

Final

ENGINEER'S REPORT

**ROAD REHABILITATION
SR 45 FROM 0.36 MILE TO 1.34 MILES
EAST OF SR 46
(PETE ELLIS DR / RANGE RD TO RUSSELL RD)
CITY OF BLOOMINGTON, MONROE COUNTY
Des. No. 9902910**

**Prepared For:
Engineering Assessment Section
Division of Environment, Planning and Engineering
INDOT**

November 1, 2005

Prepared By:



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I. PURPOSE OF REPORT

This report documents the engineering assessment phase improvements to SR 45. Included is the examination and documentation of existing conditions, evaluation of alternative corrective measures, and recommendation of an effective and efficient course of action. The project is described at a preliminary level and all relevant background data is included. The conclusions and recommendations of this report will guide the ongoing environmental and succeeding design phases.

II. PROJECT LOCATION

This project is located on SR 45 (10th Street) in the City of Bloomington, Monroe County. Project limits extend from the Pete Ellis Drive/Range Road intersection (RP 41 + 85) to 400' east of the Russell Road intersection (RP 42+83). Referenced from SR 46, these project limits are respectively 0.36 mile east and 1.34 mile east. Refer to Attachments A-1, A-2 and A-3 for project location maps.

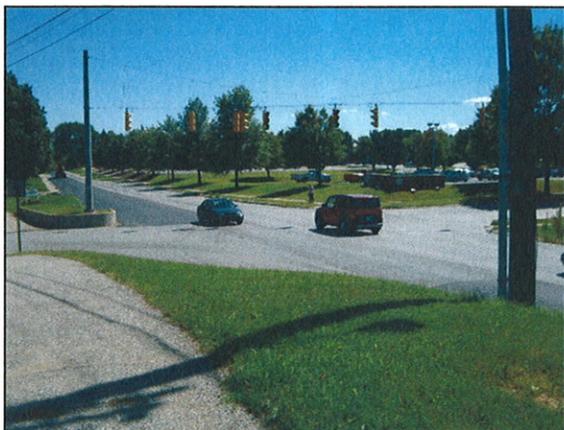


Fig. 1 SR 45 at Pete Ellis Dr/ Range Rd intersection, looking southeast

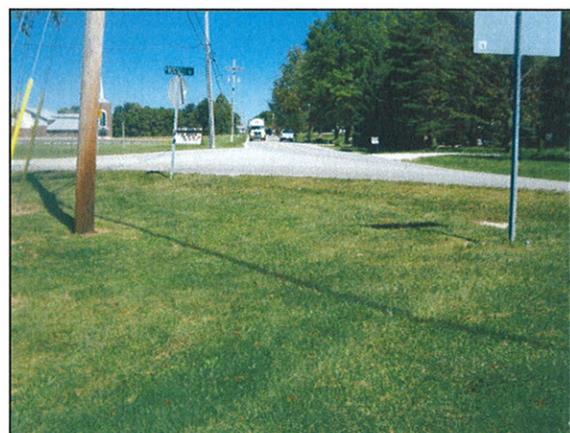


Fig. 2 SR 45 at Russell Rd, looking east

III. PROJECT NEED AND PURPOSE

The need for this project is due to existing congestion and delay caused by inadequate roadway traffic carrying capacity, particularly that for turning vehicles, coupled with and related to undesirable geometric and roadside characteristics such as inadequate provision for stopping sight distance and for pedestrians and cyclists. Need for this project is also reflected by the elevated level of crashes along the corridor.

The purpose of this project is to increase roadway capacity and reduce conflicts between through and turning vehicles, thus reducing current and impending congestion while enhancing operational safety for motorists, bicyclists and pedestrians.

IV. EXISTING CONDITIONS

See Appendices A-4 through A-18 for aerial photographs. Refer to Appendices A-22 through A-25 for ground level photographs.

SR 45 is functionally classified as an **Urban Minor Arterial**. It lies on the State 3R Non-Interstate System and the National Truck Network, but not on the National Highway System.



Fig. 3 West entrance to Fountain Park Apartments, looking west



Fig. 4 Entrance to Barrington Apartments, looking west

The SR 45 corridor lies generally west to east between the Pete Ellis Drive and Smith Road intersections, and turns north-northeast to its intersection with Russell Road. The west portion of the corridor primarily serves multi-unit apartments (Fountain Park, Union Square, Woodbridge, Barrington Place, and Bell Trace) which predominately accommodate Indiana University students and staff. The Bloomington Post Office occupies the southeast quadrant of the Pete Ellis Drive intersection. The east portion of SR 45 accesses single family homes including Tamarron Subdivision on the north side and Grandview Estates Subdivision on the south side. The University Elementary School is in the northwest quadrant of the Russell Road intersection and Mt Gilead Christian Church lies in the northeast quadrant.

Within the project limits are the four-leg intersections of SR 45 with Pete Ellis Drive (north leg - Range Road), John Hinkle Place (north leg - Woodbridge Drive), and Deckard Drive (west leg - Tamarron Drive). There are also the three-leg intersections of Grandview Drive and Smith Road, both of which tee in from the south, and Russell Road which tees in from the north.



Fig. 5 SR 45 at John Hinkle Place, looking east



Fig. 6 SR 45 at Woodbridge Drive, looking north from John Hinkle Place



Fig. 7 SR 45 at Grandview Drive, looking south



Fig. 8 SR 45 at Smith Road, looking west

The Pete Ellis Drive intersection is signalized. The other five intersections are stop-controlled on the minor approaches with SR 45 free flowing. Auxiliary lanes are provided on SR 45 at the following street intersections:

- John Hinkle Pl / Woodbridge Dr Right turn lanes in each direction
- Barrington Drive South to west right turn lane and north bound passing blister
- Smith Rd Dedicated south to east left turn lane and dedicated north to east right turn lane
- Tamarron Dr / Deckard Dr South to west right turn lane and dedicated left turn lanes in each direction
- Russell Rd Northbound passing blister

In addition to these public road intersections, there are private street approaches serving the following apartment complexes, all located between Pete Ellis Drive and Grandview Drive;

- Fountain Park Apartments (two vehicular entries on the west side, 230' and 570' with an auxiliary right turn lane in between, north of Pete Ellis Drive)
- Union Square Apartments (drive on the west side, 730' north of Pete Ellis Drive)
- Barrington Apartments (drive on west side, 1,700' north of Pete Ellis Drive).

Between Barrington Drive and Grandview Drive are two residential driveways on the east side of SR45. Between Grandview Drive and Smith Road, there are four driveways on the east side serving individual homes and a commercial site. From Smith Road to project termination north of the Russell Road intersection, there are seven driveways on the east side.

Pavement records indicate that SR 45 was originally a stone road of unknown vintage. In 1934, it was constructed of bituminous mix on stone base to a width of 16'. In 1937, it was resurfaced and widened to 20' with bituminous mix on stone base. It was subsequently resurfaced in each of the years 1955, 1961, 1972, 1987, and 1999.

The existing typical cross section of SR 45 consists of two 11' lanes, with 2' wide usable stone shoulders (7' wide stone shoulders on the east side, between John Hinkle Pl and Barrington Dr). Estimated side slopes are 6:1 except at Smith Rd, where they vary as much as 3:1. In 1997, a segment of US 45 was reconstructed on a new horizontal alignment (project number R-20165) from 530' south to 160' north of Smith Road. This reconstruction "lengthened and flattened" the 57° curve to the left through a 569' long, 573' radius horizontal curve with a maximum superelevation rate of 4% (CEDs = 40 mph). SR 45 was constructed with two 12' through lanes, a 12' eastbound auxiliary right-turn lane to Smith Road, 6' paved shoulders or combined curb and gutter (vertical), and W-Beam guardrail in select areas. Included was reconstruction of the Smith Road approach, and two private drives on the south side 160' west and 500' west of Smith Road.

Posted speed limit is 40 mph. All intersecting roads have 30 mph posted speed limits. This segment of SR 45 lies in rolling terrain.

The apparent existing horizontal alignment begins with a tangent from the Pete Ellis Drive (Range Road) centerline at station 14+63.5 and is further described in the following table:



Fig. 9 At Sta. 45+00, SR 45 curves left. Public driveway in foreground



Fig. 10 SR 45 curve at the Russell Road intersection

EXISTING HORIZONTAL ALIGNMENT				
SR 45				
PI Station	Δ	Radius	Length Ft	CEDS mph
21+31.65	1°06'56" Lt	0	0	68
30+17.21	12°30'11" Lt	916.73	200.05	50
34+39.55	6°38'58" Rt	2864.79	332.48	77
41+31.12	4°28'39" Rt	2546.49	199.00	76
42+87.83	10°33'49" Rt	619.41	114.20	42
45+00.38	18°26'43" Lt	572.96	187.73	40
50+00.00	36°54'00" Lt	572.96	569.00	40
EQUATION: PT 52+58.56 Back = POT 52+79.93 Ahead				
58+49.84	6°44'36" Lt	1909.86	224.77	65
61+01.30	36°51'19" Rt	268.57	172.76	29
RUSSELL ROAD				
PI Station	Δ	Radius	Length Ft	CEDS mph
POC 60+15.53 SR 45 = POT 10+00.00 Russell Rd				
10+70.62	29°16'08" Rt	150.00	76.63	21



Fig. 11 Vertical alignment, looking west from Sta. 39+50



Fig. 12 Crest vertical curve on SR 45, looking west from Sta. 45+00

The apparent existing vertical alignment has been estimated using a 1"=150' contour map with 2' contour intervals, provided by the City of Bloomington. The following table describes the apparent vertical alignment and Appendices A-19 and A-20 show the centerline profile.

SR 45 EXISTING VERTICAL ALIGNMENT						
PI Station	Length Ft.	G1 %	G2 %	K	Type	CEDS mph
20+90	84	1.6	-2.0	21	Crest	32
27+80	400	-4.6	0.0	87	Sag	47
30+90	60	0.0	5.4	11	Sag	20
31+90	70	5.4	-4.5	7	Crest	24
33+20	170	-4.5	-0.4	41	Sag	42
35+45	120	-0.4	-6.3	20	Crest	35
37+40	270	-6.3	5.0	21	Sag	33
42+20	280	5.0	-10.5	18	Crest	30
46+70	570	-10.5	6.5	34	Sag	28
57+70	920	6.5	1.0	167	Crest	63

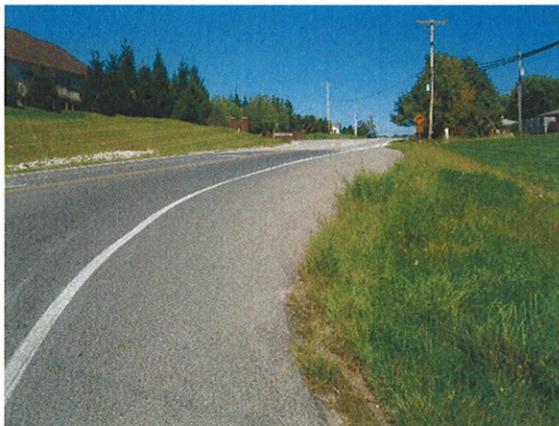


Fig. 13 SR 45, looking north from east side of Smith Road

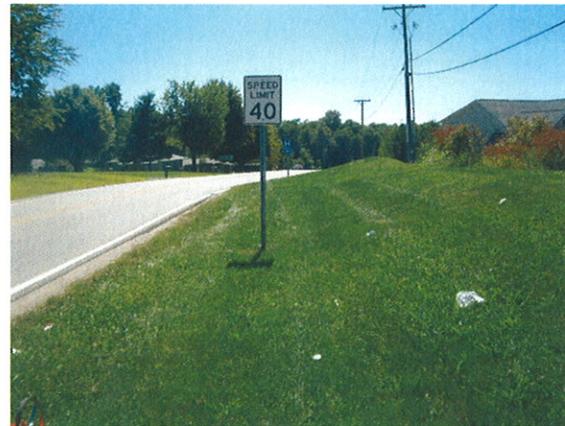


Fig. 14 SR 45, looking south from Russell Road intersection

At the Pete Ellis Drive/Range Road signalized intersection, the east leg of SR 45 currently consists of two 12' through lanes with a 2' crushed stone shoulder, a 12' grass buffer and a 4' wide concrete sidewalk on the south side and a combined concrete curb and gutter with a 4' sidewalk (no buffer) on the north side. The curb and adjacent sidewalk on the north side extend to the second (east) Fountain Park Apartments drive, beyond which the shoulder is of crushed stone. The sidewalk continues to Woodbridge Drive with a grass buffer varying from about 25' to about 10' at Barrington Drive. The stone shoulder, grass buffer, and sidewalk on the south side extend to about 150' west of John Hinkle Place. However, design plans are being prepared by A& F Engineering Company for INDOT under project designations 8824615 and 947897A which alter the existing geometry by widening SR 45 on both the west and east legs of the Pete Ellis Drive intersection to provide dedicated left and right turn lanes for both eastbound and westbound traffic. Their project terminates about 800' east of the intersection with one lane in each direction. Ready-for-contracts (RFC) date for these improvements is September, 2005.

At the John Hinkle Place and the Barrington Drive intersections, the SR 45 legs have exclusive right turn lanes with 100' tapers and 100' of deceleration. The sidewalk and 15' buffer on the south side continues from John Hinkle Place to 300' west of Grandview Drive. East of Grandview Drive, SR 45 consists of two 11' through lanes, 2' stone shoulders, and shallow side ditches.

There is an exclusive north to eastbound right turn lane at the Smith Road intersection with a 100' taper and 320' of storage/deceleration. Adjacent to this turn lane is a 300' run of guardrail behind vertical combined curb and gutter, followed by 100' of six' wide paved shoulder ending at Smith Road. On the west side, W-Beam guardrail extends 700' south and 70' north of the intersection behind a 6' paved shoulder. Guardrail end treatments do not meet current standards.

The SR 45 east (north) leg at the Smith Road intersection consists of two 12' through lanes, an exclusive left turn lane to Smith Road, 6' paved shoulders, a rip rap side ditch on the west side, and concrete side ditch on the east side. Continuing north to the Tamarron Drive/Deckard Drive intersection, the shoulders become 2' stone.

At the Tamarron Drive/Deckard Drive intersection, SR 45 has been constructed with tapers on the west side to the Tamarron Drive curb returns. The extra width and pavement area at the intersection proper affords some opportunity for turning vehicles to shy out of the normal throughway lanes allowing through traffic to pass and thus functions somewhat as a passing blister.

Between the Tamarron Drive and Russell Road intersections, SR 45 consists of two 11' through lanes, 2' stone shoulders, and a shallow grass-lined ditch on the east side. Drainage along the west side is via curb and pavement inlets. East of Russell Road, SR 45 consists of two 11' lanes with 2' stone shoulders on the north side and 4' stone shoulders on the south side.

The following utility locations have not been precisely verified. Their locations are described as left or right of centerline as one travels along SR 45 from Pete Ellis Drive to Russell Road, left being the true north or west side of the road and right being the true south or east side:

There are overhead power and communication lines along the left side of SR 45 from Pete Ellis Drive to beyond the Post Office, along both sides to 500' true west of Smith Road, along the right side to Tamarron Drive, and then along the left side to Russell Road.

A 12" potable water main runs along the left side of SR 45 from Pete Ellis Drive to about 650' true east, crosses to the right side for 900' then crosses to the left side and continues for 1,800'. Then it crosses to the right side of SR 45, runs under the Smith Road approach and continues along the right side to just north of Tamarron Drive where it crosses to the left side and continues north across Russell Road.

An 8" sanitary sewer force main runs along the left side of SR 45 from 700' east of Pete Ellis Drive to 400' west of Smith Road, where it crosses SR 45 and then to a lift station on Smith Road. A 12" sanitary sewer force main is located on the right side of SR 45 from the west side of John Hinkle Place to a point about 219' east where it then turns left

and continues north on private property. A 4" sanitary sewer force main runs east along the right side of SR 45 from Grandview Drive to Smith Road where it turns south. Small (2" and 4" respectively) private force mains cross SR 45 about 190' and 580' north of Tamarron Drive

There are markers along the SR 45 corridor at various locations indicating underground telephone and gas lines.

Drainage along the SR 45 corridor employs a combination of open roadside ditches and enclosed storm sewer systems. In general, the area west of Grandview Drive drains to enclosed storm sewers. The portion east of Grandview Drive drains in open roadside ditches or sheets overland to Indiana Creek, which crosses under SR45 at station 48+90 in a 2-barrel box culvert.

Main SR 45 drainage systems include the following:

- Intersection at John Hinkle Place, with curb inlets on the northwest and northeast curb returns. City of Bloomington has no plans for this storm drain system.
- 36" culvert about 265' east of the John Hinkle Place intersection, carrying drainage from south side of SR 45 and overflow from a detention pond. Pipe continues northeastward under Barrington Drive to a ditch which drains into Indian Creek.
- a 36" corrugated metal pipe (CMP) at the Grandview Drive intersection. The pipe is in fair condition, estimated to be over 50 years old, and has a concrete headwall and outlet located on the north side of SR 45. It empties into an open ditch flowing from the east. About 10' east of its outlet is another 36" corrugated PVC pipe inlet less than 15 years old and in good condition, which flows north to a tributary of Indiana Creek.
- About 510' west of Smith Road is an 88' long 7' by 5.1' structural plate arch culvert, constructed about 1997. It carries storm drainage from the south side of SR 45 to Indian creek on the north side.
- About 440' west of Smith Road is an inlet grate at the north edge of shoulder. From it, a pipe carries storm water down to Indian Creek.
- About 230' west of Smith Road (Station 48+90) is a 115' long twin 4' by 8' box culvert, skew angle 30° left. Flow is from south to north, conveying storm water runoff from a large area on both sides of Smith Road, on the south side of SR 45. The boxes were constructed about 1997 and are in good condition.
- On the north side of SR 45, east of Smith Road intersection is a rip-rap lined ditch which begins about 210' south of Tamarron Drive/ Deckard Drive intersection. The ditch carries runoff from Tamarron Drive and SR 45 to Indian Creek.
- In the Tamarron Drive / Deckard Drive intersection is a storm drain pipe system of unknown configuration. There is a curb inlet left of SR 45, on the north side of Tamarron Drive. In the middle of the intersection is a 3' by 3' inlet grate.
- On the right side of SR 45 as one travels east, there is a 200' long 5' wide concrete lined ditch between Smith Road and Deckard Drive, which terminates about 150' from Deckard Drive. The ditch becomes grassed, with 15" CMP culverts at each end, the east-most crossing under Deckard Drive. The ditch

system continues to east of the Russell Road intersection, with 12" CMP pipe culverts under residential driveways. Culverts between Deckard Drive and Russell Road have low concrete headwalls. Culverts east of Russell Road do not have headwalls.



Fig. 15 Headwall and 36" CMP outlet on north side of SR 45 at Grandview Drive



Fig. 16 Inlet at bottom of ditch on north side of SR 45 at Grandview Drive



Fig. 17 Twin box culvert inlet, 230 ft. west of Smith Road, looking west



Fig. 18 Paved ditch and 24" concrete pipe outlet on west side of Smith Road

Construction plans were not available for SR 45, except for that portion reconstructed in 1997 at the Smith Rd intersection under Contract R-20165. A & F Engineering is developing design plans for improvement to S.R. 45 at the west end of this project (Des. 8824615 as lead project), which includes the Pete Ellis Dr/Range Rd intersection. (See Appendices A-22 & A-23.) The proposed alternates in this Engineer's Report assume that that construction of Des. 8824615 will have been completed when this project is ready for contract.

V. TRAFFIC DATA

INDOT Traffic Statistics Unit has provided current and projected traffic data, including turning

movements for the Pete Ellis Drive, Smith Road, and Russell Road intersections.

At the Pete Ellis Drive intersection, the base year 2001 AADT on the west, east, and south legs increase respectively from 15,610 vpd, 12,170 vpd, and 9,940 vpd, to 21,280 vpd, 16,590 vpd, and 13,550 vpd in the design year 2029. Traffic counts on the north leg (Range Road) are relatively low. The AM DHV accounts for 5% to 8% of the AADT, and the PM DHV accounts for 7% to 9% of the AADT. Commercial vehicles represent 5% to 6% of all traffic.

At the Smith Road intersection, the base year 2001 AADT on the west, east, and south legs increase respectively from 10,090 vpd, 10,530 vpd, and 8,630 vpd, to 13,460 vpd, 14,020 vpd, and 11,490 vpd in the design year 2029. The AM DHV accounts for 5% to 8% of the AADT, and the PM DHV accounts for 9% to 10% of the AADT. Commercial vehicles represent 9% to 10% of all traffic.

At the Russell Road intersection, the base year 2001 AADT on the south, east, and north (Russell Road) legs increase respectively from 8,920 vpd, 6,490 vpd, and 2,970 vpd, to 11,410 vpd, 8,300 vpd, and 3,790 vpd in the design year 2029. The AM DHV accounts for 7% to 14% of the AADT, and the PM DHV accounts for 9% to 14% of the AADT. Commercial vehicles represent 9% to 12% of all traffic.

Refer to Attachments B-1 through B-6 for intersection traffic forecast sheets.

SR 45 is frequently used in both directions by commuters using bicycles and by pedestrians. Single and groups of 2, to 5 bicycle commuters were observed at 15 to 30 minute intervals over a 3 hour period during the day the site was visited in 2004.

VI. CAPACITY ANALYSIS

SR 45 was initially analyzed for 2-lane capacity assuming 11' through lanes and 2' shoulders, conditions which exist only partially, as there are segments with 12' lanes and wider shoulders. Maximum peak volumes predicted for the design year, 2029 provided conservative results, and indicated that for segments between Pete Ellis Road and Smith Road and between Smith Road and Russell Road level of service (LOS) D could be anticipated if no lanes were added. Software for 2-lane highway capacity methodology, based on the Highway Capacity Manual (HCM), was employed. (As a result of this analysis, adding lanes was not considered necessary for improving existing conditions.)

The computer software Sig/Cinema, having methodology consistent with the HCM, was used to analyze the signalized intersection of SR 45 and Pete Ellis Drive using both the existing configuration (at time of writing) and the proposed configuration (under Des. 8824615). Highway Capacity Software HCS 2000 was used to analyze the SR 45 stop controlled intersections of Smith Road and Russell Road.

INTERSECTION CAPACITY ANALYSES							
PETE ELLIS DR/ RANGE RD EXISTING GEOMETRY (SIGNALIZED)							
Intersection Delay (Seconds) / Level of Service							
2002		2009		2019		2029	
AM	PM	AM	PM	AM	PM	AM	PM
14/B	28/C	14/B	40/D	17/B	69/E	22/C	104/F
PETE ELLIS DR/ RANGE RD WITH IMPROVEMENTS PROPOSED UNDER SEPARATE DES. 8824615							
Intersection Delay (Seconds) / Level of Service							
2002		2009		2019		2029	
AM	PM	AM	PM	AM	PM	AM	PM
7/A	13/B	7/A	13/B	12/B	15/B	13/B	17/B
SMITH RD EXISTING GEOMETRY							
Smith Rd Approach Delay (Seconds) / Level of Service							
2002		2009		2019		2029	
AM	PM	AM	PM	AM	PM	AM	PM
18/C	27/D	22/C	137/F	29/D	282/F	45/E	486/F
RUSSELL RD EXISTING GEOMETRY							
Russell Rd Approach Delay (Seconds) / Level of Service							
2002		2009		2019		2029	
AM	PM	AM	PM	AM	PM	AM	PM
12/B	12/B	12/B	13/B	13/B	14/B	14/B	15/C

The analysis indicates that the existing geometry of the Pete Ellis intersection will be substandard (less than level of service D) at least ten years before expiration of the design life of SR 45. Employing geometry proposed under Des. 8824615, level of service will be adequate through the design year 2029.

At the Smith Road intersection, the stop-controlled analysis indicates that a LOS F is reached prior to 2009 when trying to meet the 2009 PM traffic volumes. This is the result of lack of gaps in the mainline traffic stream. The designer should consult with the Seymour District Traffic Engineer early in the design phase to determine if the need exists to signalize the intersection at the time of construction of the subject project.

The Russell Road intersection will perform well under existing and forecasted lane counts through the design year.

Intersection delays and service levels for the base year 2000, year of ready for contract 2009, 10 years hence at 2019 and year of design life 2029 are summarized in the preceding table:

VII. CRASH DATA AND ANALYSIS

The INDOT Crash Analysis Unit has provided crash data for accidents having occurred within the project limits from 1998 through 2000.

Examination of the crash data and information reported reveals a predominant pattern of 33% rear end accidents, which may be due to lack of left turning lanes at the intersections. Off road collisions are 25%, of which 6 out of 8 did not occur near intersections, suggesting horizontal and/or vertical alignment problems. Other crashes at intersections point to congestion as a possible contributing factor.

SR 45 CRASH DATA AND ANALYSIS (1998 THROUGH 2000)													
Crashes Occurring Within 150' East or West of Intersection													
Nearest Intersection	Number of Crashes	Crash Severity			Total Number of:		Crash Types						
		Property Damage Only	Personal Injury	Fatal	Injuries	Fatalities	Rear End	Right Angle	Off Road Collision	Head On	Left Turn	Side Swipe	Animal
Pete Ellis Dr / Range Rd	20	16	4	0	5	0	12	3	2	0	2	1	0
Woodbridge Dr / John Hinkle Pl	4	3	1	0	1	0	0	2	0	0	1	1	0
Grandview Dr	4	3	1	0	1	0	1	0	3	0	0	0	0
Smith Rd	8	5	3	0	4	0	2	2	1	0	3	0	0
Tamarron Dr / Deckard Dr	2	0	2	0	2	0	0	1	0	1	0	0	0
Russell Rd	2	1	1	0	2	0	1	0	0	0	1	0	0
Non-Intersection Related	8	6	2	0	2	0	0	1	6	0	0	0	1
Total	48	34	14	0	17	0	16	9	12	1	7	2	1
%	-	71	29	0	N/A	N/A	33	19	25	2	15	4	2

Crash rates per million vehicles entering intersections at Pete Ellis / Range Road, Smith Road, and Russell Road were respectively 0.84, 0.50, and 0.20. Insufficient data was available to enable determination of crash rates at other intersections.

VIII. PROJECT ALTERNATES AND RECOMMENDATIONS

Three alternates were considered for this project. Each alternate will affect construction on Des. 8824615's east end; Alternate 1 by less than 10', and Alternates 2 and 3, respectively, by about 300' and 400'. The three alternates retain all but the westernmost 150' of Project No. R-20165, the portion of SR 45 roadway reconstructed at Smith Road in 1997. The Smith Road intersection shall not be part of this project. Vertical realignment will be required within all three alternates from station 31+15 to station 48+50, as shown in Attachments A-19 and A-20. Vertical realignment will require closure of SR 45 between Pete Ellis Rd and Smith Rd. Attachment A-21 shows proposed typical sections.

Alternate No. 1 – Reconstruction With Auxiliary Lanes and Wide Curb Lanes
(Recommended) Refer to attached aerial photographs A-4 through A-8 showing improvements superimposed.

Alternate No. 1 involves the provision of auxiliary turn lanes and passing blisters at intersections and commercial driveways as warranted. Widened curb lanes with an extra 2' width shall be provided in each direction to accommodate adult, on-street bicycle travel. A passing blister shall be maintained at the Barrington apartment complex entry street. At Russell Rd, the horizontal alignment of SR 45 shall be brought to current safety standards by increasing the 268' radius to a minimum of at least 570 feet. Vertical realignment shall be improved to meet the 40 mph design standards in that portion of SR 45 beginning about 250' west of the entrance to the Barrington apartments and ending about 300' west of the centerline of Smith Road. Three retaining walls are needed in Alternate No. 1 in order to minimize right-of-way impacts. This alternate is preferred because it is the only alternate that provides enhanced safety for adult cyclists as well as for motorists. Its construction cost falls halfway (and within less than 5% difference) between the other two alternates, which make no such provision.

Alternate No. 2 – Reconstruction With Auxiliary Lanes Refer to attached aerial photographs A-9 through A-13 showing plan view.

Alternate No. 2 is similar to Alternate No. 1, but without wide curb lanes. Both the horizontal and vertical centerline alignments of Alternate 1 are included in this alternate. This is less costly than Alternate No. 1, but does not make special allowance for bicycle trips. Alternate No. 2 has four retaining walls to minimize right-of-way impacts.

Alternate No. 3 – Reconstruction With Continuous Median/Left Turn Lane and Other Auxiliary Lanes Refer to attached aerial photographs A-14 through A-18 showing plan view.

Alternate No. 3 provides a continuous median left turn lane at all apartment driveways and street intersections. The vertical alignment revision used in Alternate 1 is included in

this alternate. Providing a continuous left turn lane will require the centerline horizontal alignment to differ from that of Alternate 1 for about 4 stations, beginning about 900' west of Smith Rd. For the same reason, the new horizontal alignment of SR 45 at Russell Rd will differ from that for Alternate 1, although the new centerline radius will be about the same for both alternates. This alternate is not necessary because the existing roadway level of service is acceptable without adding a continuous median left turn lane. It too does not provide any special allowance for the accommodation of adult commuting cyclists. Its cost is more than that of Alternate No. 2, since its point of beginning is about 110' nearer to the Pete Ellis intersection, requiring more removals and replacements plus new construction on the southbound side of SR 45 from approximately station 19+00 to station 27+00. Alternate No. 3 has three retaining walls.

IX. SURVEY REQUIREMENTS

The required survey limits along SR 45 will begin 300' in the northbound direction from the Pete Ellis Drive intersection to 600' beyond the existing Russell Road intersection for a total mainline survey length of 5140'. Typical survey coverage should extend 80' either side of roadway centerline. In addition, survey limits should extend 150', with 50' wide coverage left and right, along the east driveway entrance to Fountain Park Apartments, Union Square Apartments, John Hinkle Place, Woodbridge Drive, the driveway entrance to Barrington Place Apartments, Grandview Drive, Deckard Drive, and Tamarron Drive (but 70' left and right along Tamarron Drive). Survey limits should extend 400' along Russell Road, 50' left and right. Total mainline plus "S-line" survey length is 6740'.

X. TRAFFIC MAINTENANCE

The following conceptual plan is presented but maintenance of traffic must be refined during the design phase. It is recommended that the majority of this project be constructed in distinct phases while maintaining traffic on existing/new pavement sections. The vertical realignment from stations 31+15 to 48+50 will cause closure of SR 45 and rerouting of traffic. Access denied to Grandview Drive can be rerouted via Smith Road and East Post Road. It appears that Barrington Apartments has only one access at station 32+00 and a local detour to that entrance may have to be provided. On the south side of SR 45, a temporary public driveway may have to be provided during staged construction for access to homes between stations 39+00 and 45+00 by extending the existing public driveway beginning near station 45+00 west about 300'.

For general through traffic, normally traveling 19.2 miles along SR 45 from its junction with SR 46 to its junction with SR 135 at Bean Blossom, an official detour would use SR 46 and SR 135, beginning at the junction of SR 45 and SR 46 and travel 22.5 miles via SR 135. The official detour will add 3.3 miles of travel. Examining USGS maps, a local detour does not appear to be feasible.

Assuming a distribution of 100% use of the official detour the estimated cost to the traveling public to use these routes would be \$650,000 based on a 30 day closure period, and \$980,000 for a 45 day closure period for this project.

XI. RIGHT-OF-WAY SUMMARY

Apparent existing right-of-way width varies from 35' left or right of centerline to over 100' from centerline and is taken from as-built plans (stations 47+00 to 55+00) and utility pole locations.

Additional right of way shall be needed due to vertical realignment and the construction of auxiliary lanes. Right of way requirements should be minimized by using retaining walls in areas where the vertical alignment needs to be lowered. Right-of-way requirements for the three alternatives are shown in the following table:

<u>Right-of-Way</u>	<u>Alt 1(Recommended)</u>	<u>Alt 2</u>	<u>Alt 3</u>
Parcels Affected:	18	18	16
Residential Driveways:	10	9	10
Commercial Driveways:	1	0	0
R/W Required:			
Residential	1.3 Ac	1.0 Ac	0.9 Ac
Commercial/Industrial	<0.1 Ac	0 Ac	0 Ac
Institutional (Church)	<0.1Ac	<0.1 Ac	<0.1Ac
Anticipated Relocations	None	None	None

Proposed right-of-way requirements presented in this Engineer's Report are approximate, developed using limited information available at this stage. The more refined right-of-way limits generated from later phases may differ from the estimates presented at this time.

XII. DESIGN FEATURES

Functional Classification:	Urban Minor Arterial
Design Classification:	3R, Two-Lane Urban Arterial (Suburban) Table 55-3F
Design Speed	40 mph
Project Termini & Length:	RP 41+85 to RP 42+83 Length = 0.98 miles
Terrain:	Rolling
Access Control:	None
Typical Roadway Section	See Drawings on A-21
Horizontal Alignment:	Existing
Vertical Alignment (See A-19 and A-20):	$G_{MAX} = \pm 9\%$, $K_{CREST} = 44$, $K_{SAG} = 64$

XIII. ESTIMATED COST

2005 COST ESTIMATE			
ITEM	Alternate 1	Alternate 2 Recommended	Alternate 3
Excavation, Removals & Pavement Construction	\$1,440,000	\$1,380,000	\$1,520,000
Retaining Walls	\$240,000	\$230,000	\$320,000
Drainage	\$170,000	\$170,000	\$170,000
Signs & Markings	\$40,000	\$40,000	\$50,000
Maintenance of Traffic	\$200,000	\$170,000	\$150,000
Construction Cost	\$2,090,000	\$1,990,000	\$2,210,000
Permanent Right-of- Way	\$200,000	\$170,000	\$160,000
Temporary Right-of- Way	\$50,000	\$50,000	\$50,000
Right-of-Way Total	\$250,000	\$220,000	\$210,000
Preliminary Engineering	\$130,000	\$150,000	\$160,000
Project Total Cost	\$2,470,000	\$2,360,000	\$2,580,000

XIV. ENVIRONMENTAL CONSIDERATIONS

The INDOT Environmental Assessment Section is continuing its investigation of the anticipated impacts incurred within the described recommended roadway improvements and will prepare the required environmental documents. Based on cursory inspection, it is not anticipated that this project will generate any significant social, economical, or environmental impacts.

The proposed right-of-way dimensions, areas, and number of parcels presented in this Engineer's Report are approximate, developed using limited information available at this stage. Later phases of project development will refine and establish precise right-of-way requirements, which are likely to differ from the provisional information presented here. Assessment of social, economic, and environmental impacts should account for the unrefined nature of these right-of-way limits by assessing potential impacts a reasonable extent beyond the proposed preliminary limits.

XV. OTHER PROJECTS

This project has a ready for contracts date of October 15, 2009. There are five other planned INDOT projects in the area.

OTHER PROJECTS				
Des. No.	Route	Category & Location	RP	RFC
8824615	SR 45	Added Travel Lanes	41+57 to 41+95	9/05
9010075	SR 46	Added Travel Lanes	53+36 to 56+46	3/06
0200208	SR 45	Pavement Replacement, Monroe St to Kinser Pike (Kinned under #4239 with 5 other projects)	35+58 to 39+07	9/09
0014800	SR 46	Road Reconstruction, SR 446 to West Junction with SR 135	57+85 to 73+05	6/07
0100773	SR 46	Intersection Improvement at Smith Rd	57+37	1/09

These projects should not conflict with construction of this project provided the projected letting dates are maintained.

XVI. CORRESPONDENCE AND COORDINATION

A field investigation for this project was held on April 4, 2001. See Appendices C-1 and C-2 for minutes.

The following persons were consulted and provided input into the development of these recommendations.

INDOT Engineering Assessment Section:	Brad Steckler, Paul Schmidt
INDOT Seymour District:	Jim Ude
City of Bloomington:	Justin Wykoff
Bloomington Area Metropolitan Planning Organization:	Tom Mikuda, Frank Nierzwicki
A&F Engineering Co.:	Mike Finger

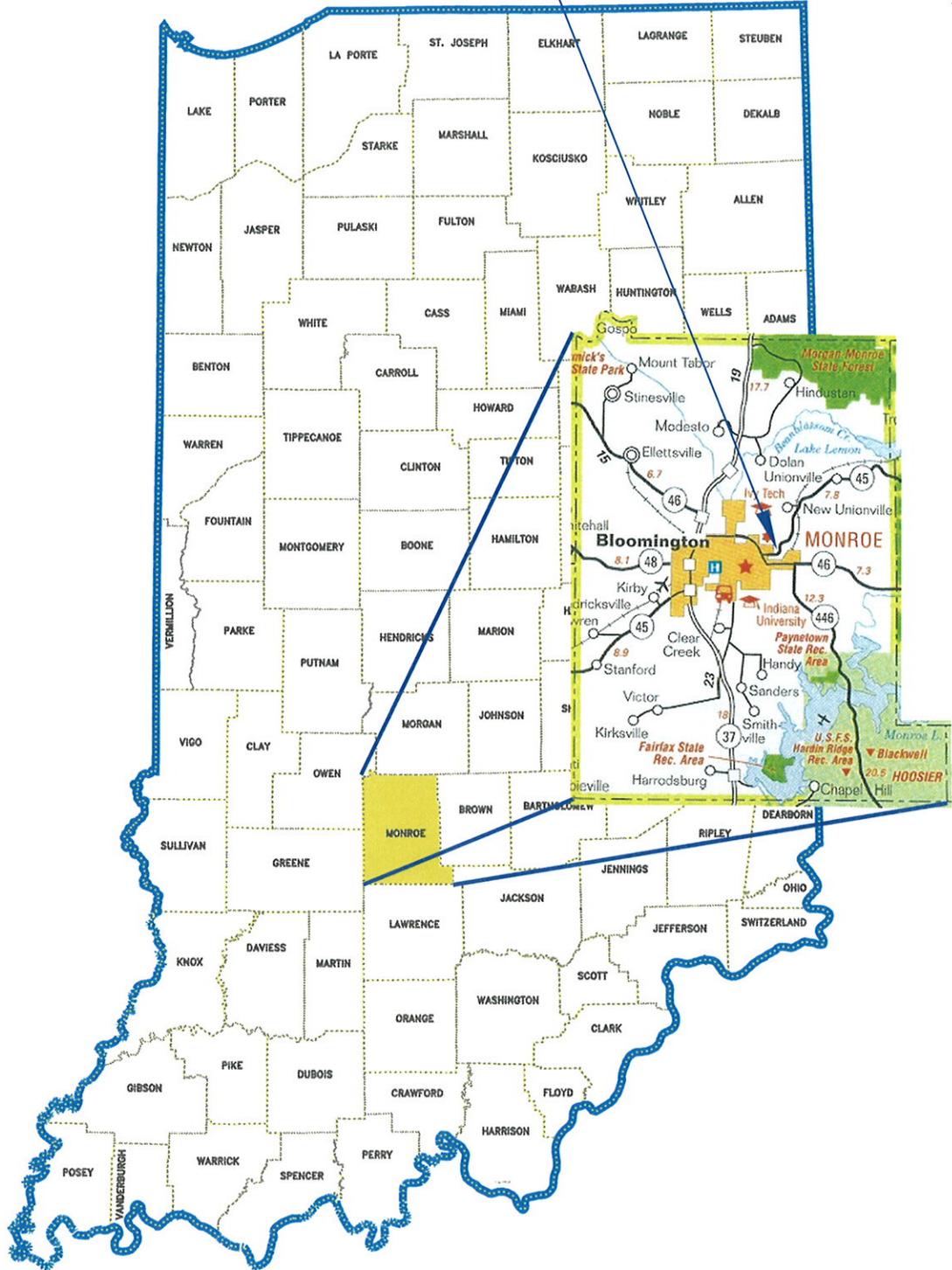
XVII. CHANGES TO PROPOSAL

The Engineering Assessment Section shall be consulted if deviation from the proposal is determined necessary during a later phase. The person initiating the change should send a memo giving justification and cost impacts of the changes to the Engineering Assessment Section Manager for concurrence. If the designer initiates the changes, the memo should be routed through the appropriate Design Development Section Manager.

Report Recipients (1 CD each except as noted):

Saundra Vaughn (3 CDs)	Design Project Coordinator
Tom Seeman	Design Section Manager
Mike Holowaty	Design Specialty Group
Matt Thomas	Design Utilities Engineer
William Schmidt (hardcopy and CD)	Design Location Survey
Ben Lawrence	Environmental Assessment Section Acting Manager
Athar Khan	Geotechnical Engineer
Sally Morgan	Land Acquisition Division
Jim Ude	Seymour District Development Engineer
Brad Steckler (original hardcopy and CD)	Engineering Assessment Section Manager

PROJECT LOCATION



PROJECT LOCATION - STATE

ROAD REHABILITATION

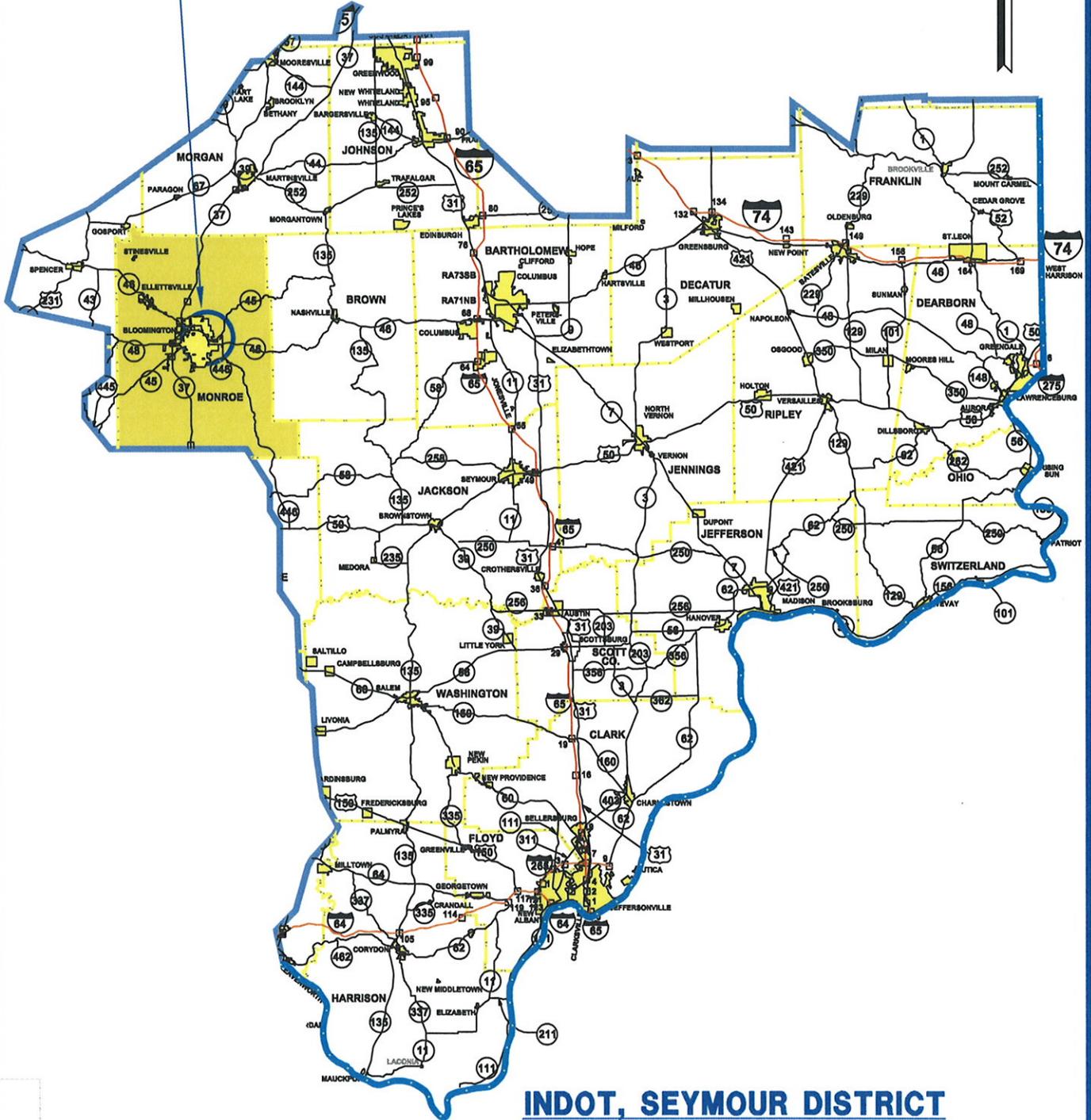
DES. NO. 9902910

SR 45 FROM PETE ELLIS DR/RANGE RD TO RUSSELL RD
CITY OF BLOOMINGTON, MONROE COUNTY

SCALE = NTS

A-1

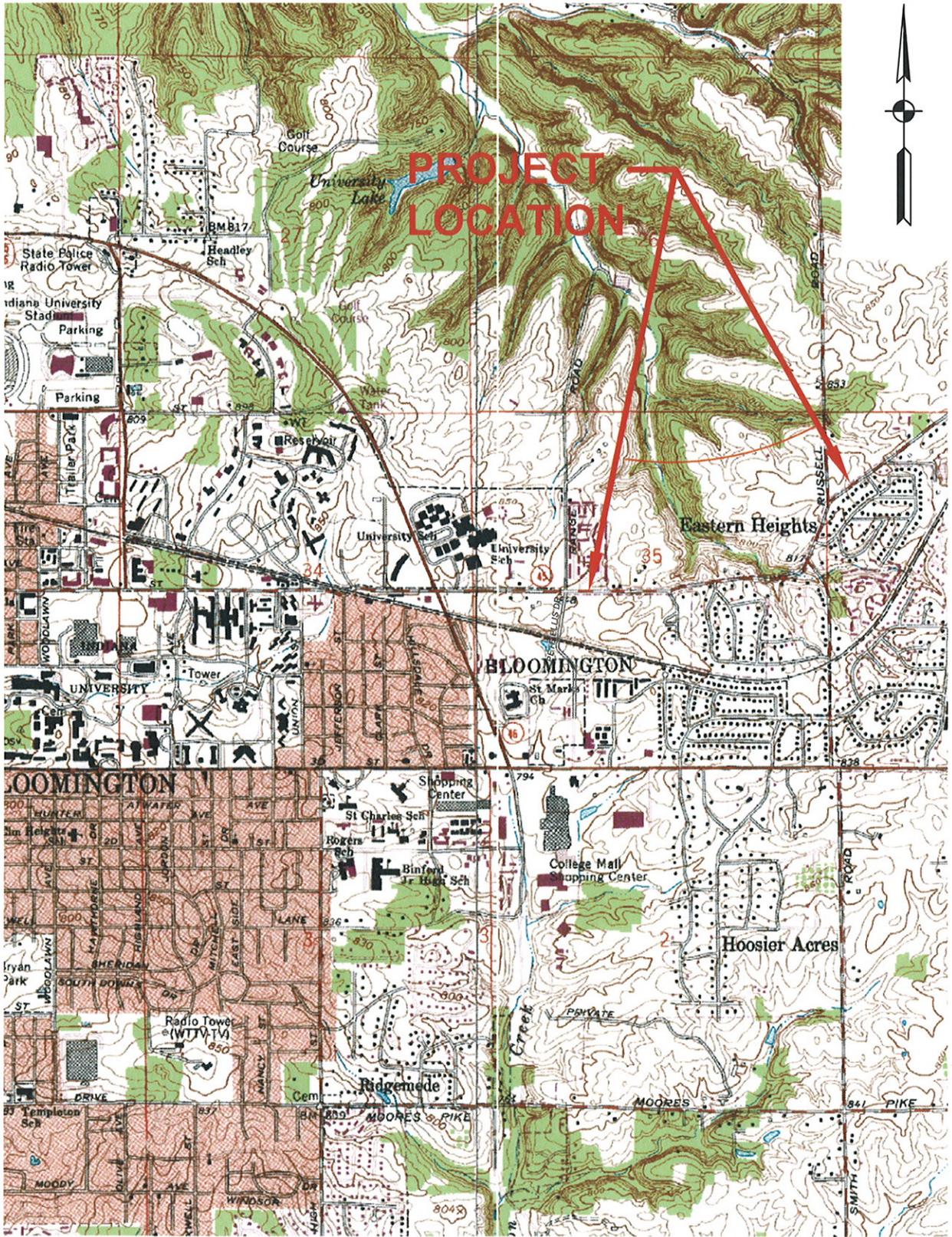
PROJECT LOCATION



INDOT, SEYMOUR DISTRICT

PROJECT LOCATION - INDOT DISTRICT
ROAD REHABILITATION
DES. NO.: 9902910
SR 45 FROM PETE ELLIS DR/RANGE RD TO RUSSELL RD
CITY OF BLOOMINGTON, MONROE COUNTY

SCALE - NTS



PROJECT LOCATION - USGS TOPO

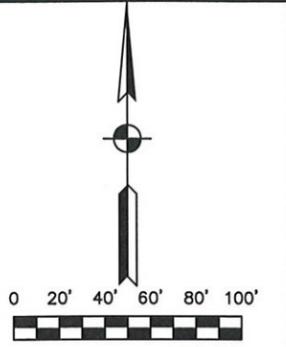
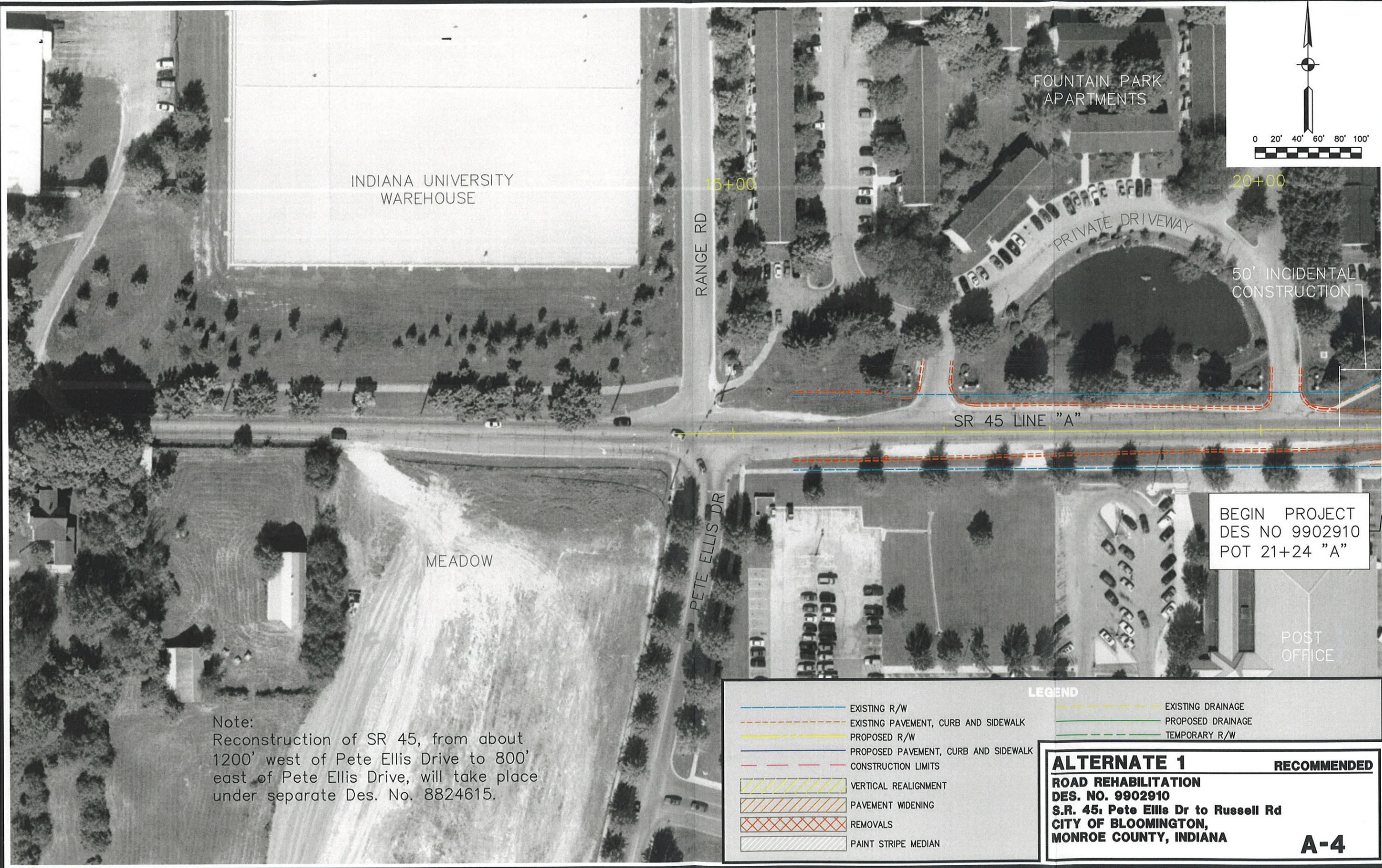
ROAD REHABILITATION

DES. NO. 9902910

**SR 45 FROM PETE ELLIS DR/RANGE RD TO RUSSELL RD
CITY OF BLOOMINGTON, MONROE COUNTY**

SCALE - NTS

A-3



Note:
 Reconstruction of SR 45, from about
 1200' west of Pete Ellis Drive to 800'
 east of Pete Ellis Drive, will take place
 under separate Des. No. 8824615.

BEGIN PROJECT
 DES NO 9902910
 POT 21+24 "A"

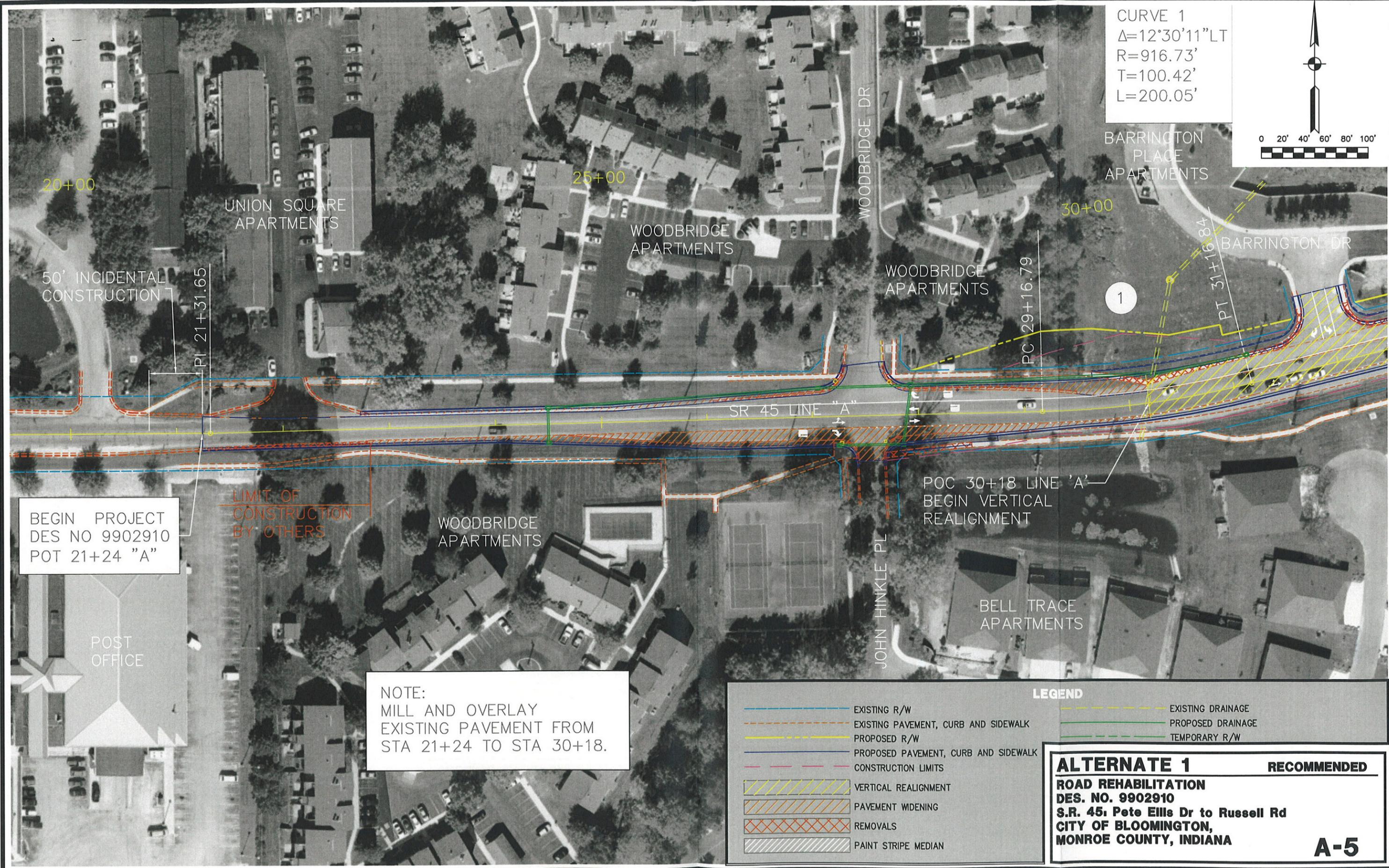
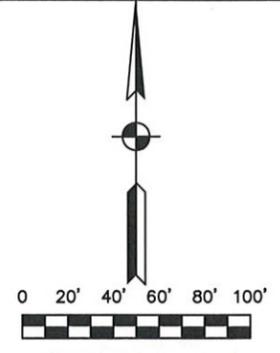
LEGEND			
	EXISTING R/W		EXISTING DRAINAGE
	EXISTING PAVEMENT, CURB AND SIDEWALK		PROPOSED DRAINAGE
	PROPOSED R/W		TEMPORARY R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK		
	CONSTRUCTION LIMITS		
	VERTICAL REALIGNMENT		
	PAVEMENT WIDENING		
	REMOVALS		
	PAINT STRIPE MEDIAN		

ALTERNATE 1 **RECOMMENDED**

ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Ellis Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA

A-4

CURVE 1
 $\Delta=12^{\circ}30'11''$ LT
 R=916.73'
 T=100.42'
 L=200.05'



BEGIN PROJECT
 DES NO 9902910
 POT 21+24 "A"

NOTE:
 MILL AND OVERLAY
 EXISTING PAVEMENT FROM
 STA 21+24 TO STA 30+18.

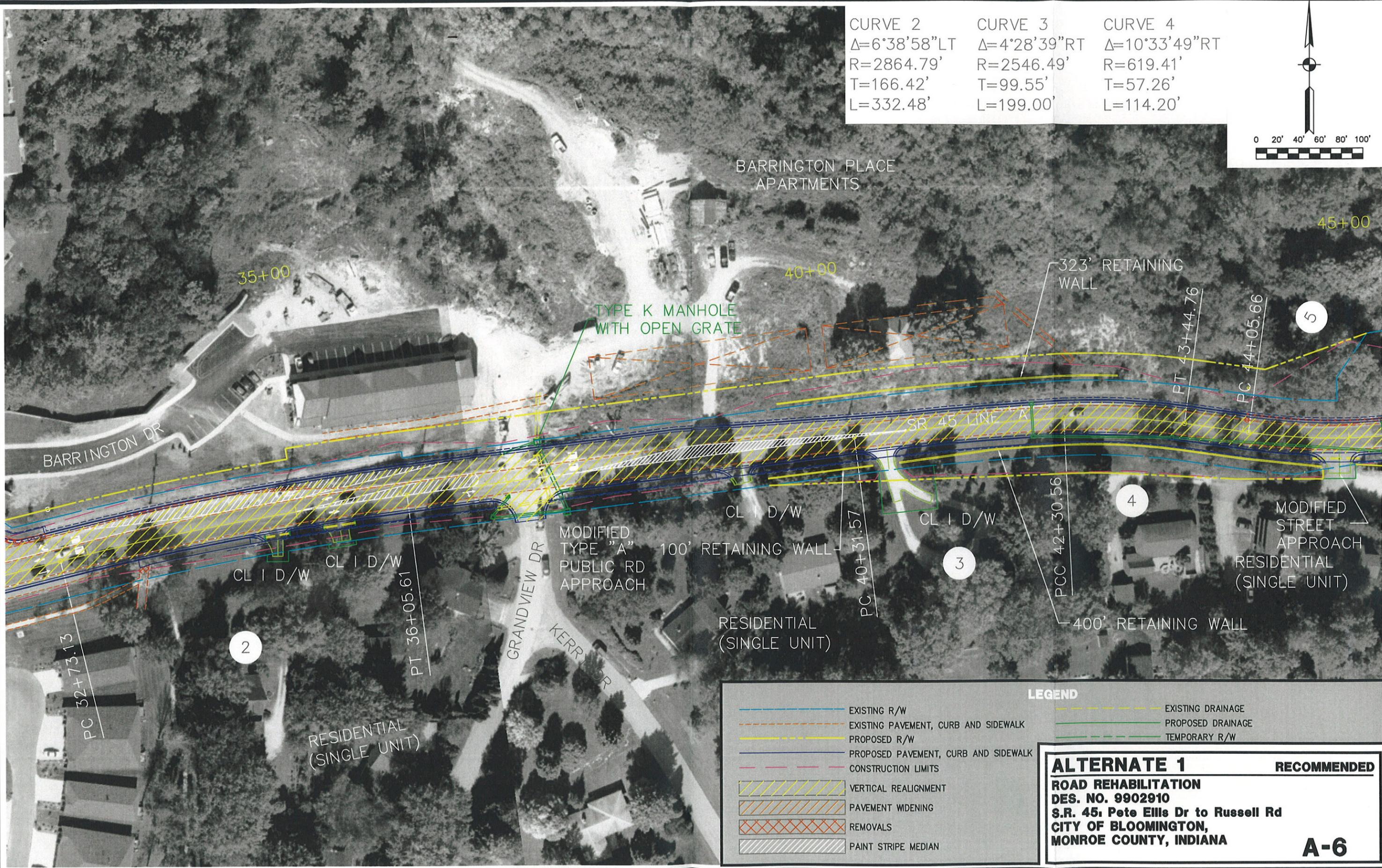
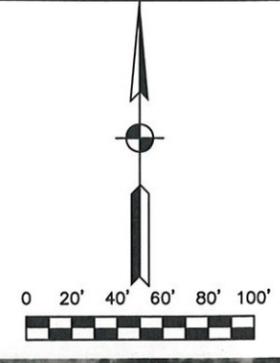
LEGEND	
	EXISTING R/W
	EXISTING PAVEMENT, CURB AND SIDEWALK
	PROPOSED R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK
	CONSTRUCTION LIMITS
	VERTICAL REALIGNMENT
	PAVEMENT WIDENING
	REMOVALS
	PAINT STRIPE MEDIAN
	EXISTING DRAINAGE
	PROPOSED DRAINAGE
	TEMPORARY R/W

ALTERNATE 1 **RECOMMENDED**

ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Ellis Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA

A-5

CURVE 2	CURVE 3	CURVE 4
$\Delta=6^{\circ}38'58''\text{LT}$	$\Delta=4^{\circ}28'39''\text{RT}$	$\Delta=10^{\circ}33'49''\text{RT}$
$R=2864.79'$	$R=2546.49'$	$R=619.41'$
$T=166.42'$	$T=99.55'$	$T=57.26'$
$L=332.48'$	$L=199.00'$	$L=114.20'$



LEGEND

	EXISTING R/W		EXISTING DRAINAGE
	EXISTING PAVEMENT, CURB AND SIDEWALK		PROPOSED DRAINAGE
	PROPOSED R/W		TEMPORARY R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK		
	CONSTRUCTION LIMITS		
	VERTICAL REALIGNMENT		
	PAVEMENT WIDENING		
	REMOVALS		
	PAINT STRIPE MEDIAN		

ALTERNATE 1 **RECOMMENDED**

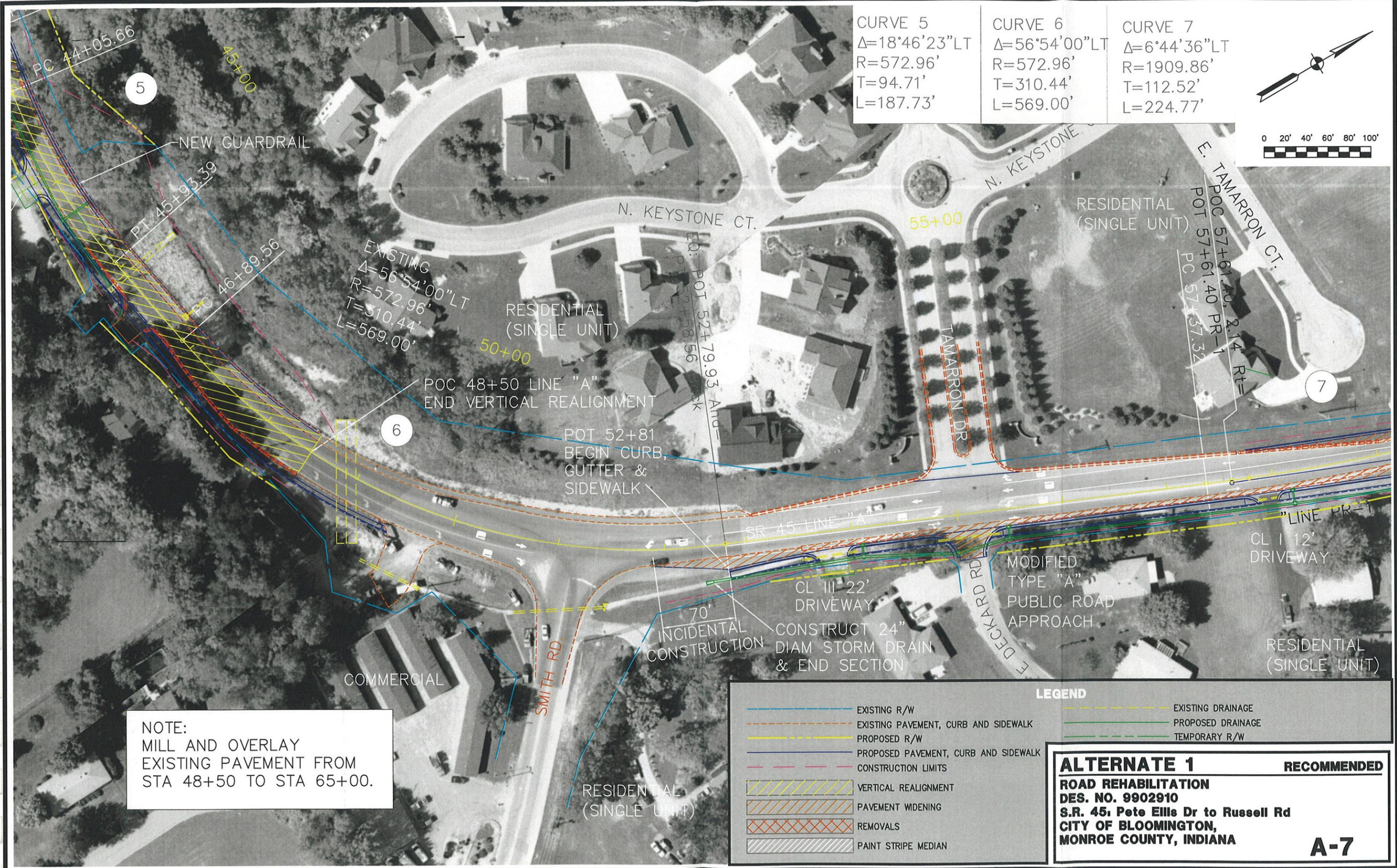
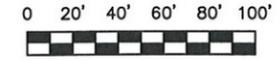
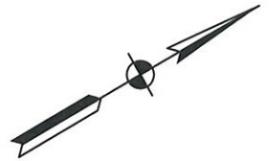
ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Eille Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA

A-6

CURVE 5
 $\Delta=18^{\circ}46'23''$ LT
 R=572.96'
 T=94.71'
 L=187.73'

CURVE 6
 $\Delta=56^{\circ}54'00''$ LT
 R=572.96'
 T=310.44'
 L=569.00'

CURVE 7
 $\Delta=6^{\circ}44'36''$ LT
 R=1909.86'
 T=112.52'
 L=224.77'



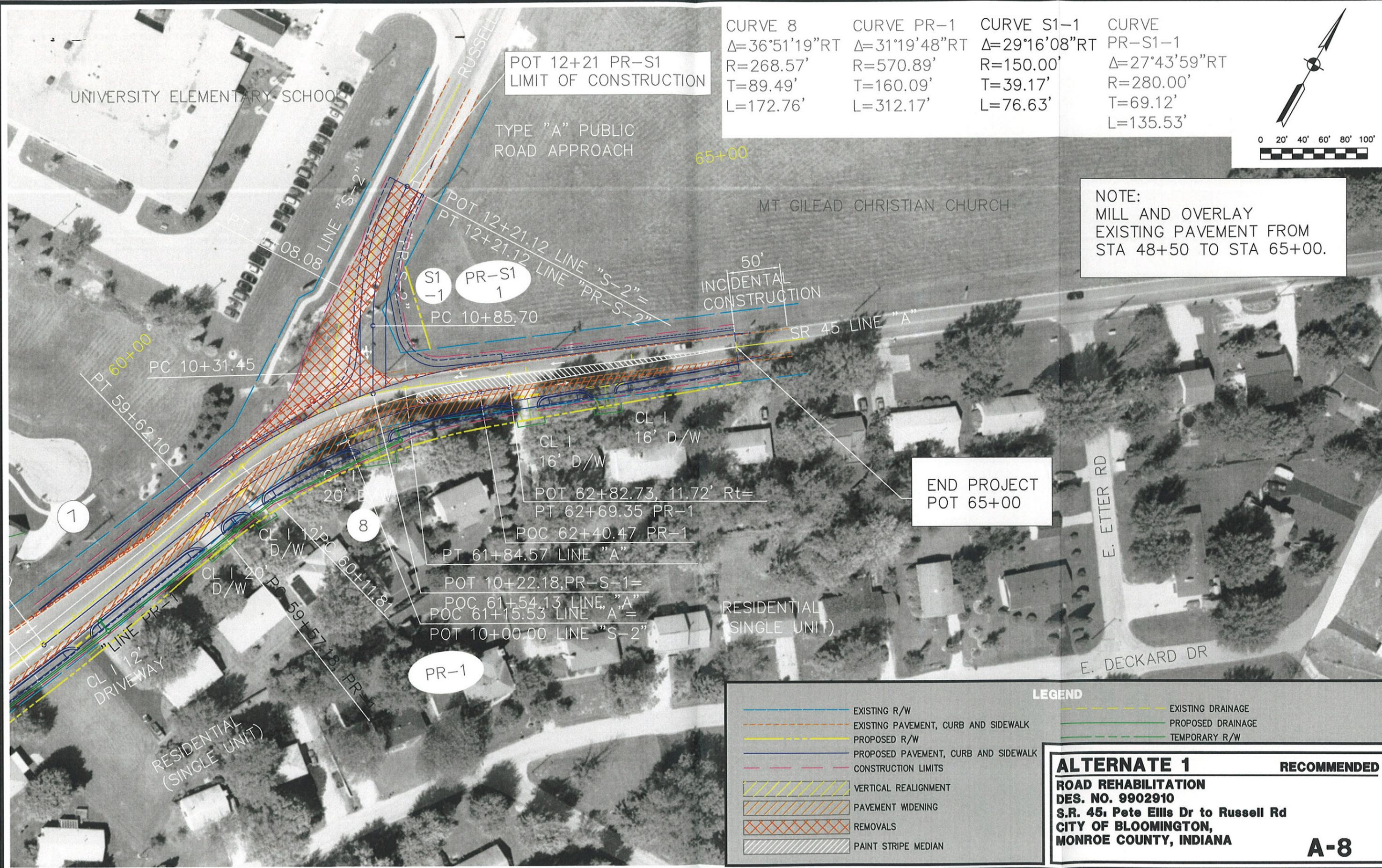
NOTE:
 MILL AND OVERLAY
 EXISTING PAVEMENT FROM
 STA 48+50 TO STA 65+00.

LEGEND	
	EXISTING R/W
	EXISTING PAVEMENT, CURB AND SIDEWALK
	PROPOSED R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK
	CONSTRUCTION LIMITS
	VERTICAL REALIGNMENT
	PAVEMENT WIDENING
	REMOVALS
	PAINT STRIPE MEDIAN
	EXISTING DRAINAGE
	PROPOSED DRAINAGE
	TEMPORARY R/W

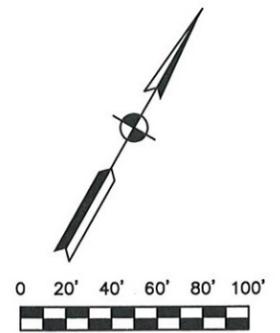
ALTERNATE 1 **RECOMMENDED**

ROAD REHABILITATION
 DES. NO. 9902910
 S.R. 45, Pete Eills Dr to Russell Rd
 CITY OF BLOOMINGTON,
 MONROE COUNTY, INDIANA

A-7



CURVE 8 Δ=36°51'19"RT R=268.57' T=89.49' L=172.76'	CURVE PR-1 Δ=31°19'48"RT R=570.89' T=160.09' L=312.17'	CURVE S1-1 Δ=29°16'08"RT R=150.00' T=39.17' L=76.63'	CURVE PR-S1-1 Δ=27°43'59"RT R=280.00' T=69.12' L=135.53'
--	--	--	---



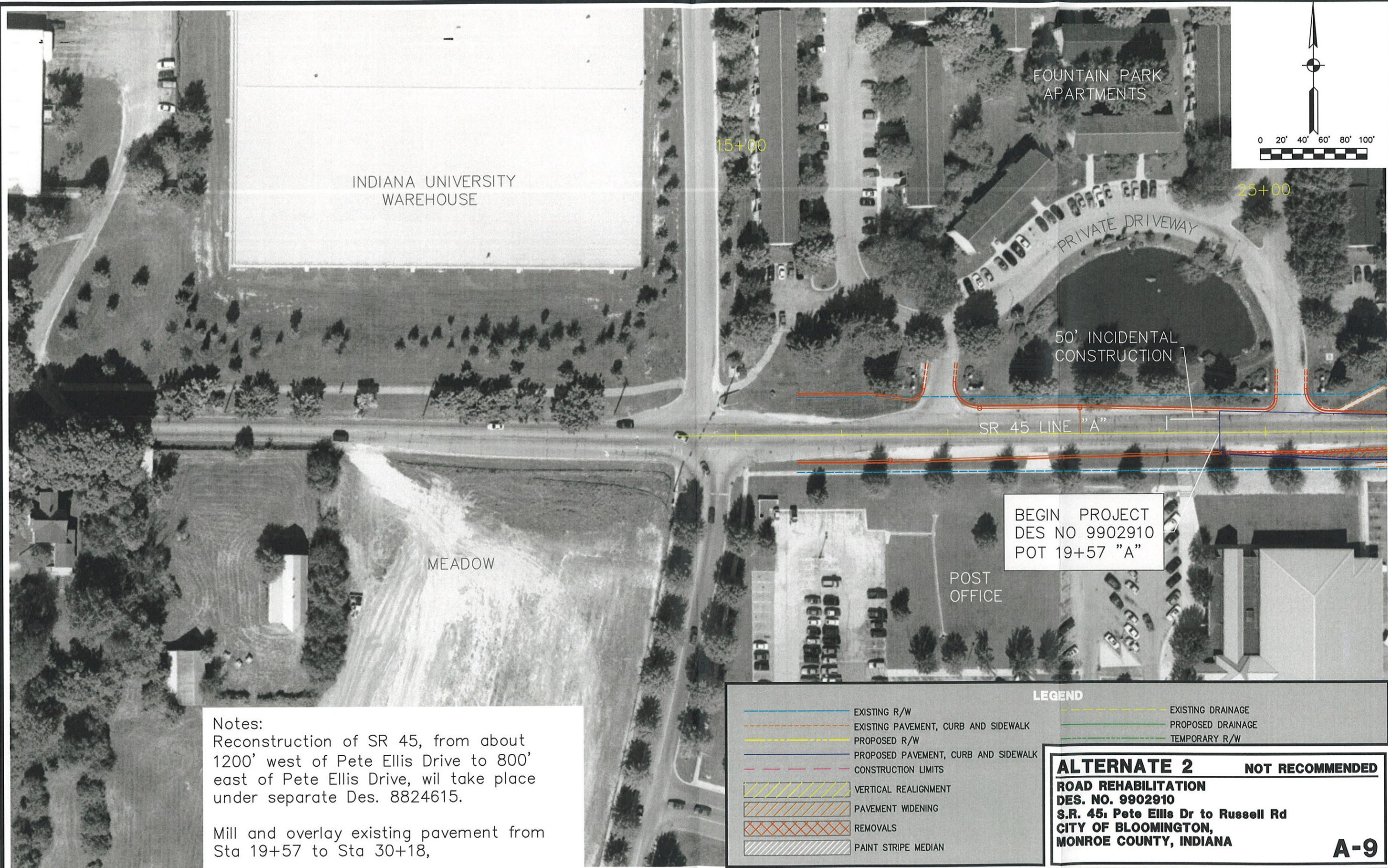
NOTE:
MILL AND OVERLAY
EXISTING PAVEMENT FROM
STA 48+50 TO STA 65+00.

**END PROJECT
POT 65+00**

LEGEND

	EXISTING R/W		EXISTING DRAINAGE
	EXISTING PAVEMENT, CURB AND SIDEWALK		PROPOSED DRAINAGE
	PROPOSED R/W		TEMPORARY R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK		
	CONSTRUCTION LIMITS		
	VERTICAL REALIGNMENT		
	PAVEMENT WIDENING		
	REMOVALS		
	PAINT STRIPE MEDIAN		

ALTERNATE 1 **RECOMMENDED**
ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Ellis Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA **A-8**



Notes:
 Reconstruction of SR 45, from about 1200' west of Pete Ellis Drive to 800' east of Pete Ellis Drive, will take place under separate Des. 8824615.

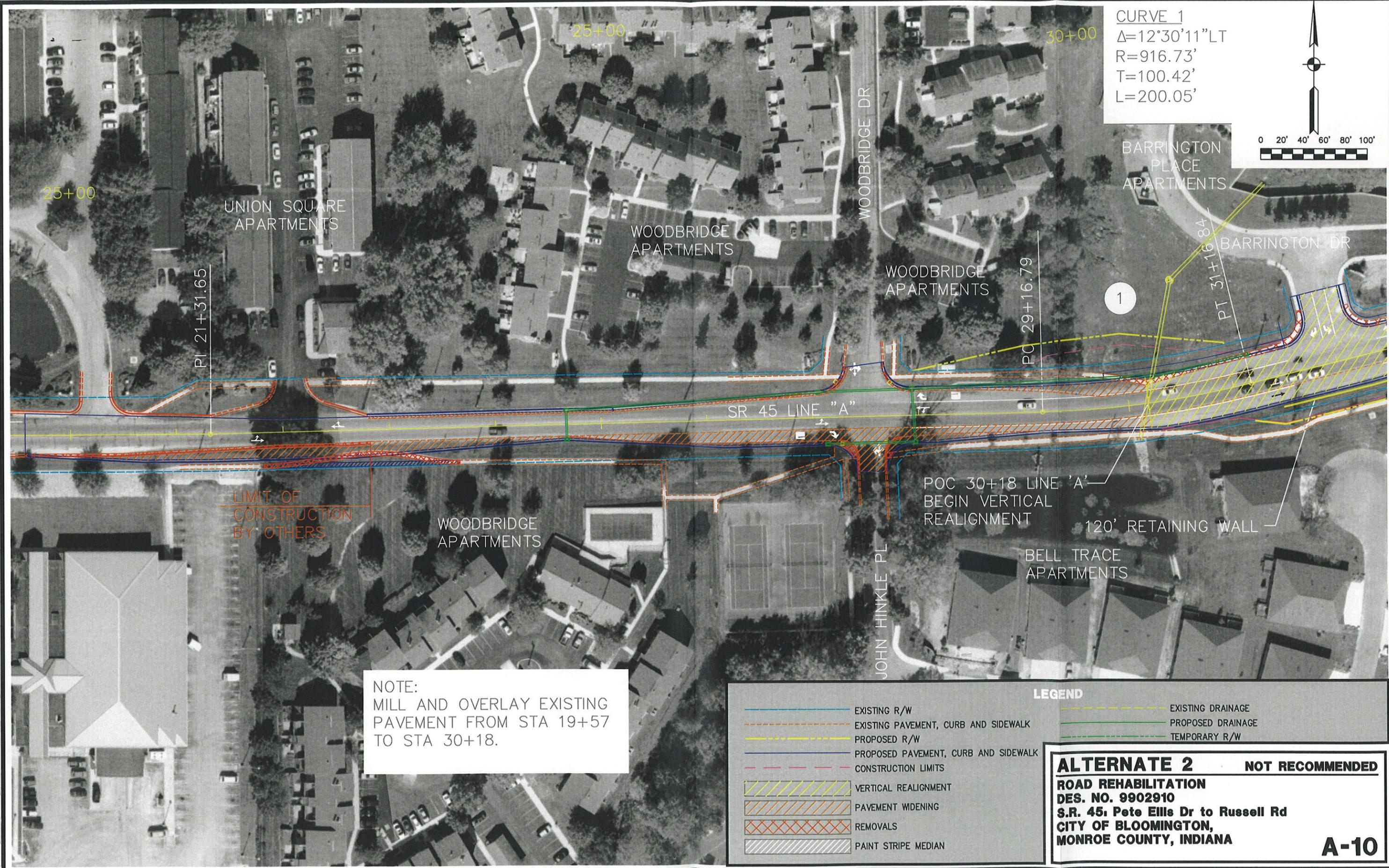
Mill and overlay existing pavement from Sta 19+57 to Sta 30+18,

LEGEND			
	EXISTING R/W		EXISTING DRAINAGE
	EXISTING PAVEMENT, CURB AND SIDEWALK		PROPOSED DRAINAGE
	PROPOSED R/W		TEMPORARY R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK		
	CONSTRUCTION LIMITS		
	VERTICAL REALIGNMENT		
	PAVEMENT WIDENING		
	REMOVALS		
	PAINT STRIPE MEDIAN		

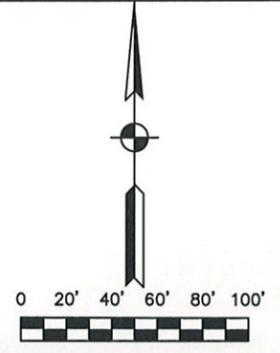
ALTERNATE 2 **NOT RECOMMENDED**

ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Ellis Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA

A-9



CURVE 1
 $\Delta=12^{\circ}30'11''$ LT
 $R=916.73'$
 $T=100.42'$
 $L=200.05'$



NOTE:
 MILL AND OVERLAY EXISTING
 PAVEMENT FROM STA 19+57
 TO STA 30+18.

LEGEND	
	EXISTING R/W
	EXISTING PAVEMENT, CURB AND SIDEWALK
	PROPOSED R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK
	CONSTRUCTION LIMITS
	VERTICAL REALIGNMENT
	PAVEMENT WIDENING
	REMOVALS
	PAINT STRIPE MEDIAN
	EXISTING DRAINAGE
	PROPOSED DRAINAGE
	TEMPORARY R/W

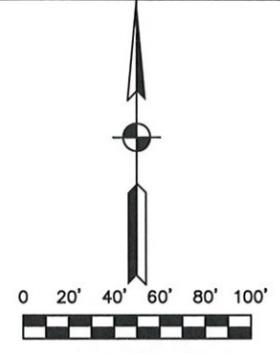
ALTERNATE 2 **NOT RECOMMENDED**
ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Ellis Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA

35+00

40+00

45+00

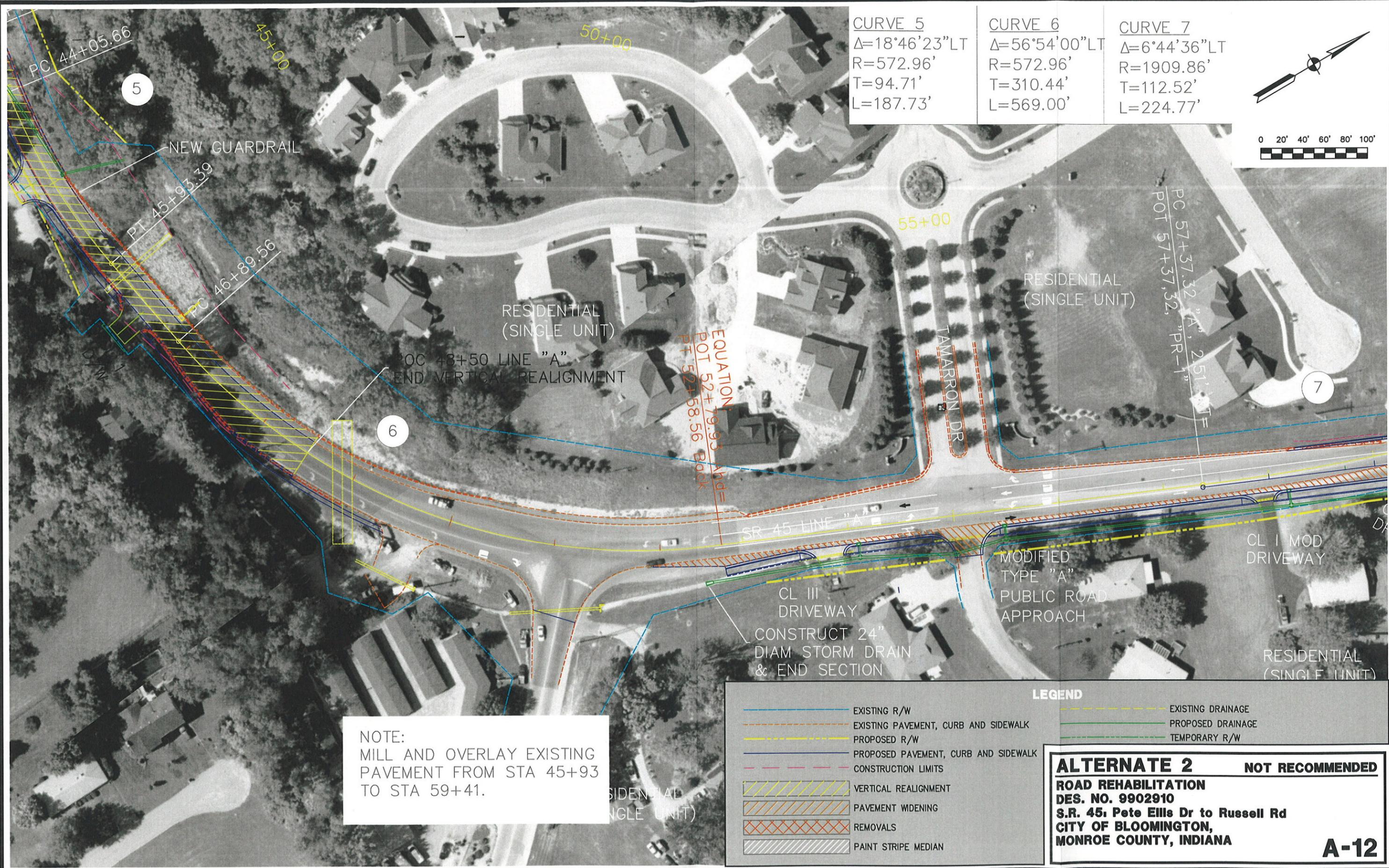
CURVE 2	CURVE 3	CURVE 4
$\Delta=6^{\circ}38'58''\text{LT}$	$\Delta=4^{\circ}28'39''\text{RT}$	$\Delta=10^{\circ}33'49''\text{RT}$
$R=2864.79'$	$R=2546.49'$	$R=619.41'$
$T=166.42'$	$T=99.55'$	$T=57.26'$
$L=332.48'$	$L=199.00'$	$L=114.20'$



LEGEND

	EXISTING R/W		EXISTING DRAINAGE
	EXISTING PAVEMENT, CURB AND SIDEWALK		PROPOSED DRAINAGE
	PROPOSED R/W		TEMPORARY R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK		
	CONSTRUCTION LIMITS		
	VERTICAL REALIGNMENT		
	PAVEMENT WIDENING		
	REMOVALS		
	PAINT STRIPE MEDIAN		

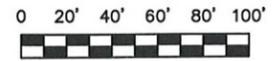
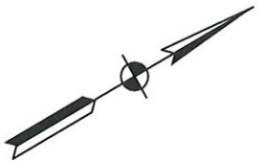
ALTERNATE 2 NOT RECOMMENDED
ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Ellis Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA



CURVE 5
 $\Delta=18^{\circ}46'23''$ LT
 $R=572.96'$
 $T=94.71'$
 $L=187.73'$

CURVE 6
 $\Delta=56^{\circ}54'00''$ LT
 $R=572.96'$
 $T=310.44'$
 $L=569.00'$

CURVE 7
 $\Delta=6^{\circ}44'36''$ LT
 $R=1909.86'$
 $T=112.52'$
 $L=224.77'$



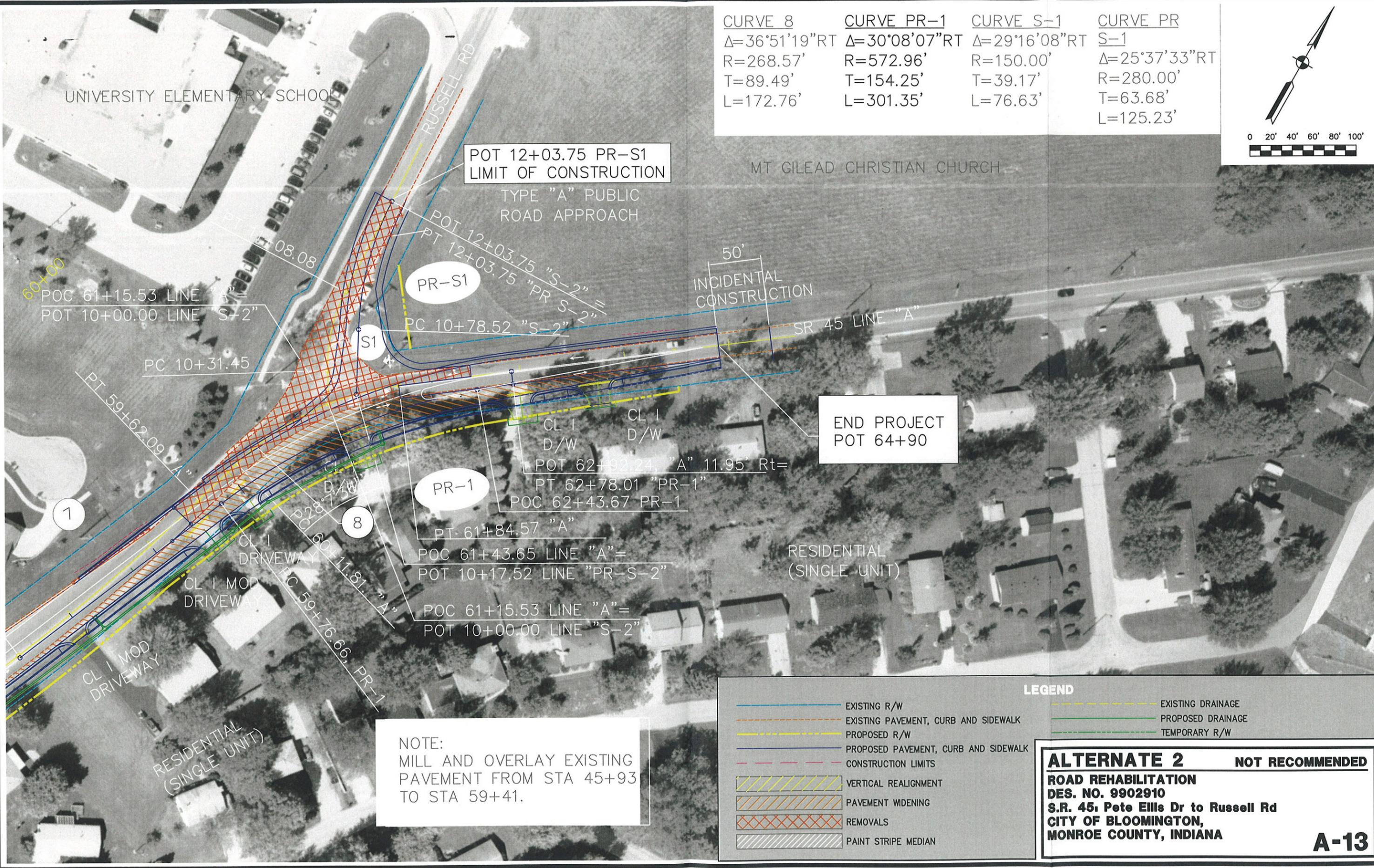
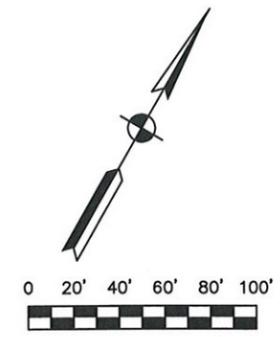
EQUATION:
 POT 52+79.93 And=
 POT 52+58.56 Back

NOTE:
 MILL AND OVERLAY EXISTING
 PAVEMENT FROM STA 45+93
 TO STA 59+41.

LEGEND	
	EXISTING R/W
	EXISTING PAVEMENT, CURB AND SIDEWALK
	PROPOSED R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK
	CONSTRUCTION LIMITS
	VERTICAL REALIGNMENT
	PAVEMENT WIDENING
	REMOVALS
	PAINT STRIPE MEDIAN
	EXISTING DRAINAGE
	PROPOSED DRAINAGE
	TEMPORARY R/W

ALTERNATE 2 **NOT RECOMMENDED**
ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Ellis Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA

CURVE 8	CURVE PR-1	CURVE S-1	CURVE PR S-1
$\Delta=36^{\circ}51'19''$ RT	$\Delta=30^{\circ}08'07''$ RT	$\Delta=29^{\circ}16'08''$ RT	$\Delta=25^{\circ}37'33''$ RT
R=268.57'	R=572.96'	R=150.00'	R=280.00'
T=89.49'	T=154.25'	T=39.17'	T=63.68'
L=172.76'	L=301.35'	L=76.63'	L=125.23'



POT 12+03.75 PR-S1
LIMIT OF CONSTRUCTION

MT GILEAD CHRISTIAN CHURCH

TYPE "A" PUBLIC
ROAD APPROACH

50'
INCIDENTAL
CONSTRUCTION

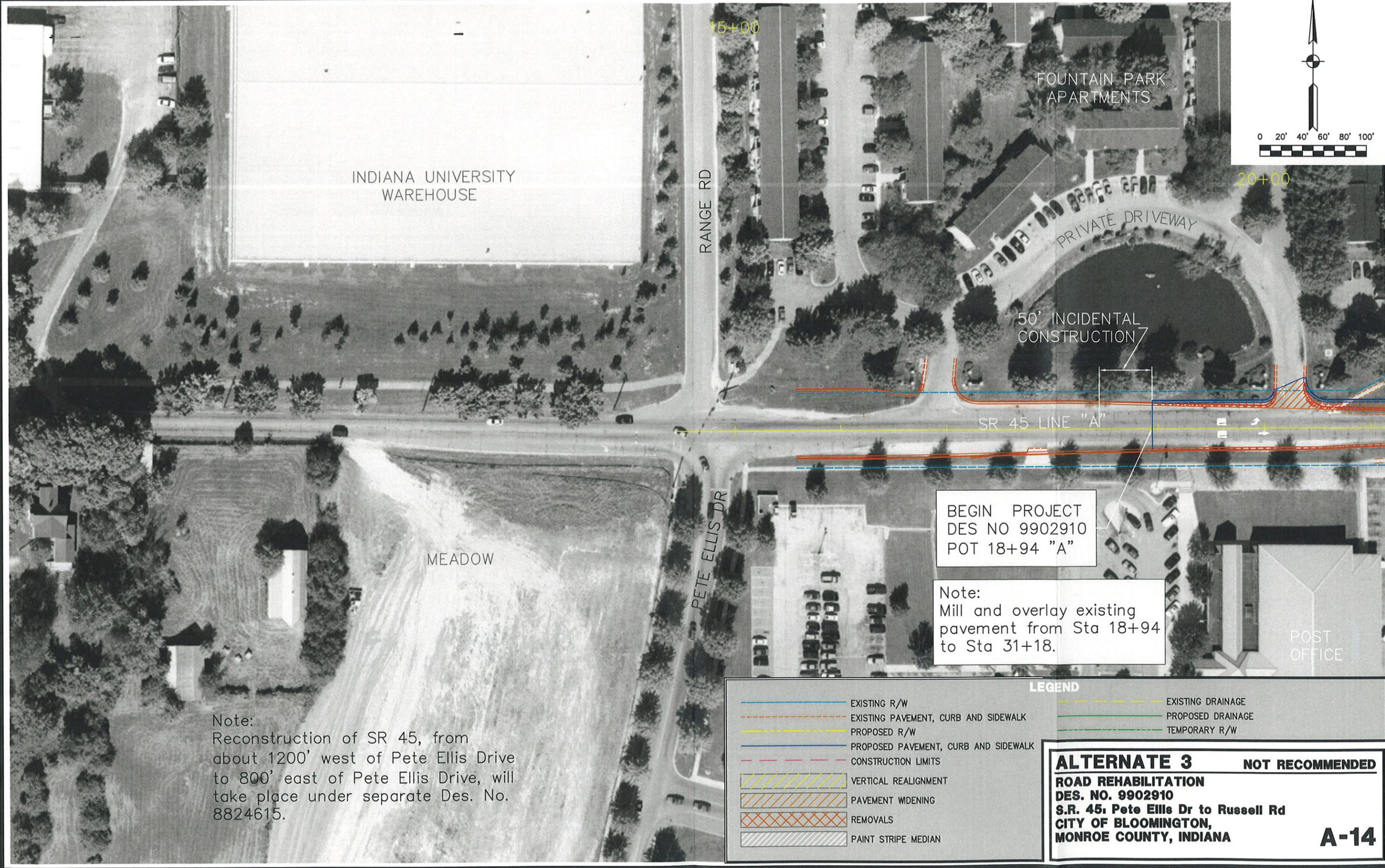
END PROJECT
POT 64+90

NOTE:
MILL AND OVERLAY EXISTING
PAVEMENT FROM STA 45+93
TO STA 59+41.

LEGEND

	EXISTING R/W		EXISTING DRAINAGE
	EXISTING PAVEMENT, CURB AND SIDEWALK		PROPOSED DRAINAGE
	PROPOSED R/W		TEMPORARY R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK		
	CONSTRUCTION LIMITS		
	VERTICAL REALIGNMENT		
	PAVEMENT WIDENING		
	REMOVALS		
	PAINT STRIPE MEDIAN		

ALTERNATE 2 NOT RECOMMENDED
ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Ellis Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA



INDIANA UNIVERSITY WAREHOUSE

FOUNTAIN PARK APARTMENTS

RANGE RD

15+00

20+00

PRIVATE DRIVEWAY

50' INCIDENTAL CONSTRUCTION

SR 45 LINE "A"

MEADOW

PETE ELLIS DR

BEGIN PROJECT
DES NO 9902910
POT 18+94 "A"

Note:
Mill and overlay existing
pavement from Sta 18+94
to Sta 31+18.

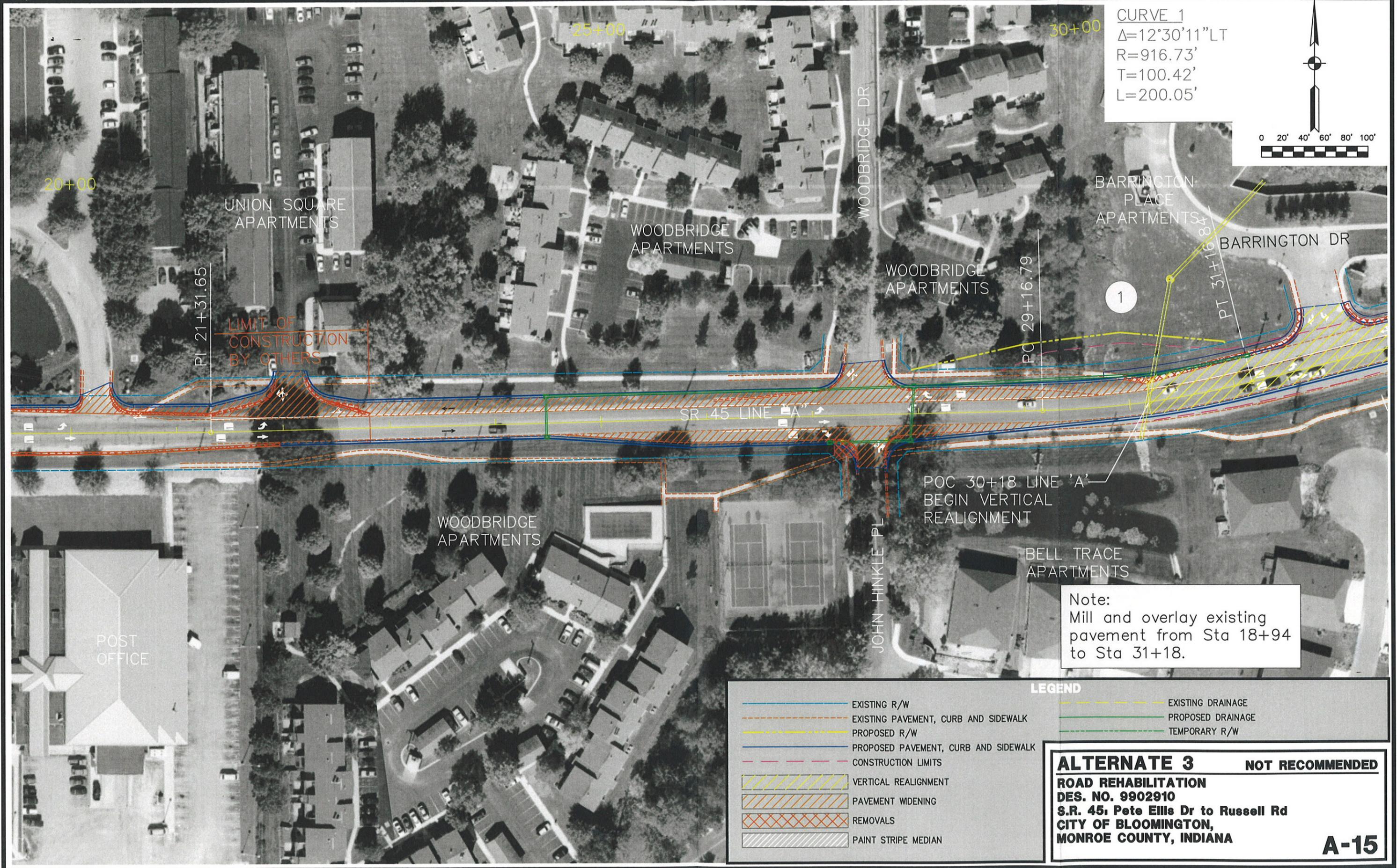
POST OFFICE

Note:
Reconstruction of SR 45, from
about 1200' west of Pete Ellis Drive
to 800' east of Pete Ellis Drive, will
take place under separate Des. No.
8824615.

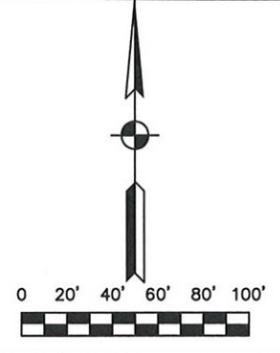
LEGEND

- EXISTING R/W
- - - EXISTING PAVEMENT, CURB AND SIDEWALK
- PROPOSED R/W
- PROPOSED PAVEMENT, CURB AND SIDEWALK
- - - CONSTRUCTION LIMITS
- ▨ VERTICAL REALIGNMENT
- ▨ PAVEMENT WIDENING
- ▨ REMOVALS
- ▨ PAINT STRIPE MEDIAN
- EXISTING DRAINAGE
- PROPOSED DRAINAGE
- TEMPORARY R/W

ALTERNATE 3 **NOT RECOMMENDED**
ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Ellis Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA **A-14**



CURVE 1
 $\Delta=12^{\circ}30'11''$ LT
 R=916.73'
 T=100.42'
 L=200.05'



Note:
 Mill and overlay existing
 pavement from Sta 18+94
 to Sta 31+18.

LEGEND

	EXISTING R/W		EXISTING DRAINAGE
	EXISTING PAVEMENT, CURB AND SIDEWALK		PROPOSED DRAINAGE
	PROPOSED R/W		TEMPORARY R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK		
	CONSTRUCTION LIMITS		
	VERTICAL REALIGNMENT		
	PAVEMENT WIDENING		
	REMOVALS		
	PAINT STRIPE MEDIAN		

ALTERNATE 3 NOT RECOMMENDED
ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Ellis Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA

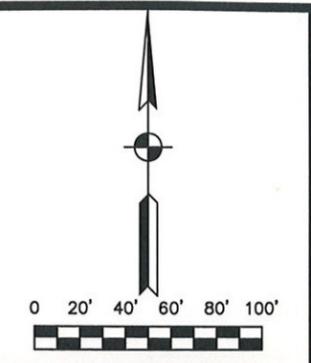
A-15

35+00

40+00

45+00

CURVE 2	CURVE 3	CURVE 4
$\Delta=6^{\circ}38'58''\text{LT}$	$\Delta=4^{\circ}28'39''\text{RT}$	$\Delta=10^{\circ}33'49''\text{RT}$
$R=2864.79'$	$R=2546.49'$	$R=619.41'$
$T=166.42'$	$T=99.55'$	$T=57.26'$
$L=332.48'$	$L=199.00'$	$L=114.20'$



BARRINGTON PLACE APARTMENTS

TYPE K MANHOLE WITH OPEN GRATE

500' RETAINING WALL

BARRINGTON DR

GRANDVIEW DR

KERRY DR

MODIFIED STREET APPROACH

110' RETAINING WALL

RESIDENTIAL (SINGLE UNIT)

380' RETAINING WALL

MODIFIED STREET APPROACH RESIDENTIAL (SINGLE UNIT)

2

RESIDENTIAL (SINGLE UNIT)

3

4

5

PC 32+73.13

PT 36+05.61

PC 40+31.57

PCC 42+30.56

POT 42+88.21

LINE PR-A

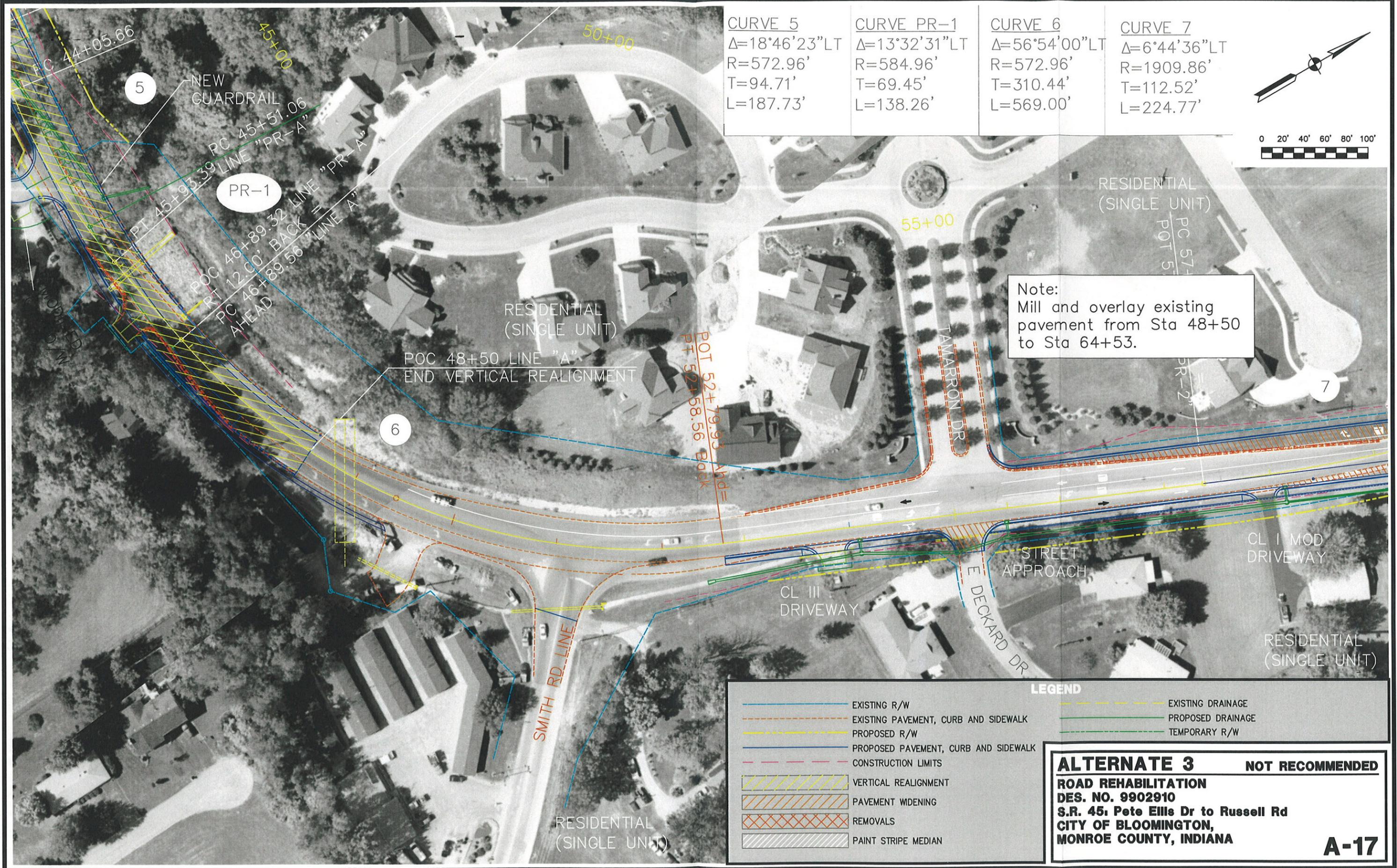
PT 43+44.76

PC 44+05.66

LEGEND

- EXISTING R/W
- EXISTING PAVEMENT, CURB AND SIDEWALK
- PROPOSED R/W
- PROPOSED PAVEMENT, CURB AND SIDEWALK
- CONSTRUCTION LIMITS
- VERTICAL REALIGNMENT
- PAVEMENT WIDENING
- REMOVALS
- PAINT STRIPE MEDIAN
- EXISTING DRAINAGE
- PROPOSED DRAINAGE
- TEMPORARY R/W

ALTERNATE 3 NOT RECOMMENDED
ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Ellis Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA



CURVE 5
 $\Delta=18^{\circ}46'23''$ LT
 $R=572.96'$
 $T=94.71'$
 $L=187.73'$

CURVE PR-1
 $\Delta=13^{\circ}32'31''$ LT
 $R=584.96'$
 $T=69.45'$
 $L=138.26'$

CURVE 6
 $\Delta=56^{\circ}54'00''$ LT
 $R=572.96'$
 $T=310.44'$
 $L=569.00'$

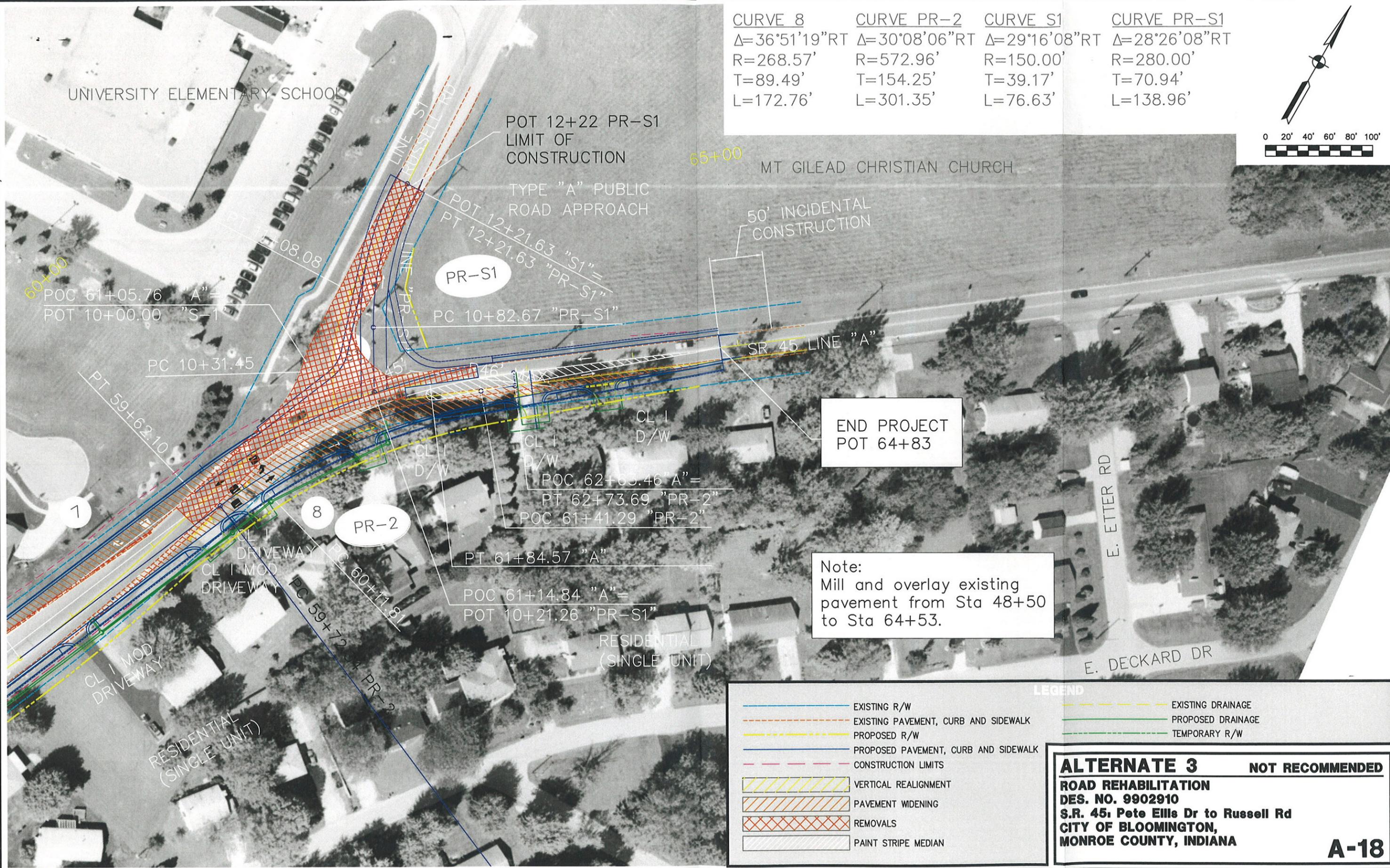
CURVE 7
 $\Delta=6^{\circ}44'36''$ LT
 $R=1909.86'$
 $T=112.52'$
 $L=224.77'$

Note:
 Mill and overlay existing
 pavement from Sta 48+50
 to Sta 64+53.

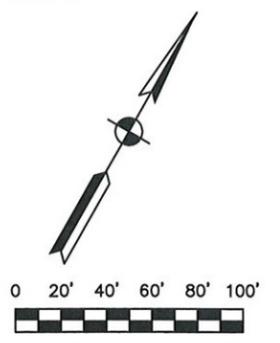
LEGEND

	EXISTING R/W		EXISTING DRAINAGE
	EXISTING PAVEMENT, CURB AND SIDEWALK		PROPOSED DRAINAGE
	PROPOSED R/W		TEMPORARY R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK		
	CONSTRUCTION LIMITS		
	VERTICAL REALIGNMENT		
	PAVEMENT WIDENING		
	REMOVALS		
	PAINT STRIPE MEDIAN		

ALTERNATE 3 NOT RECOMMENDED
ROAD REHABILITATION
DES. NO. 9902910
S.R. 45, Pete Ellis Dr to Russell Rd
CITY OF BLOOMINGTON,
MONROE COUNTY, INDIANA



CURVE 8	CURVE PR-2	CURVE S1	CURVE PR-S1
$\Delta=36^{\circ}51'19''$ RT	$\Delta=30^{\circ}08'06''$ RT	$\Delta=29^{\circ}16'08''$ RT	$\Delta=28^{\circ}26'08''$ RT
R=268.57'	R=572.96'	R=150.00'	R=280.00'
T=89.49'	T=154.25'	T=39.17'	T=70.94'
L=172.76'	L=301.35'	L=76.63'	L=138.96'

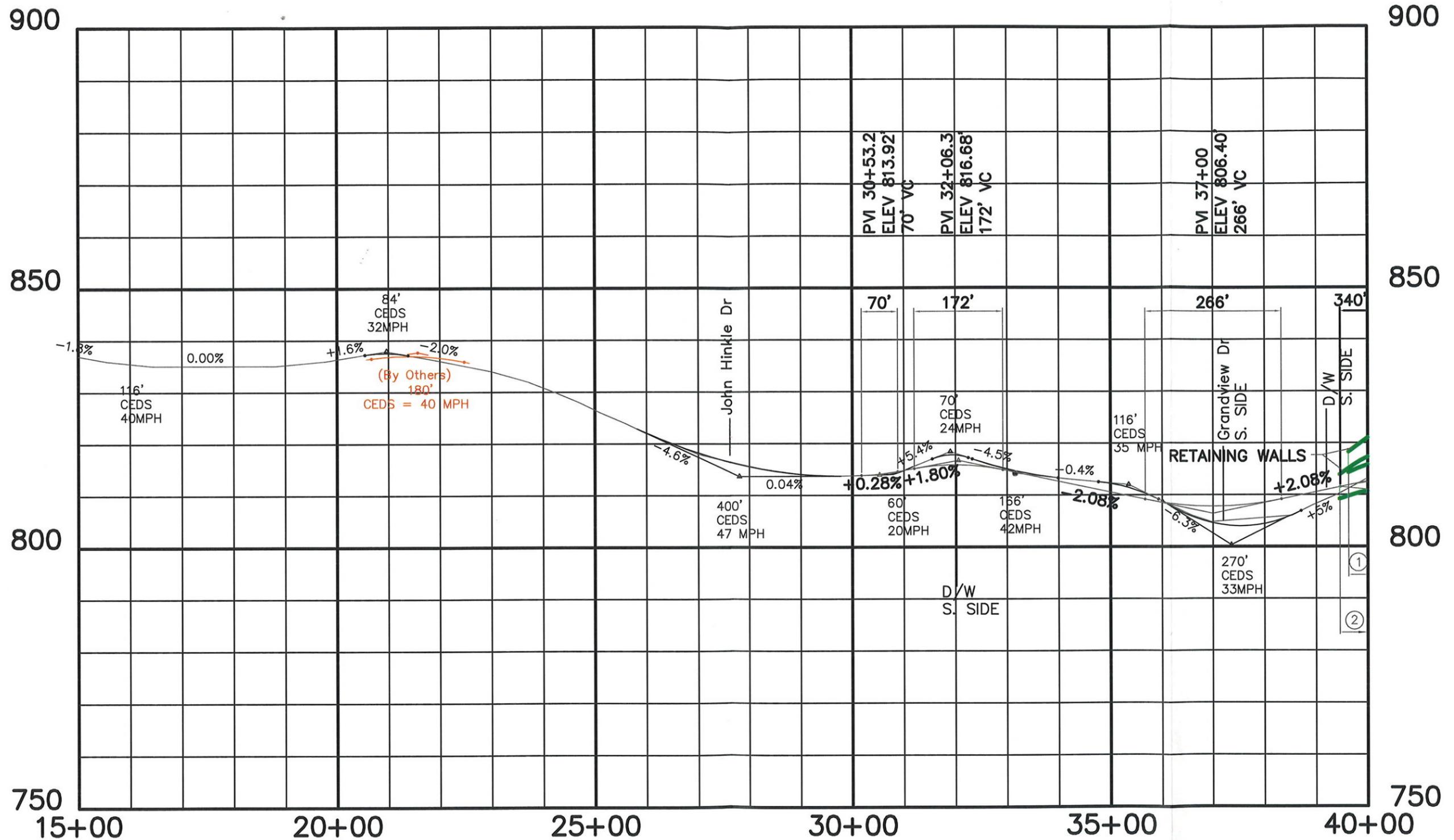


END PROJECT
POT 64+83

Note:
Mill and overlay existing
pavement from Sta 48+50
to Sta 64+53.

LEGEND			
	EXISTING R/W		EXISTING DRAINAGE
	EXISTING PAVEMENT, CURB AND SIDEWALK		PROPOSED DRAINAGE
	PROPOSED R/W		TEMPORARY R/W
	PROPOSED PAVEMENT, CURB AND SIDEWALK		
	CONSTRUCTION LIMITS		
	VERTICAL REALIGNMENT		
	PAVEMENT WIDENING		
	REMOVALS		
	PAINT STRIPE MEDIAN		

ALTERNATE 3 NOT RECOMMENDED
ROAD REHABILITATION
 DES. NO. 9902910
 S.R. 45, Pete Eills Dr to Russell Rd
 CITY OF BLOOMINGTON,
 MONROE COUNTY, INDIANA

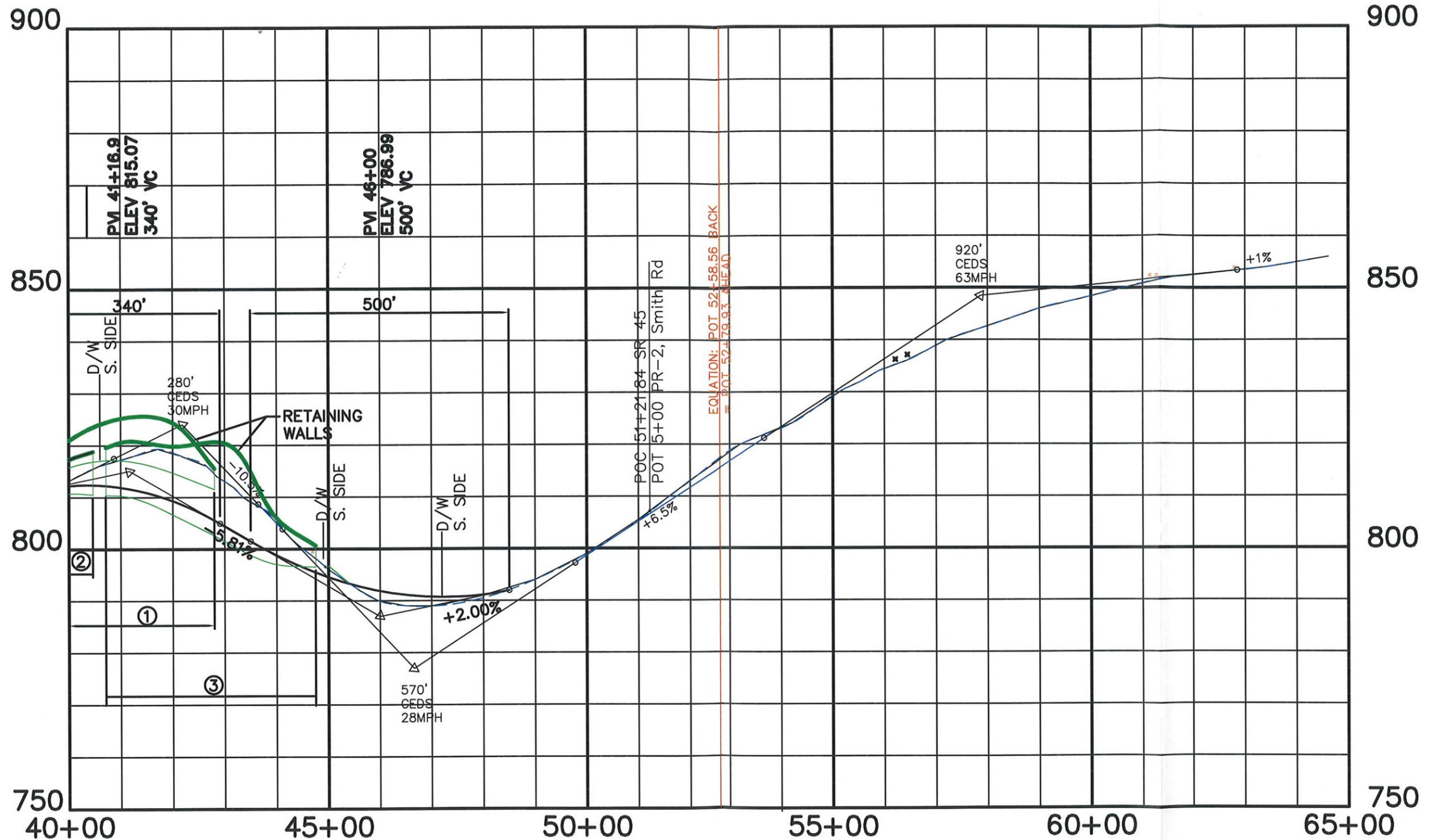


RETAINING WALLS

- ① STA. 39+63 TO 42+80, 39' LEFT
- ② STA. 39+46 TO 40+46, 25' RIGHT

EXIST. AND PROPOSED CONCEPTUAL PROFILE

**ROAD REHABILITATION
 DES. NO. 9902910
 ALTERNATE 1
 SR 45, PETE ELLIS DR TO RUSSELL RD
 CITY OF BLOOMINGTON
 MONROE COUNTY, INDIANA**

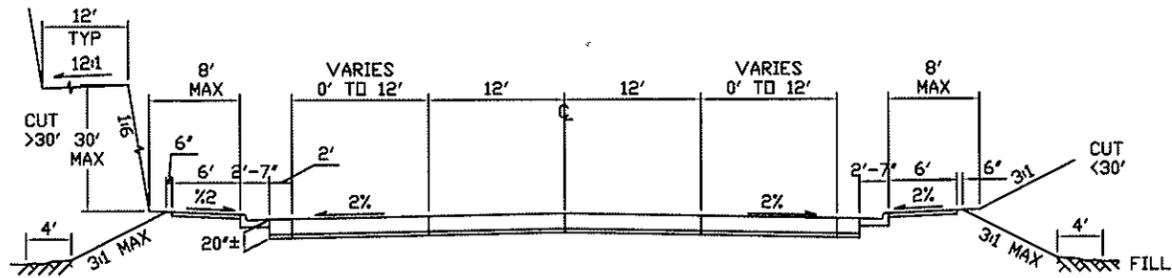


RETAINING WALLS

- ① STA. 39+63 TO 42+80, 39' LEFT
- ② STA. 39+46 TO 40+46, 25' RIGHT
- ③ STA. 40+71 TO 44+75, 28' TO 25' RIGHT

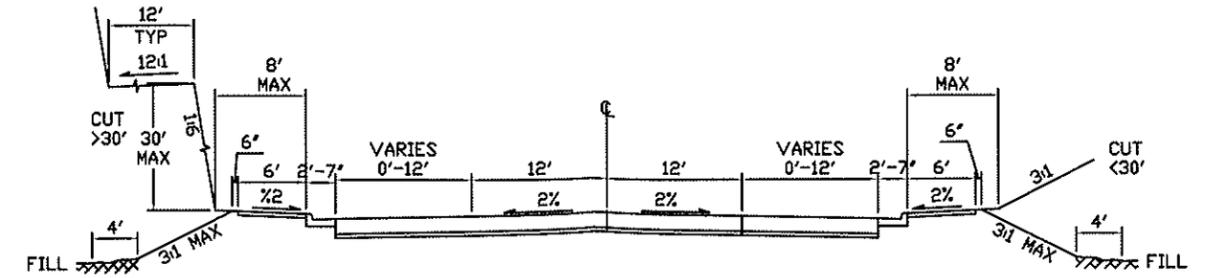
EXIST. AND PROPOSED CONCEPTUAL PROFILE

ROAD REHABILITATION
 DES. NO. 9902910
 ALTERNATE 1
 SR 45, PETE ELLIS DR TO RUSSELL RD
 CITY OF BLOOMINGTON
 MONROE COUNTY, INDIANA



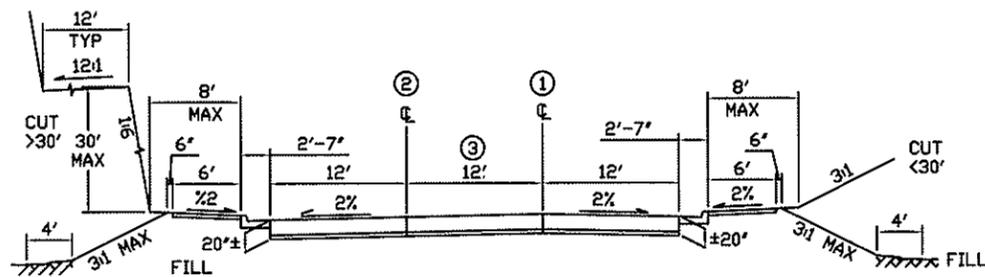
SR 45 TYPICAL SECTION
ALTERNATE 1 (RECOMMENDED)

SIDEWALK SHOWN IS FROM 33+43 RT TO 48+50 RT, 52+80 RT TO 65+00 RT, AND FROM 29+67 LT TO 32+63 LT ONLY. SEE BELOW RIGHT FOR LEFT EDGE OF PAVEMENT WHERE NO SIDEWALK IS TO BE CONSTRUCTED. SEE AERIAL DRAWINGS FOR NEW SIDEWALK NOT LOCATED ADJACENT TO CURB.



SR 45 TYPICAL SECTION
ALTERNATE 2

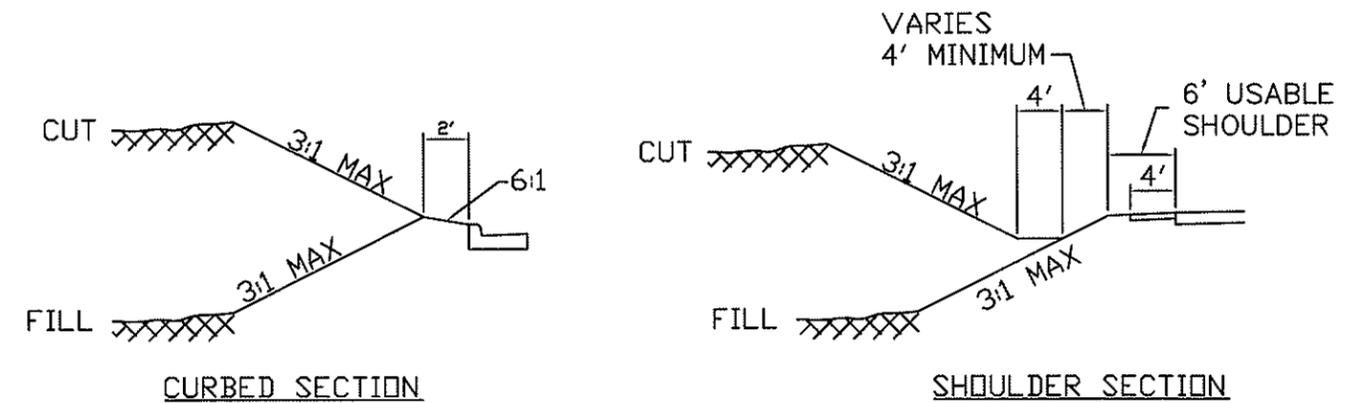
SIDEWALK SHOWN IS FROM 33+43 RT TO 48+50 RT, 52+80 RT TO 64+47 RT, AND FROM 29+79 LT TO 32+63 LT ONLY. SEE BELOW FOR LEFT EDGE OF PAVEMENT WHERE NO SIDEWALK IS TO BE CONSTRUCTED. SEE AERIAL DRAWINGS FOR NEW SIDEWALK NOT LOCATED ADJACENT TO CURB.



SR 45 TYPICAL SECTION
ALTERNATE 3

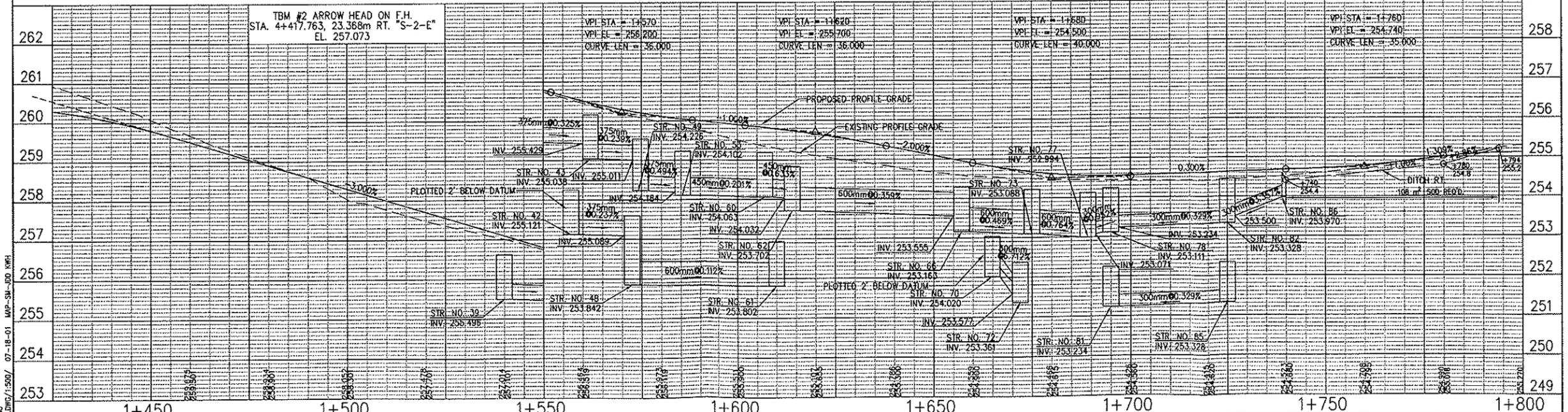
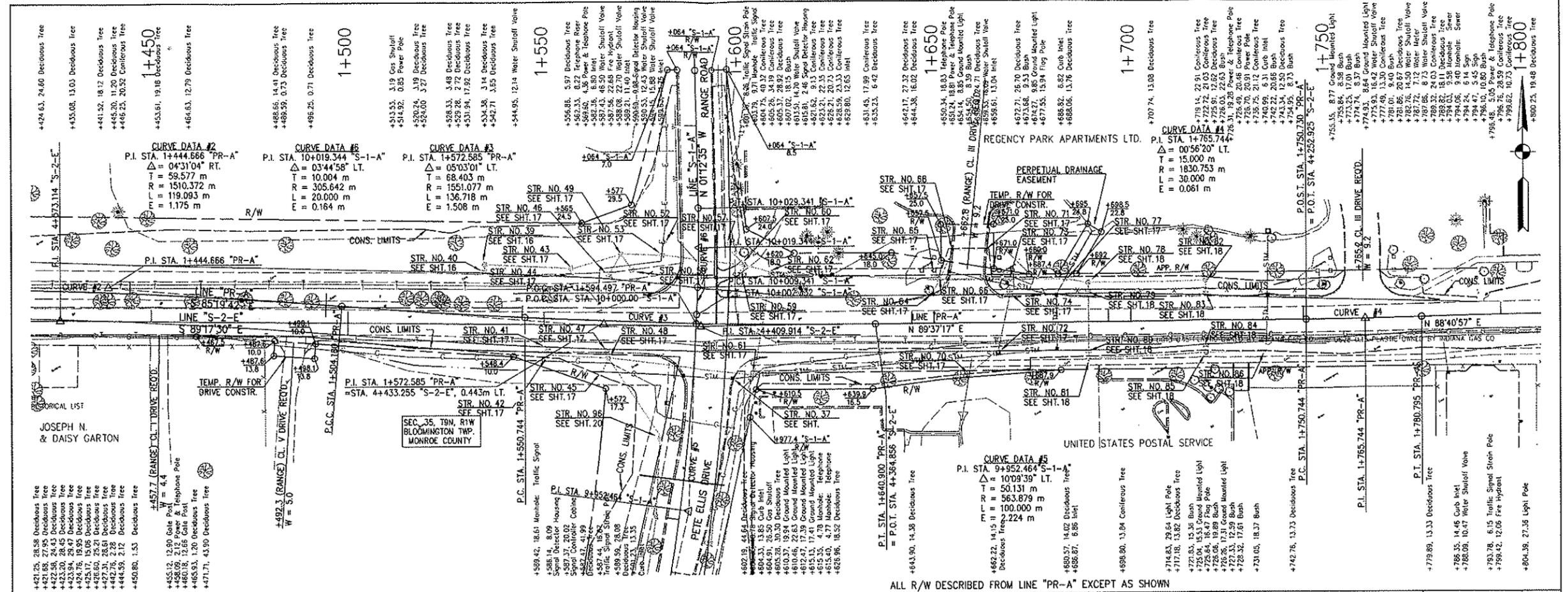
SIDEWALK SHOWN IS FROM 33+46 RT TO 48+50 RT, 52+80 RT TO 64+53 RT, AND FROM 29+78 LT TO 32+63 LT ONLY. SEE RIGHT FOR LEFT EDGE OF PAVEMENT WHERE NO SIDEWALK IS TO BE CONSTRUCTED. SEE AERIAL DRAWINGS FOR NEW SIDEWALK NOT LOCATED ADJACENT TO CURB.

- ① LOCATION OF CONSTRUCTION CENTERLINE FROM BEGINNING OF PROJECT TO POC 46+89 AND FROM PDT 52+80 TO POC 59+54
- ② LOCATION OF CONSTRUCTION CENTERLINE FROM POC 62+23 TO PDT 62+49
- ③ TAPERS FROM 12' AT PDT 62+49 TO 0' AT PDT 64+53



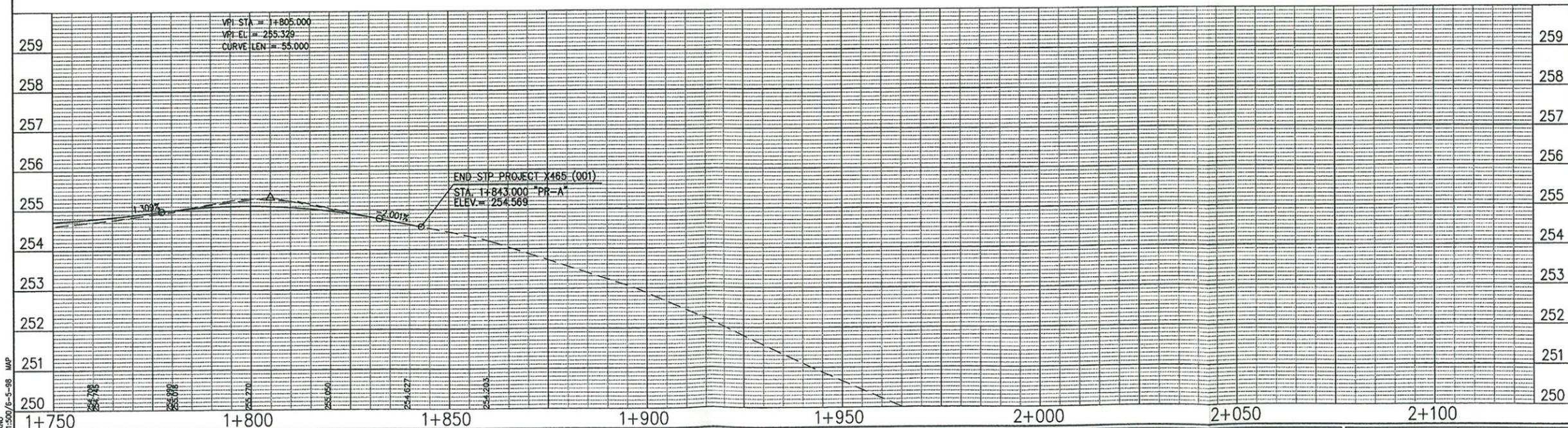
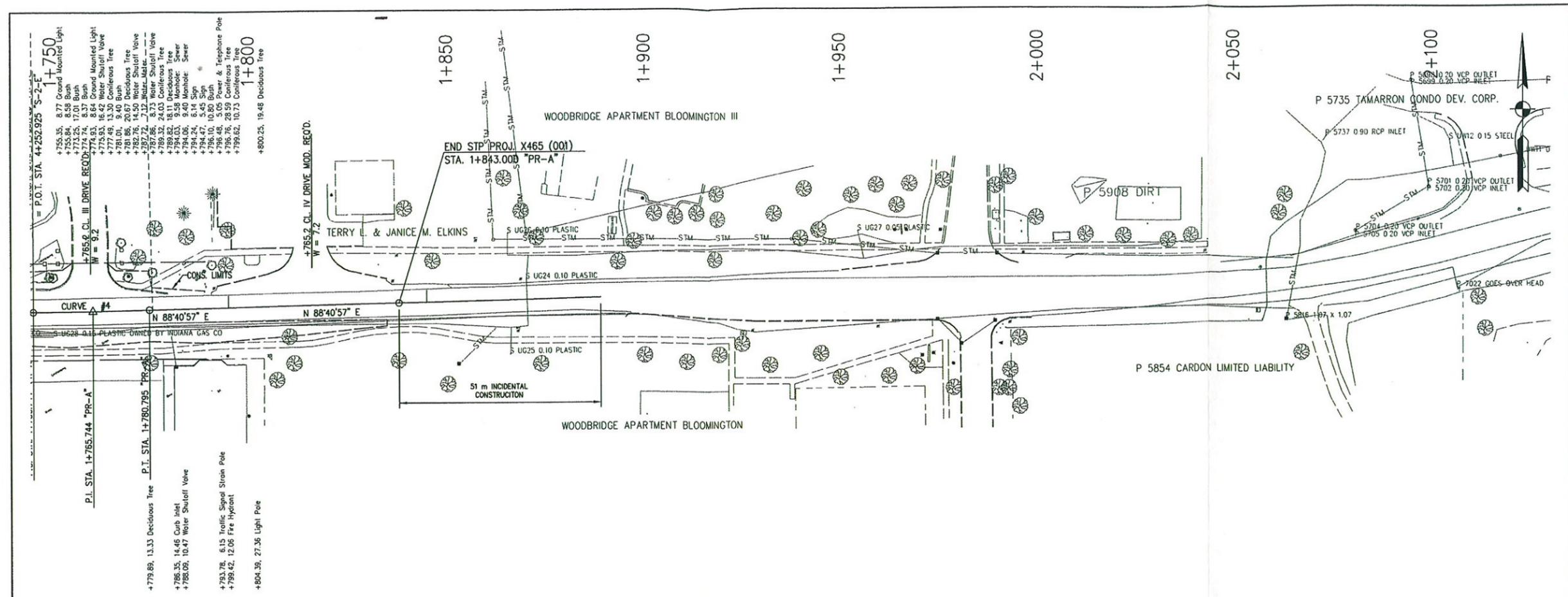
TYPICAL GRADING AT BACK OF CURB
WHERE NO SIDEWALK IS TO BE CONSTRUCTED

TYPICAL CROSS SECTIONS
ROAD RECONSTRUCTION
 DES. NO. 9902910
 S.R. 45, Pete Ellis Dr to Russell Rd
 CITY OF BLOOMINGTON,
 MONROE COUNTY, INDIANA



RECOMMENDED FOR APPROVAL	DESIGN ENGINEER	DATE	INDIANA DEPARTMENT OF TRANSPORTATION		HORIZONTAL SCALE	BRIDGE FILE
DESIGNED: M.F.	DRAWN: SM		PLAN & PROFILE LINE "PR-A"		1 : 500	
CHECKED: JDD	CHECKED: M.F.				VERTICAL SCALE	DESCRIPTION
					1 : 50	BB24615
					SURVEY BOOK	SHEETS
						10 of 44
					CONTRACT	PROJECT
						STP-X465 (001)

SEPARATE PROJECT FOR INFORMATION ONLY.

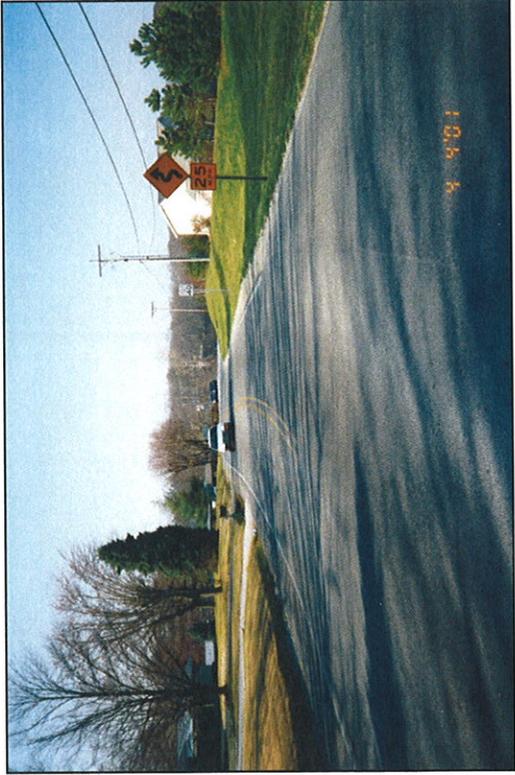


REF: 88018ED, 88030001, X465
 C:\88018\ED\88030001\1671:500(5-5-98).MAP

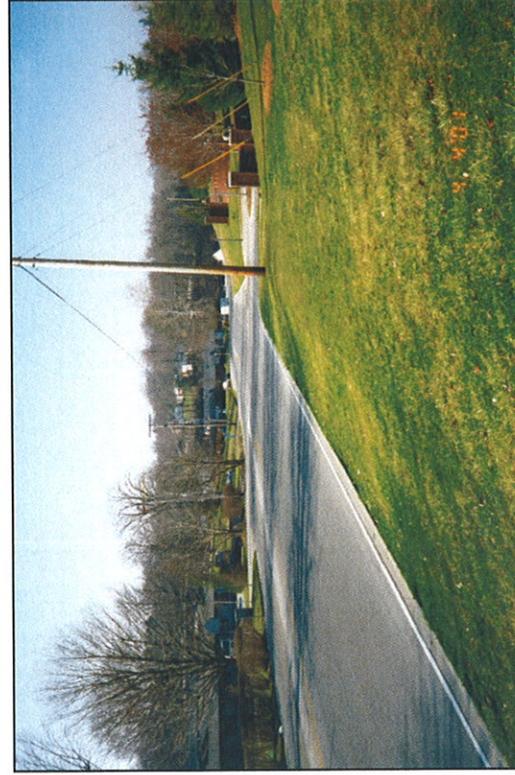
SEPARATE PROJECT. FOR INFORMATION ONLY.		RECOMMENDED FOR APPROVAL _____ DESIGN ENGINEER _____ DATE _____	INDIANA DEPARTMENT OF TRANSPORTATION	HORIZONTAL SCALE 1 : 500 VERTICAL SCALE 1 : 50	BRIDGE FILE DESIGNATION 8824615
		DESIGNED: A & F DRAWN: JOD CHECKED: M.F CHECKED: M.F	PLAN & PROFILE LINE "PR-A"	SURVEY BOOK CONTRACT	SHEETS 10A of 44 PROJECT STP-X465



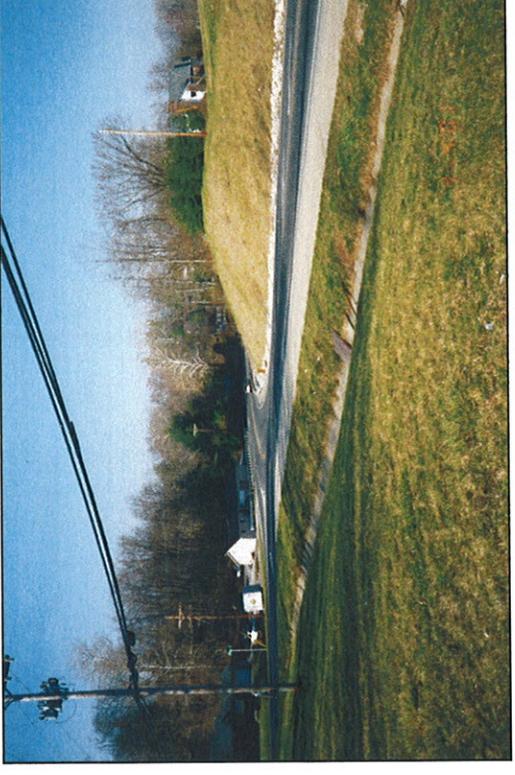
SR 45 and Russell Rd (on right) intersection, looking west



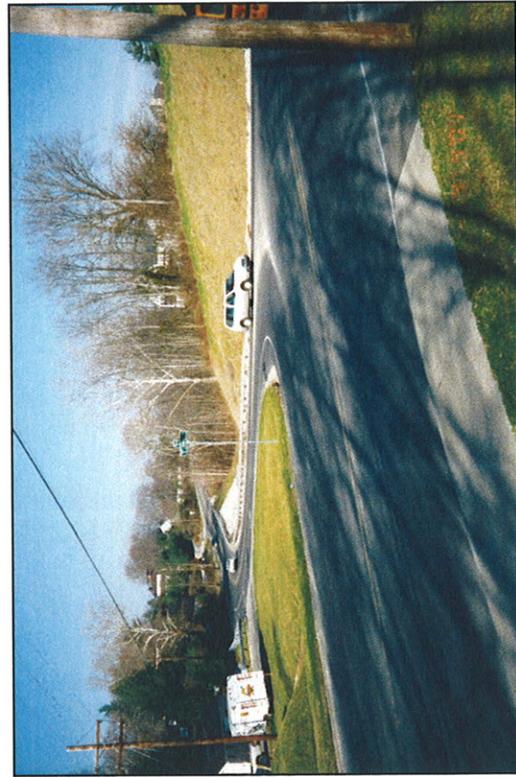
SR 45, looking south from Russell Rd intersection



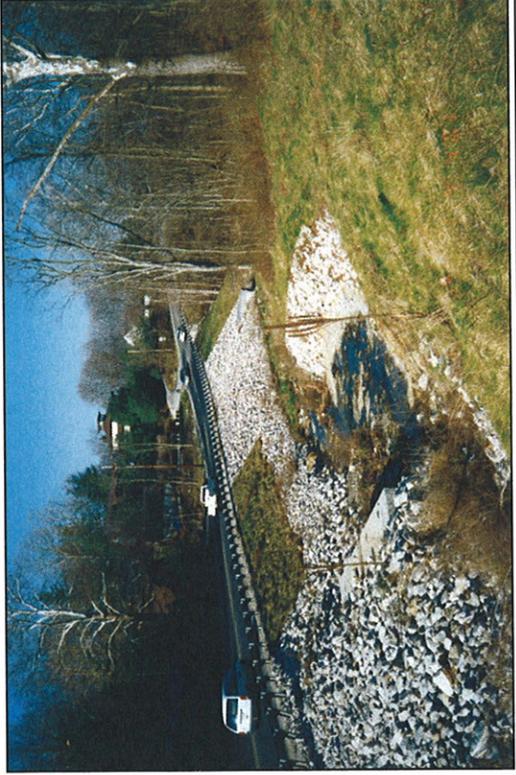
SR 45 intersection at Deckard Dr (left) and Tamarron Dr (right), looking south



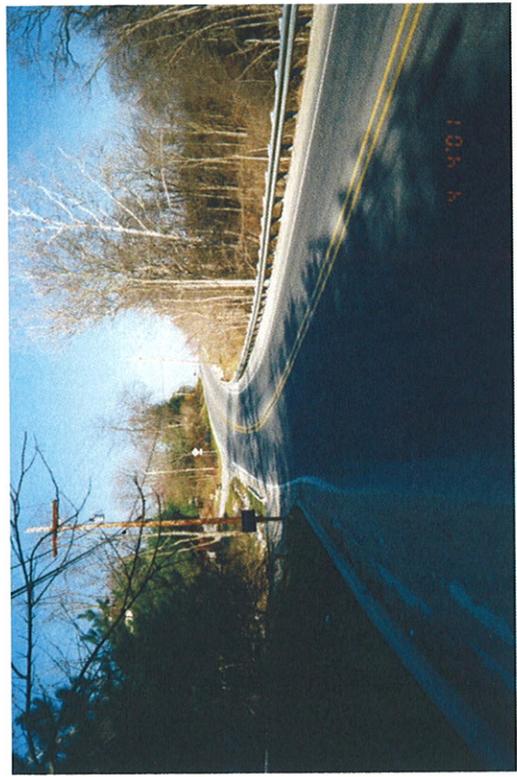
Concrete lined drain ditch on east side of SR 45 between Smith Rd (right) and Deckard Dr, looking south



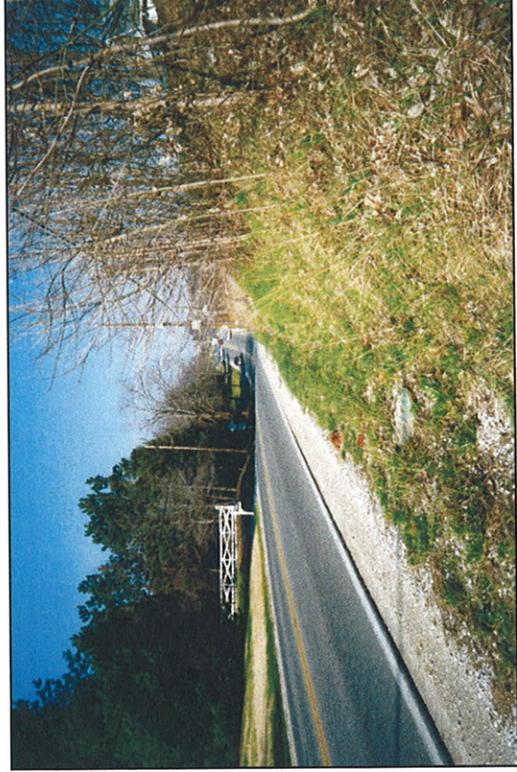
Smith Rd intersection at SR 45, looking west



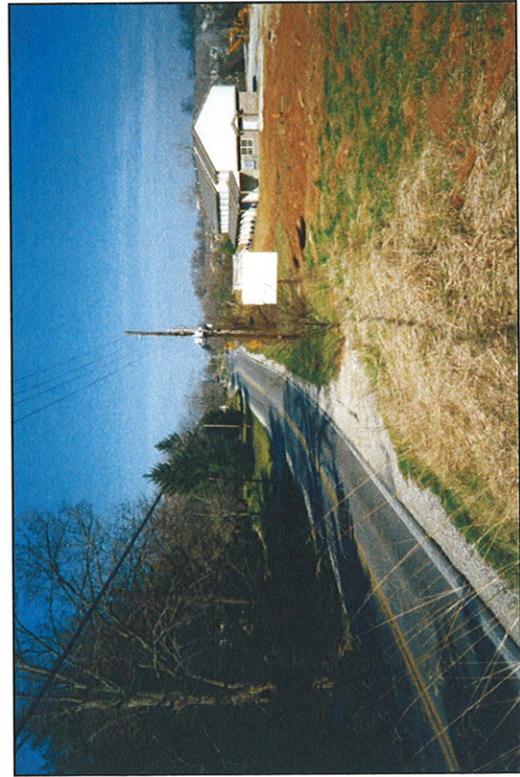
Indiana Creek, on north side of SR 45, west of Smith Rd intersection, looking west



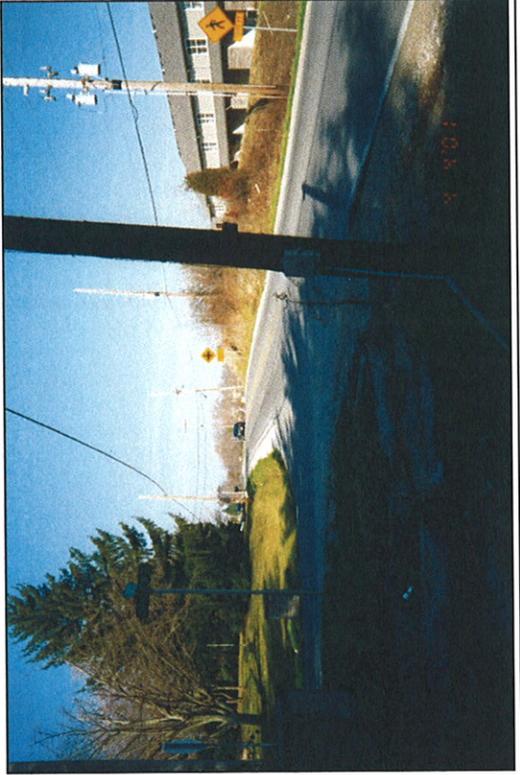
SR 45, west of Smith Rd intersection, looking west



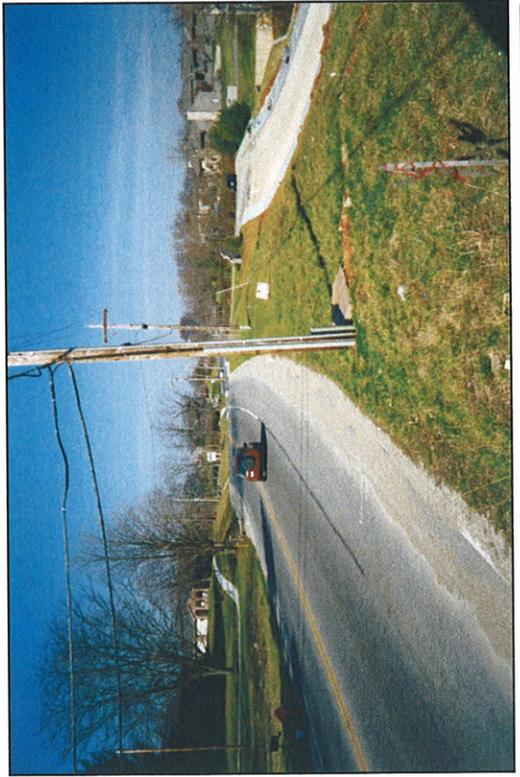
SR 45 between Grandview Dr and crest vertical curve west of Smith Rd, looking west



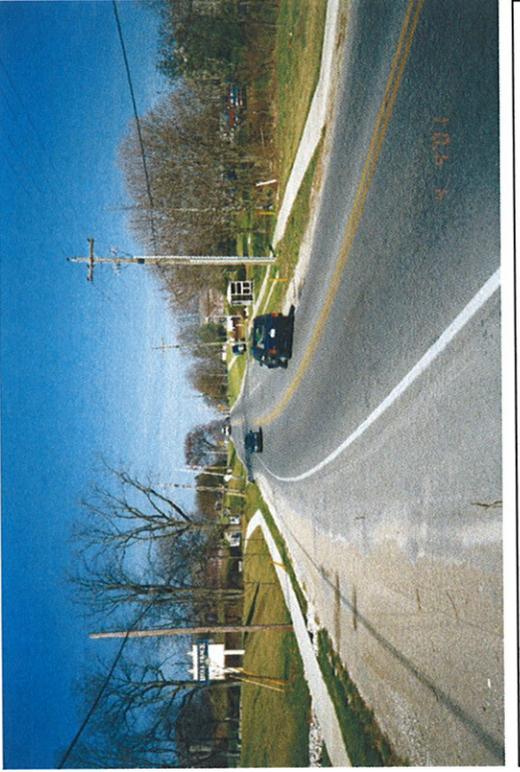
SR 45 at Grandview Dr intersection, looking west



SR 45 and Grandview Dr intersection, looking west



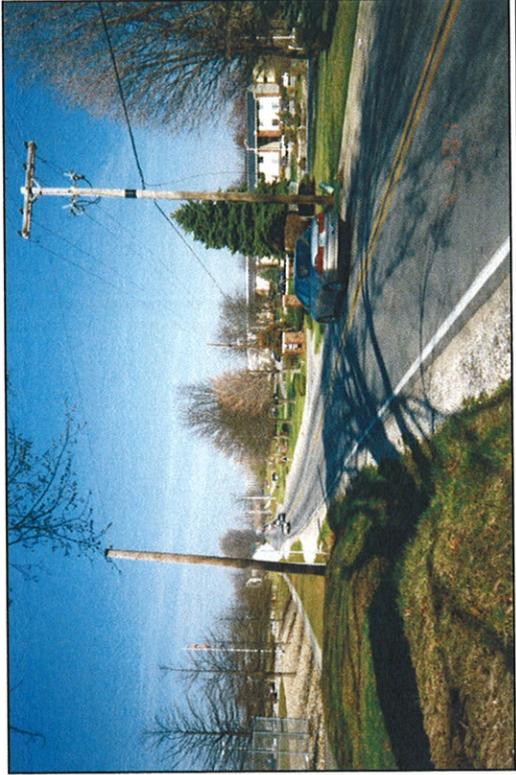
SR 45, east of entrance to Barrington Apartment complex, looking west



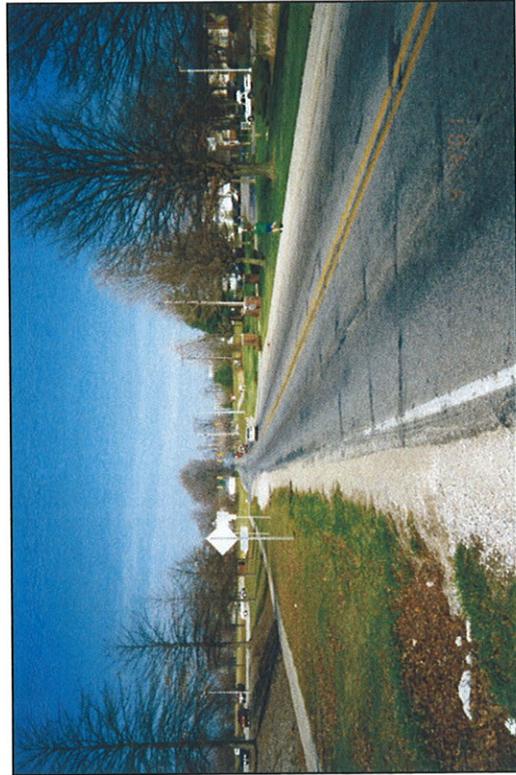
SR 45 between John Hinkle Pl and Entrance to Barrington Apartment complex, looking west



SR 45 west of US Post Office and Union Square apartments



SR 45, looking west, with US Post office on left and Fountain Park Apartment complex on right



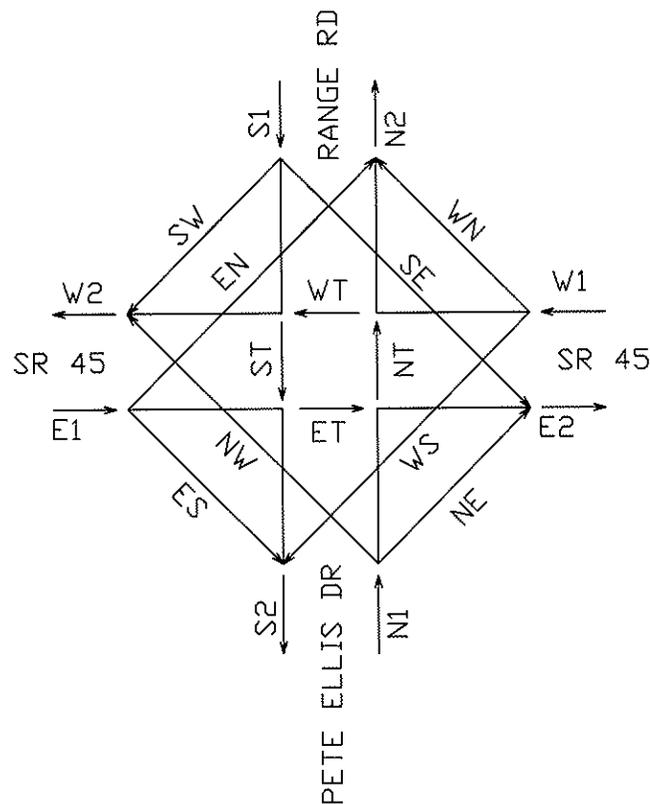
SR 45, looking west, with US Post office on left and Fountain Park Apartment complex on right



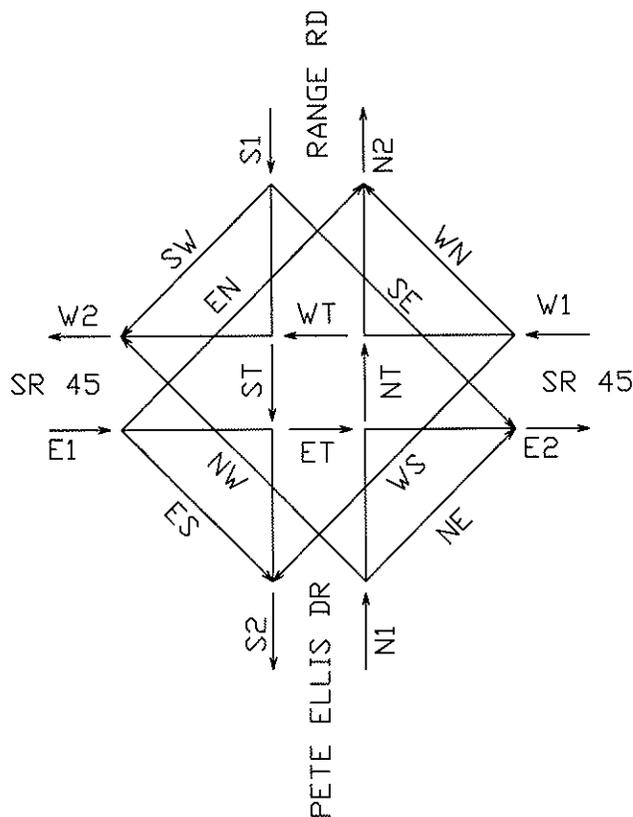
SR 45 at Range Rd (left) / Pete Ellis Dr (right) intersection, looking east

AADT AND AM PEAK TRAFFIC - SR 45 at Pete Ellis Drive

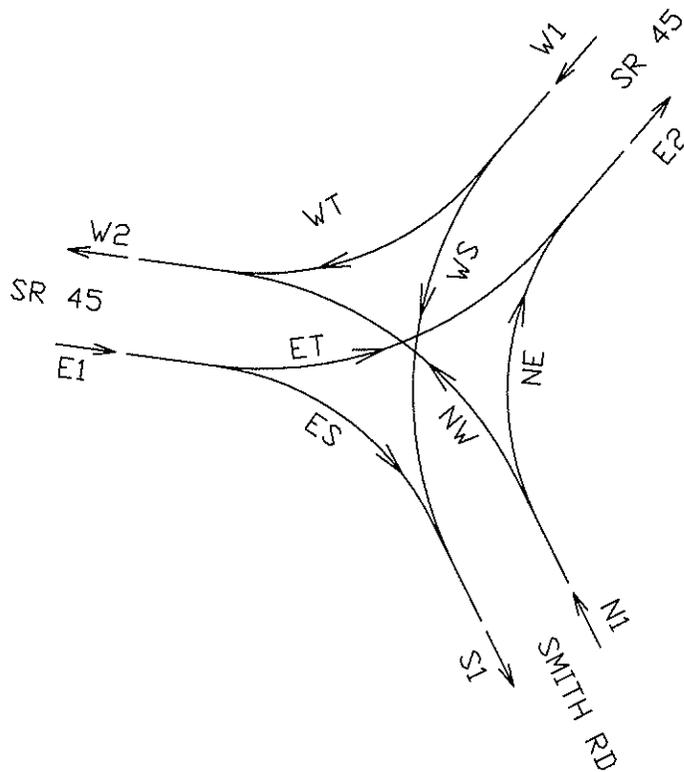
Direction	AADT				AM PEAK HOURLY VOLUME					COMMERCIAL	
	2001*	2009	2019	2029	%DHV	2001	2009	2019	2029	%AADT	%DHV
N1	7980	8800	9840	10880	5	399	440	492	544	6	6
S2	1960	2160	2410	2670	7	137	151	169	187	6	9
S1	1390	1530	1710	1890	8	111	122	137	151	6	10
N2	4290	4730	5290	5850	6	257	284	317	351	6	8
E1	6940	7660	8560	9460	6	416	460	514	568	6	10
W2	8670	9570	10690	11820	6	520	574	641	709	6	6
W1	5390	5950	6650	7350	6	323	357	399	441	6	6
E2	6780	7480	8360	9240	6	407	449	502	554	6	9
NE	1650	1820	2030	2250	5	83	91	102	113	6	5
NW	5160	5690	6360	7030	5	258	285	318	352	6	6
NT	1170	1290	1440	1590	5	59	65	72	80	6	6
SE	40	40	40	50	8	3	3	3	4	5	20
SW	100	110	120	130	8	8	9	10	10	6	10
ST	1250	1380	1540	1700	8	100	110	123	136	6	10
ES	210	230	250	280	7	15	16	18	20	6	10
EN	1640	1810	2020	2230	6	98	109	121	134	6	10
ET	5090	5610	6280	6940	6	305	337	377	416	6	10
WN	1480	1630	1820	2010	6	89	98	109	121	6	6
WS	500	550	610	680	6	30	33	37	41	6	5
WT	3410	3760	4200	4640	6	205	226	252	278	6	6
	* Base Year										



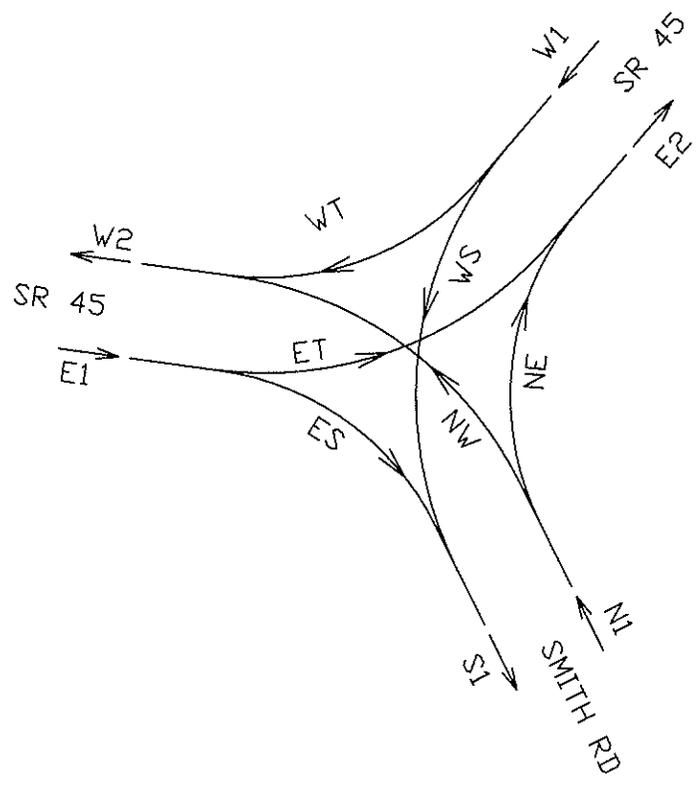
AADT AND PM PEAK TRAFFIC - SR 45 at Pete Ellis Drive											
Direction	AADT				PM PEAK HOURLY VOLUME					Commercial	
	2001*	2009	2019	2029	%DHV	2001	2009	2019	2029	% AADT	%DHV
N1	7980	8800	9840	10880	8	638	704	787	870	6	9
S2	1960	2160	2410	2670	8	157	173	193	214	6	7
S1	1390	1530	1710	1890	8	111	122	137	151	6	7
N2	4290	4730	5290	5850	8	343	378	423	468	6	8
E1	6940	7660	8560	9460	8	555	613	685	757	6	6
W2	8670	9570	10690	11820	8	694	766	855	946	6	9
W1	5390	5950	6650	7350	8	431	476	532	588	6	9
E2	6780	7480	8360	9240	8	542	598	669	739	6	7
NE	1650	1820	2030	2250	8	132	146	162	180	6	8
NW	5160	5690	6360	7030	8	413	455	509	562	6	9
NT	1170	1290	1440	1590	8	94	103	115	127	6	9
SE	40	40	40	50	8	3	3	3	4	5	20
SW	100	110	120	130	8	8	9	10	10	6	10
ST	1250	1380	1540	1700	8	100	110	123	136	6	6
ES	210	230	250	280	7	15	16	18	20	6	5
EN	1640	1810	2020	2230	8	131	145	162	178	6	6
ET	5090	5610	6280	6940	8	407	449	502	555	6	6
WN	1480	1630	1820	2010	9	133	147	164	181	6	8
WS	500	550	610	680	8	40	44	49	54	6	9
WT	3410	3760	4200	4640	8	273	301	336	371	6	9
* Base Year											



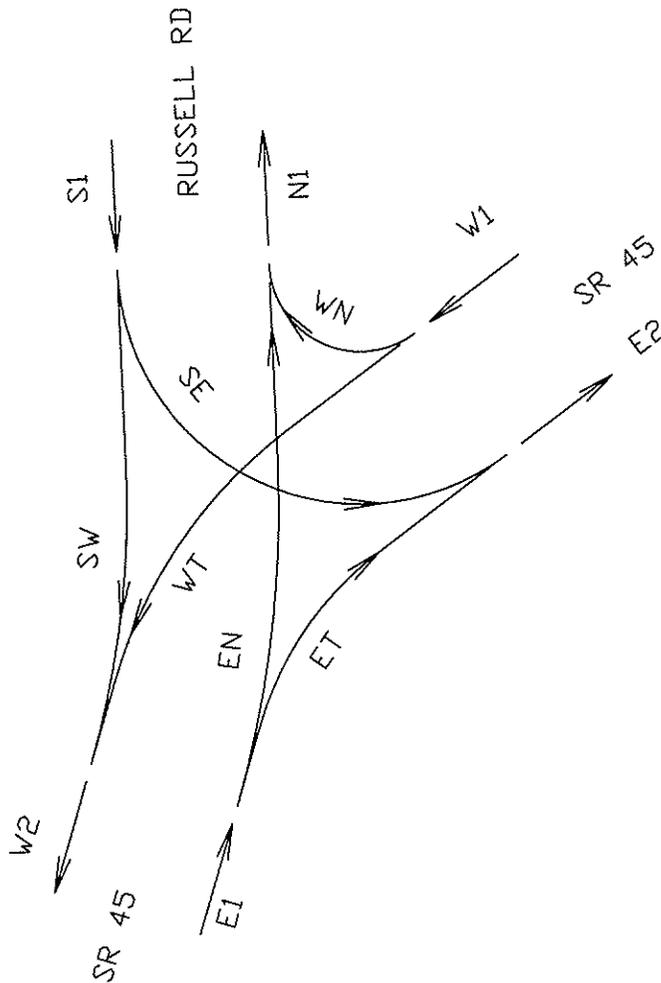
AADT AND AM PEAK TRAFFIC - SR 45 at Smith Road											
Direction	AADT				AM PEAK HOURLY VOLUME					COMMERCIAL	
	2001*	2009	2019	2029	%DHV	2001	2009	2019	2029	%AADT	%DHV
E1	5700	6247	6931	7615	7	399	437	485	533	9	7
W2	4390	4811	5338	5865	7	307	337	374	411	9	10
S1	4700	5151	5715	6279	8	376	412	457	502	9	9
N1	3930	4307	4779	5250	5	197	215	239	263	9	7
E2	5530	6061	6724	7388	6	332	364	403	443	9	7
W1	4990	5469	6068	6667	8	399	438	485	533	9	11
ET	3180	3485	3867	4248	7	223	244	271	297	9	7
ES	2520	2762	3064	3367	7	176	193	215	236	9	7
NW	1580	1732	1921	2111	5	79	87	96	106	9	7
NE	2350	2576	2858	3140	5	118	129	143	157	9	7
WS	2180	2389	2651	2912	8	174	191	212	233	10	11
WT	2810	3080	3417	3754	8	225	246	273	300	9	11
* Base Year											



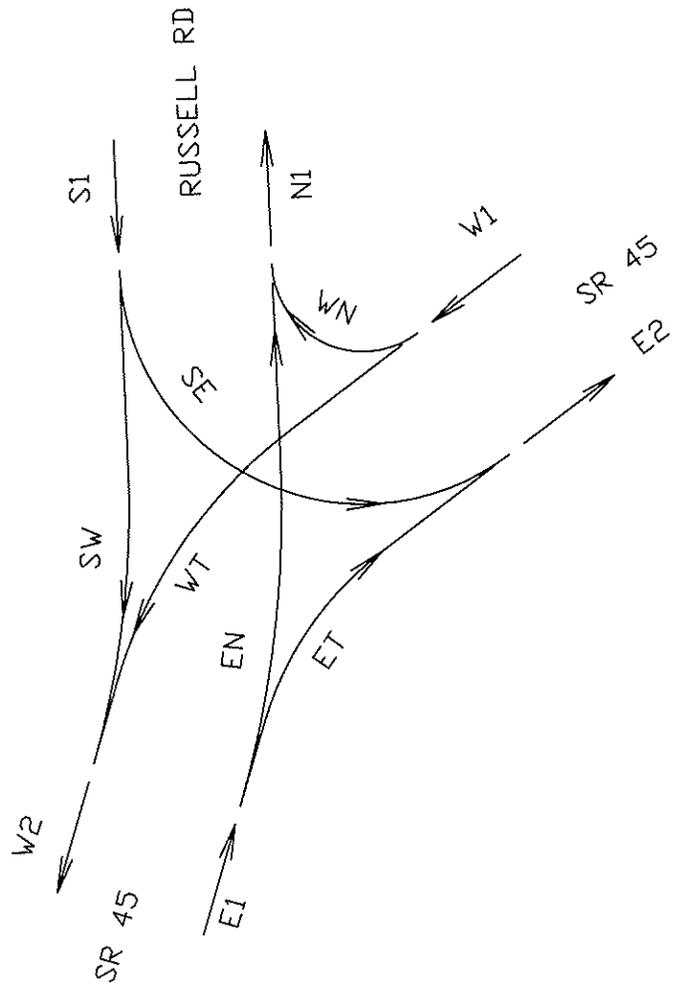
AADT AND PM PEAK TRAFFIC - SR 45 at Smith Road											
Direction	AADT				PM PEAK HOURLY VOLUME				COMMERCIAL		
	2001*	2009	2019	2029	%DHV	2001	2009	2019	2029	%AADT	%DHV
E1	5700	6247	6931	7615	9	513	562	624	685	9	20
W2	4390	4811	5338	5865	9	395	433	480	528	9	10
SI	4700	5151	5715	6279	9	423	464	514	565	9	14
NI	3930	4307	4779	5250	9	354	388	430	473	9	20
E2	5530	6061	6724	7388	9	498	545	605	665	9	20
W1	4990	5469	6068	6667	9	449	492	546	600	9	5
ET	3180	3485	3867	4248	9	286	314	348	382	9	20
ES	2520	2762	3064	3367	9	227	249	276	303	9	20
NW	1580	1732	1921	2111	9	142	156	173	190	9	20
NE	2350	2576	2858	3140	9	212	232	257	283	9	20
WS	2180	2389	2651	2912	9	196	215	239	262	10	7
WT	2810	3080	3417	3754	9	253	277	308	338	9	5
* Base Year											



AADT AND AM PEAK TRAFFIC - SR 45 at Russell Road											
Direction	AADT				AM PEAK HOURLY VOLUME					COMMERCIAL	
	2001*	2009	2019	2029	%DHV	2001	2009	2019	2029	%AADT	%DHV
E1	4520	4880	5330	5780	9	407	439	480	520	9	7
W2	4400	4750	5190	5630	9	396	428	467	507	9	11
W1	3270	3530	3850	4180	7	229	247	270	293	9	11
E2	3220	3470	3790	4120	9	290	312	341	371	9	7
S1	1400	1510	1650	1790	13	182	196	215	233	9	11
N1	1570	1690	1850	2000	8	126	135	148	160	9	8
SW	1290	1390	1520	1650	13	168	181	198	215	9	11
EN	1410	1520	1660	1800	9	127	137	149	162	9	7
ET	3110	3350	3660	3980	9	280	302	329	358	9	7
WN	160	170	180	200	5	8	9	9	10	12	10
WT	3110	3350	3660	3980	7	218	235	256	279	9	11
SE	110	110	120	140	14	15	15	17	20	8	10
* Base Year											



AADT AND PM PEAK TRAFFIC - SR 45 at Russell Road											
Direction	AADT				PM PEAK HOURLY VOLUME				COMMERCIAL		
	2001*	2009	2019	2029	%DHV	2001	2009	2019	2029	%AADT	%DHV
E1	4520	4880	5330	5780	9	407	439	480	520	9	20
W2	4400	4750	5190	5630	10	440	475	519	563	9	5
W1	3270	3530	3850	4180	9	294	318	347	376	9	5
E2	3220	3470	3790	4120	9	290	312	341	371	9	19
S1	1400	1510	1650	1790	11	154	166	182	197	9	5
N1	1570	1690	1850	2000	9	141	152	167	180	9	18
SW	1290	1390	1520	1650	11	142	153	167	182	9	4
EN	1410	1520	1660	1800	9	127	137	149	162	9	20
ET	3110	3350	3660	3980	9	280	302	329	358	9	20
WN	160	170	180	200	11	18	19	20	22	12	5
WT	3110	3350	3660	3980	9	280	302	329	358	9	5
SE	110	110	120	140	14	15	15	17	20	8	5
* Base Year											





**City of Bloomington
Planning Department**

August 29, 2001

Steve Dommer, P.E.
Senior Project Manager
VS Engineering, Inc.
4275 North High School Road
Indianapolis, IN 46254

Dear Mr. Dommer:

I wanted to take this opportunity to thank you for meeting with the City of Bloomington and the Seymour District to discuss future transportation improvements on East SR 45 (East 10th Street). I believe the August 15, 2001 meeting provided the City of Bloomington with the opportunity for input on VS Engineering's study on this road segment. The proposed improvements along SR 45 from Pete Ellis Drive to Russell Road could greatly improve traffic movements and the safety of bicyclists and pedestrians.

I would also like to point out some of the points that were discussed at this meeting concerning the possible improvements and INDOT's timetable for these improvements.

- At this time the City anticipates that widening will be limited to a three lane cross section for East 10th Street from Pete Ellis to Russell Road (west end).
- A minor curve correction between Grandview Drive and the Smith Road intersection.
- Closure of the western drive cut at the Fountain Park apartment complex.
- The installation of a paved bus pull-off east of Pete Ellis across the street from the Fountain Park apartment complex.
- The addition of a 8 foot sidepath on the north side of 10th Street from Pete Ellis to Russell Road.
- The inclusion of 14-16 foot medians when needed along 10th Street from Pete Ellis to Russell Road.
- The inclusion of a grassplot between the roadway and the sidepaths/sidewalks.
- Review the possibility of removing the overhead utility lines and placing them underground.
- VS Engineering will check with INDOT concerning the planned traffic improvements on 10th Street from the SR 45/46 bypass to Pete Ellis to ensure a smooth transition between the projects.

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The projected INDOT ready for letting schedule for improvements on 10th Street from the SR 45/46 bypass to Pete Ellis is in the year 2003. The projected ready for letting date for the 10th Street improvements from Pete Ellis to Russell Road is March 2006.

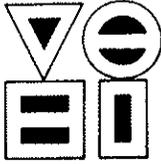
If you have any questions concerning this project, please let me know.

Sincerely,



Frank Nierzwicki
Manager
Long Range Planning and Transportation

CC: Tom Micuda, Director
Jim Ude, INDOT Seymour District Engineer
file



VS ENGINEERING, INC.

4275 North High School Road, Indianapolis, Indiana 46254
Phone: (317) 293-3542
FAX (317) 293-4737

MEMORANDUM

To: Brad L. Steckler, Manager
INDOT Engineering Assessment Section

Thru: Sanjay B. Patel
Project Manager
VS Engineering, Inc.

From: Steve Dommer, P.E.
Project Engineer
VS Engineering, Inc.

Subject: Des. No. 9902910
Project No. NH-X465 ()
Work Type: Added Travel Lanes
Route: S.R. 45
County: Monroe
Town: Bloomington

Date: April 9, 2001

This memorandum is a summary of the findings and recommendations made at the field investigation held at the project site at 9:00 a.m., April 4, 2001. The purpose of the field investigation was to review the existing conditions and determine the general scope of work desired for incorporation into the engineering assessment report. In attendance were the following personnel:

Jim Ude	INDOT Seymour District Development Engineer
Steve Dommer	VS Engineering, Inc.
Tony Mendez	VS Engineering, Inc.

Mr. James Juricic and Ms. Mary Jo Hamman were invited but unable to attend. A copy of this memorandum will be sent to them for reference and review comments.

1. This project is located on S.R. 45 from Pete Ellis Drive to Russell Road on the east side of Bloomington. The Pete Ellis/S.R. 45 intersection is four legged and signalized with Range Road making up the north leg. Russell Road T's into S.R. 45 from the north. This project is scoped for added turn lanes. Along the north side of S.R. 45 are the Fountain Park Apartments, the Barrington Place Apartments, and the Tamarron housing subdivision. University Elementary School is located northwest of the intersection of

S.R. 45 and Russell Road. Along the south side of S.R. 45 are the Woodridge Apartments, the Bell Trace Apartments, the Bloomington Post Office, and residential housing. These apartment complexes serve Indiana University students and staff.

2. This section of S.R. 45 is characterized by a series of horizontal and vertical curves. S.R. 45 generally consists of two 12 foot lanes (asphalt, good condition) with 2 foot stone shoulders. Posted speed limit is 40 mph. There are overhead utility along both sides of S.R. 45. There are underground utilities including telephone, gas, water, and sewers (storm and sanitary) throughout the project limits. Right turning lanes have been constructed at Smith Road, Range Road, Tamarron housing subdivision, and at all drives to the apartment complexes. Curb has been constructed at several of these right turn lanes/driveways. There is guardrail along both sides of S.R. 45 west of Smith Road. Drainage is by both storm sewers and open ditches. West of Smith Road are twin 4 feet by 8 feet box culverts under S.R. 45. Mr. Ude said these structures were installed a few years ago as part of an improvement project which included the Smith Road intersection.
3. Improvements discussed included construction of a two-way left turn lane, passing blisters, and exclusive left and right turn lanes. Also discussed was reconstruction of S.R. 45 on new horizontal and vertical alignments.
4. Mr. Ude said that there is another project (Des. No. 8824615) planned for S.R. 45, immediately east of this project, extending from S.R. 46 to Pete Ellis Drive.

If any of the recipients of these minutes have questions, additions or revisions, please contact the writer.

cc: All present
Mr. James Juricic
Ms. Mary Jo Hamman