROJECT NO.



ELEVATION ALONG @ INTERSTATE 64

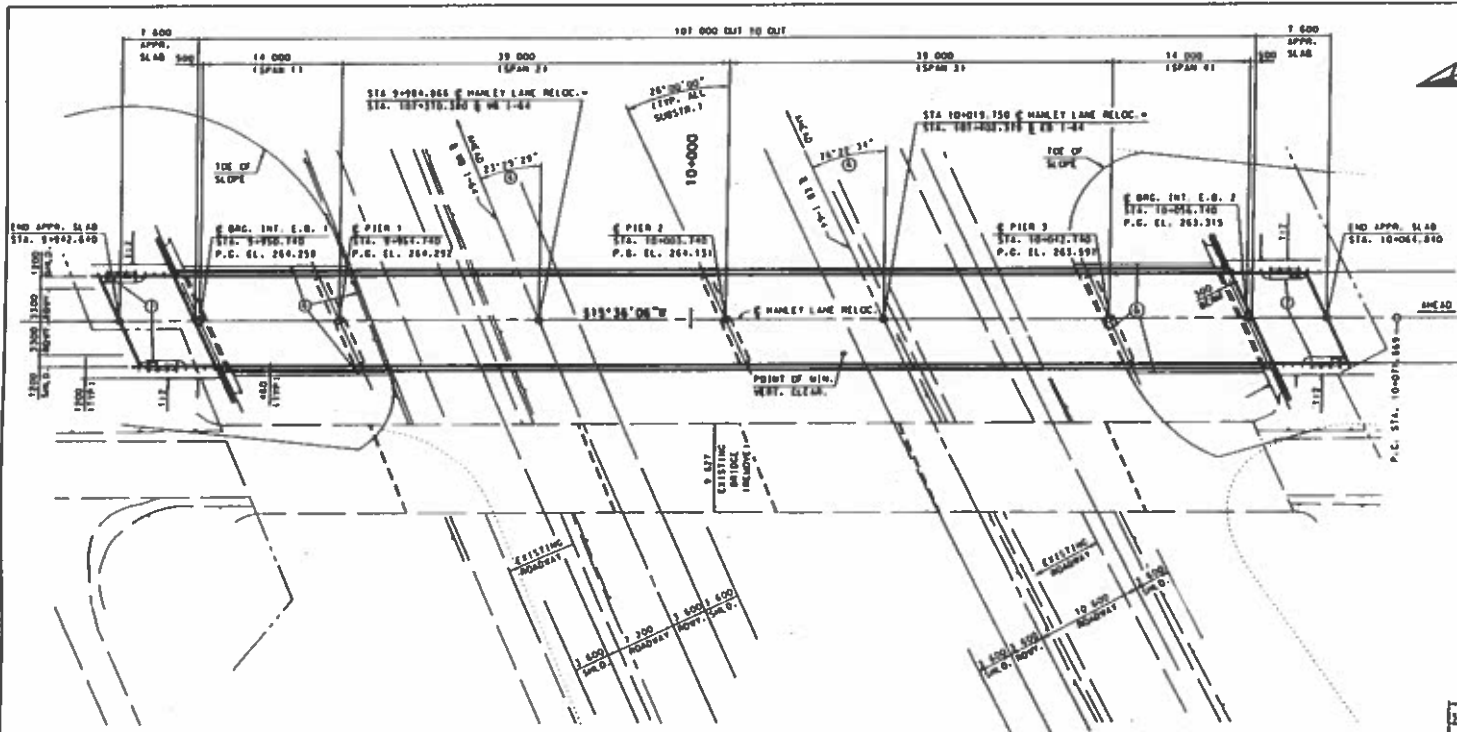
23 774 - 42 367 - 23 774 SPANS
 VARIABLE DEPTH WELDED PLATE GIRDERS, CONTINUOUS & COMPOSITE
 HS25 LIVE LOAD (INCL. CONST. F.) 18 000 LB BRIDGE ROADWAY, 19°19'20" SASH LEFT
 24 250 OUT-TO-OUT SHOULDERS AT BRIDGE, VARYING, FULL SLOPES

PRELIMINARY LAYOUT

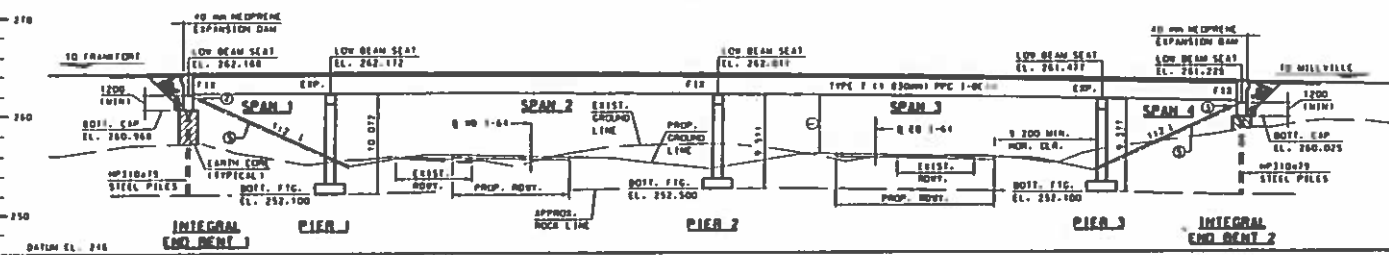
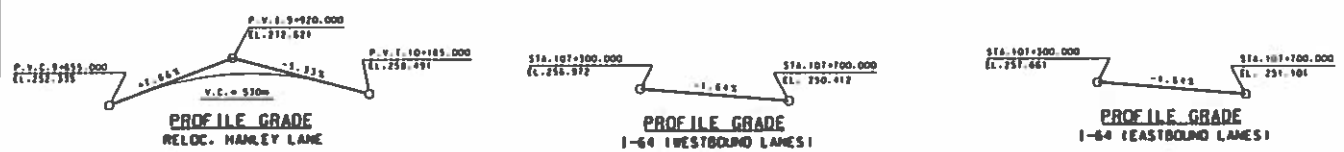
COMMONWEALTH OF KENTUCKY
 DEPARTMENT OF HIGHWAYS
 FRANKFORT
 COUNTY OF
FRANKLIN
 LOUISVILLE-LEXINGTON-CATLETTSBURG
 ROAD

STATION _____ P. E. PROJECT NO. _____
 CONSTRUCTION PROJECT NO. _____ IMPROVEMENT PROJECT NO. _____ DRAWING NO. _____

TYPICAL SECTION
 (LOOKING AHEAD STATION)

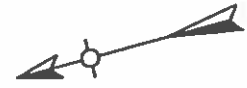


PLAN



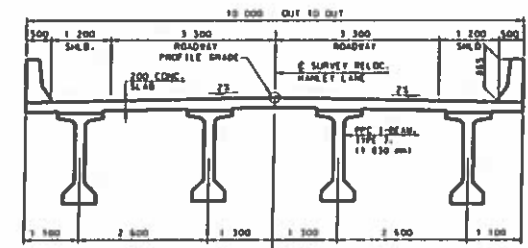
SECTION ALONG C HANLEY LANE RELOC.

14 000 - 39 000 - 39 000 - 14 000 SPANS
 TYPE 2 (11 630 mm) PPC I-BEAMS, CONTINUERS & COMPOSITE FOR LIVE LOAD
 MS29 LIVE LOADING, 9 000 mm BRIDGE ROADWAY, 26° SKEW LEFT
 11 400 mm OUT-TO-OUT S-SHOLDERS AT BRIDGE, 1:2 SLOPES



CURVE DATA HANLEY LANE RELOC.	CURVE DATA EASTBOUND I-64	CURVE DATA WESTBOUND I-64
P. I. STA. 10+115.351	P. I. STA. 107+193.912	P. I. STA. 107+100.422
$\Delta = 19^{\circ}09'21''$ RE.	$\Delta = 40^{\circ}00'57''$ RE.	$\Delta = 38^{\circ}01'25''$ RE.
R = 250.000 m	R = 1800.000 m	R = 1800.000 m
T = 43.683 m	Ta = 707.805 m	Ta = 670.301 m
L = 86.492 m	Lc = 100.000 m	Lc = 100.000 m
E = 5.100 m	Lc = 1187.324 m	Lc = 1094.359 m
B = 0.23	F = 1'35'30"	F = 1'35'30"
Runoff = 37.000 m	S.T. = 66.669 m	S.T. = 64.669 m
Runoff = 11.936 m	S.T. = 33.336 m	S.T. = 33.336 m
	Ca = 956.616 m	Ca = 104.103 m
	a = 3.345	a = 3.355
	Runoff = 100.000 m	Runoff = 100.000 m
	Runoff = 59.524 m	Runoff = 59.524 m

- NOTATIONS:
- ① MIN. VERT. CLR. = 5.640 m (18'6" REQ'D.)
 - ② BERM EL. 241.740 (E. D. 1)
 - ③ BERM EL. 240.823 (E. D. 2)
 - ④ ANGLES MEASURED FROM TANGENT TO CURVED BASELINE AT INTERSECTING STATION.
 - ⑤ CRUSHED AGGREGATE SLOPE PROTECTION 1300 mm THICK
 - ⑥ LIMITS OF CRUSHED AGGREGATE SLOPE PROTECTION.
 - ⑦ CURB BOX (INLET TYPE @ ISEE ROADWAY PLANS)



TYPICAL SECTION

RELOC. HANLEY LANE OVER RELOC. I-64 SHEET

COMMONWEALTH OF KENTUCKY
 DEPARTMENT OF HIGHWAYS

FRANKFORT
 COUNTY OF

FRANKLIN
 LOUISVILLE-LEXINGTON-CATLETTSBURG
 ROAD

10+003.740
 STATION HANLEY LN. RELOC. P. E. PROJECT NO.

CONSTRUCTION PROJECT NO. _____ MAINTENANCE PROJECT NO. _____ DRAWING NO. **24177**

PRELIMINARY LAYOUT