



**MEMORANDUM**  
**Missouri Department of Transportation**

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**DATE:** April 20, 2018

**TO:** Thomas Blair, P.E.  
District Engineer

**FROM:** Thomas Montes-De-Oca, P.E.  
Project Manager

**SUBJECT:** District SL - Design  
Route P, St. Louis County  
Pavement Rehabilitation and Sidewalk Improvements  
Job No. J6S3273  
Conceptual Study Report

**REMARKS**

☐ Major Route

☒ Minor Route

**DESIGN TRAFFIC**

ADT (2016) = **15004**  
ADT (2019) = **15230**  
ADT (2039) = **16828**  
% Trucks = **5%**  
Operational (Posted) Speed = **40 MPH**

**CONCEPTUAL COST <sup>(1)</sup>**

**Construction:** \$5,371,641.41  
**PE:** \$483,447.73  
**CE:** \$376,014.90  
**Right of Way:** \$240,751.35  
**Utilities:** \$50,000.00

**Project Total: \$6,524,855.39**

<sup>(1)</sup>Assumptions made preparing the engineer's opinion of probable cost:

- Used SET form quantities for pavement repair
- Used SET form for pavement selection
- Replaced all curb and gutter within project limits
- Replaced all raised asphalt shoulder not being removed for sidewalk (assumed A3 Shoulder)
- Added all new ped heads, push buttons, posts, signs etc at each crossing (including conduit, cable and pull boxes back to the cabinet)
- Full signal replacement at MO 366 & Route P
- Assumed 8-inch Concrete Sidewalk on bus stop pads and other locations that might occasionally receive vehicular traffic (near driveways)
- Assumed cost for right-of-way was \$20/SF and \$5/SF for temporary construction easement.

### EXISTING FACILITIES

Beginning Log Mile	Pavement		Year Built	Roadbed Width	Min. R/W Width	Access Control
	Width	Type				
0.000-1.991	48'	9' Reinforced Concrete under Asphalt Overlay	1960	68'	90'	No
1.991-2.144	60'	9' Reinforced Concrete under Asphalt Overlay	1960	76'	80'	No

### PROPOSED DESIGN CRITERIA

Functional Classification	Design Speed	No. & Width Of Lanes	Roadbed Width	Right of Way	
				Width	Control
Minor Arterial	40	4-5 Lanes – 12'	68-76'	80-90'	Normal

### PROPOSED DESIGN

This project consists of coldmilling and resurfacing all lanes of Route P (Mackenzie Road) from the north edge line of MO 30 (Gravois Road) to the south edge of MO 366 (Watson Road). The project will also replace or add concrete sidewalk to both sides of Route P within the same project limits. The only exception is on the west side of Route P adjacent to Resurrection Cemetery. No sidewalks will be added in this area, unless to provide access to a Metro bus stop.

In some locations, the existing 7-ft wide raised asphalt shoulder will be removed to provide a 6-ft sidewalk adjacent to the new curb and gutter, especially in areas where parking is prohibited or low parking demands. In locations where there is a high demand for street parking, sufficient right-of-way, and reasonable grades, the raised asphalt shoulder is being replaced (due to condition) and a proposed 5-ft sidewalk is being offset from the raised shoulder. There are sections on Route P, such as from Gramond to Heege, whose residents regularly park on the raised shoulder, but the proposed design still removes the raised shoulder and replaces it with sidewalk. For these sections, an offset sidewalk does not appear to be feasible due to existing grades and/or right-of-way. However, these areas will need further analysis and survey to rule out feasibility. For all the locations where sidewalk replaces the raised shoulder, the team should consider pursuing parking restrictions to discourage motorists from either parking on the new sidewalk or blocking the right lane of Route P.

Approximately three to four Metro bus stops, as shown on the attached plans, are proposed to be slightly relocated to provide better accessibility. These are only suggestions and will need to be fully coordinated with Metro before final design.

The project also includes full signal replacement and accessibility improvements for pedestrians for the intersection of MO 366 and Route P. Future studies are planned for this intersection. However, the conceptual estimate assumes that all configurations/layout remain substantially the same, and it is a simple replacement of existing conditions.

All curb and gutter along Route P will be removed and replaced with either a vertical (where the proposed sidewalk is adjacent to curb) or mountable curb (where parking is allowed and there is a raised asphalt shoulder).

### RIGHT OF WAY

Additional right-of-way (6,862 SF) and temporary construction easement (20,702 SF) will be necessary to construct the sidewalk along Route P from a total of sixty-nine (69) parcels. Where new right-of-way is being purchased, it will include the full width of the new sidewalk plus an additional one foot outside the edge of sidewalk. It should also be noted that part or all of the existing raised shoulder, existing curb ramps, existing signals, part of the existing roadway is currently outside of right-of-way on the east side of Route P from Gramond Drive to Heege Road. In this area, it is necessary to acquire right-of-way whether or not sidewalk is added. Thirteen (13) residential parcels will need both new R/W and temporary construction easement. Another five (5) residential and two (2) commercial parcels will require only new R/W. Another forty-two (42) residential and seven (7) commercial parcels will require only temporary construction easement.

### ACCIDENT DATA AND SAFETY ENHANCEMENTS

Project Accident Rate – 719.44

A summary of accident data is attached.

Statewide rate for a similar class of roadway - 525.37

Locations within or adjacent to the project limits which are on the “High Severity Location Lists” in the TMS database – N/A

### POSSIBLE DESIGN EXCEPTIONS

#### **Vertical Alignment**

The sag curve located between station 37+41 and station 40+41 does **not** meet the AASHTO Green Book (6<sup>th</sup> Edition) design control for sag vertical curves (Table 3-36) which uses headlight sight distance as the controlling factor. For a K value of 64 and the approach grades, the required length of curve would be 826 feet. The scope of this project will only coldmill and resurface the roadway of Route P. Therefore, no improvements to this vertical curve will be added to this project.

## **Lateral Offset to Obstruction**

### Existing/Proposed Retaining Wall

There is an existing 2-3' retaining wall on the east side of Route P adjacent to Our Redeemer Cemetery. The wall terminates at a private driveway. Near the end of the wall, there are also a signal post on a concrete base and a utility pole. This project will widen the sidewalk to 6-ft. This will require an approximately 3-4ft wall. The signal post and possibly the utility pole will need to be relocated.



According to AASHTO Roadside Design Guide Table 3-1, the suggested clear zone width is 16-18ft from edge of travel way. However, chapter 10 of the Roadside Design Guide also states these guidelines are "...for rural highways, Interstates, and freeways where speed are generally higher—approaching or exceeding 50 mph – and vehicles operating under free-flow conditions." It goes on to state, "for arterials and non-controlled access facilities in an urban environment ...establishing a clear zone using the guidance from Chapter 3 is not practical." It suggests that a 4 to 6-ft lateral offset to obstructions is a more appropriate guide for urban environments.



However, considering the probably higher speeds and free-operating condition of evening and over-night hours, the exposed end of the retaining wall should be protected if at all feasible. Because of the limited space, the recommendation would be to construct a sloped concrete end treatment (barrier height transition) and steepen the back slope behind the wall to the limits of existing right-of-way, if possible. Survey and further engineering will be necessary to determine if this is feasible. It should be noted that AASHTO's Roadside Design Guide allow this treatment for speeds of 40 mph or less, while MoDOT Standard Plans states that "height transitions shall not be used in locations here the posted speed is greater than 35MPH."

### Utility Poles

Wooden utility poles, occurring every 175-200', are present along Route P. All appear to be within 16' of the travel way. However, like above, the Roadside Design Guide suggests that a 4 to 6-ft lateral offset to obstructions is a more appropriate guide for urban environments. The scope of the project does NOT include moving the poles, unless required by ADA.

### Minimum Turning Radii – MO 30 (Gravois) and RT P

Using Autoturn, a WB-67 design vehicle was run for the following movements:

- (1) Westbound Gravois to Northbound Route P, and
- (2) Southbound Route P to Westbound Gravois



For movement #1, the WB-67 truck **was not** able to make this movement even with occupying both shared thru/right turn, left thru, and left turn lane. However, it would require relocating signals, curb ramp, utilities and buying right-of-way (which could potentially mean business buy-out) to provide accommodation for a WB-67.

For movement #2, the WB-67 truck **can** make this movement. However, it requires the truck to occupy its shared thru/right turn lane, all of the left thru lane and part of the left turn lane.

See **Exhibit A** (1 of 4) for more details.

#### Minimum Turning Radii – MO 366 (Watson) and RT P

Using Autoturn, a WB-67 design vehicle was run for the following movements:

- (1) Westbound Watson to Northbound “Shopping center”
- (2) Northbound Route P to Westbound Watson
- (3) Eastbound Watson to Southbound Route P
- (4) Southbound Shopping center to Eastbound Watson
- (5) Eastbound Watson to Northbound Shopping center
- (6) Northbound Route P to Eastbound Watson
- (7) Southbound Shopping center to Westbound Watson
- (8) Westbound Watson to Southbound Route P

For all movements, the WB-67 truck **can** make this movement with occupying its turn lane and/or partially occupying an adjacent lane. However, movements 4, 6, and 8 have dual turn lanes and **do not** allow two WB-67 trucks to simultaneously make these movements.

See **Exhibit A** for more details. As stated above, future studies are planned for this intersection. Those studies should consider, if dual turn lanes are required, whether or not simultaneous truck movement should to be included in the scope of the final design.

### UTILITIES

#### **Gas**

Spire has several 2”, 6”, and 20” gas lines that run underneath areas of proposed resurfacing, sidewalk additions, and within construction limits. In addition, several gas valves are located within areas of proposed resurfacing, sidewalk, curb ramps, and raised shoulders that may need adjusting.

#### **Electric**

Several wooden power poles along sidewalks and at intersections will have to be relocated in order to meet ADA requirements (approximately 18). In addition, the signal at MO 366 and Route P will be completely removed and replaced. Coordination with Ameren will need to take place to construct a new power supply.

### **Water**

For the majority of the project, an 8" water main runs along the west side of Route P, which could potentially interfere with some of the sidewalk addition and resurfacing along this side. From Rhodes Ave to Watson Rd, the main moves into the center of the street which shouldn't cause any conflict with construction. Water valves may need to be adjusted within areas of proposed resurfacing, sidewalk, curb ramps, and raised shoulder construction.

### **Sewer**

There are many sewer lines running down Route P and crossing over into adjacent streets. However, these lines are all located in the center or side of the roadway and not underneath the sidewalk and are unlikely to cause issues during construction of the sidewalk. Manhole lids may need to be adjusted during resurfacing.

### **Storm**

There are numerous storm pipes and curb inlets in the limits of this project. Many of the inlets and manholes that lie within areas of construction will need to be adjusted to grade or have their frame/grate replaced. An MSD permit will be necessary for this project. Pre and Post Impervious areas were compared. At this stage, there is a net reduction of impervious area by approximately 1,058 square yards. Because of this reduction, no detention requirements from MSD are anticipated.

## **ENVIRONMENTAL SUMMARY**

### **Historic Preservation and Cultural Resources**

The following is a list of cultural or historical sites/buildings that are adjacent to the project:

- Cemeteries
  - Our Redeemer Cemetery
  - Resurrection Cemetery
  - Lakewood Park Cemetery
- Affton High School's Building – National Register of Historic Places

No known impacts are anticipated for these resources. All construction work will be contained within existing right-of-way.

### **Community Impact Assessment**

While new right-of-way and temporary construction easements will be required to make the new sidewalks ADA-compliant, no displacements of residents or businesses will be required as a part of this project.

### **Threatened and Endangers Species**

There are a few trees that may need to be removed to build the new sidewalks along Route P. These will need to be assessed to determine if they are providing a habitat for known T&E species in this area, or the project will need to place a time restriction on when these trees can be removed.

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No known impacts will affect the following areas due to the proposed project:

- Wetland and Streams
- Hazardous and Solid Waste
- Floodplain Management
- Section 4(f) Public Land
- Farmland Conversion
- Air Quality
- Noise

Attachments:

**Exhibit A – AutoTurn**

**Exhibit B – Right-of-Way Estimate**

**Conceptual Plans**

**Conceptual Estimate**

Approved by:



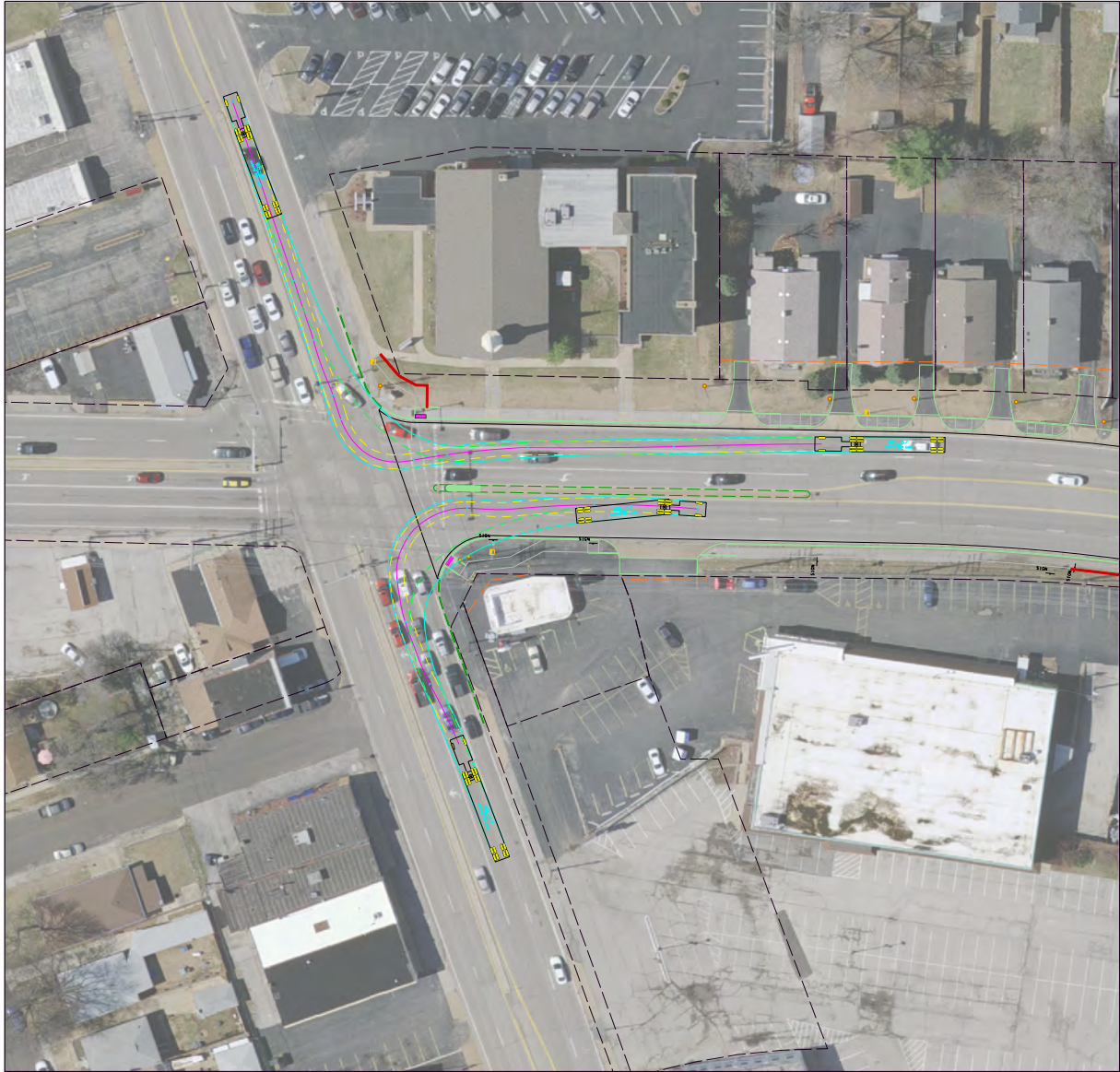
Thomas Blair, P.E.

District Engineer

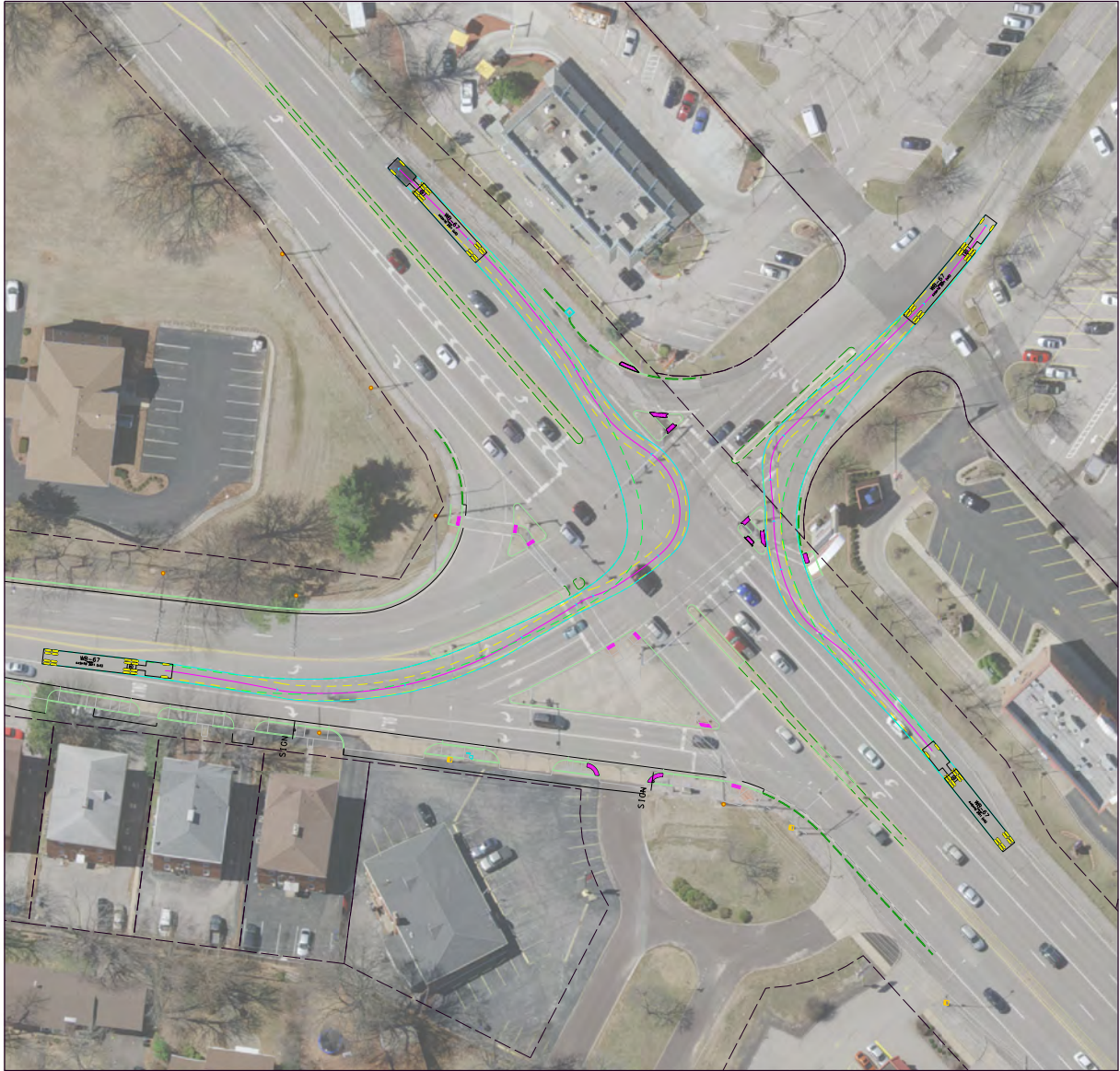
May 8, 2018

cc: Design Division  
Construction and Materials Division  
Traffic Division  
Margaret Bruns, P.E. (EFK Moen)





WESTBOUND GRAVOIS RD TO NORTHBOUND ROUTE P &  
SOUTHBOUND ROUTE P TO WESTBOUND GRAVOIS RD



WESTBOUND WATSON RD TO NORTHBOUND ROUTE P &  
NORTHBOUND ROUTE P TO WESTBOUND WATSON RD

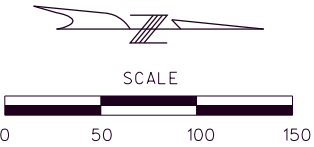


EXHIBIT A  
AUTOTURN  
ROUTE P (MACKENZIE RD)  
SHEET 1 OF 4

EFFK•Moen, LLC


Civil Engineering Design

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Missouri Certificate of Authority: 001578

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION



105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

DATE	DESCRIPTION

PROJECT NO.

BRIDGE NO.

ROUTE RT: P

DISTRICT SL

STATE MO

SHEET NO. 1

DATE PREPARED 2/27/2018

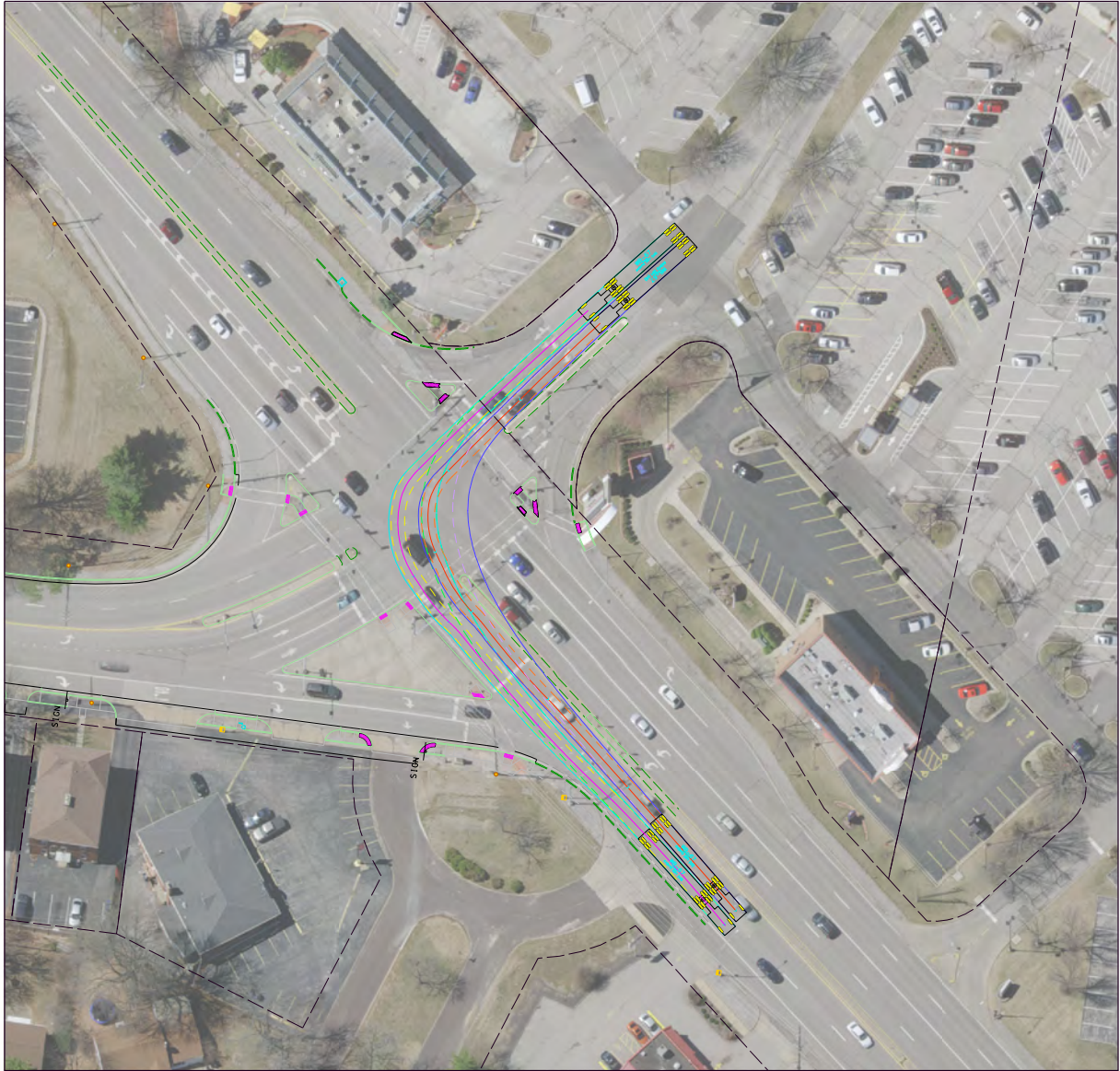
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EASTBOUND WATSON RD TO SOUTHBOUND ROUTE P &  
SOUTHBOUND ROUTE P TO EASTBOUND WATSON RD



DUAL TURN SOUTHBOUND P TO EASTBOUND WATSON RD

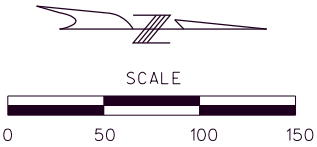


EXHIBIT A  
AUTOTURN  
ROUTE P (MACKENZIE RD)  
SHEET 2 OF 4

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PROJECT NO.

BRIDGE NO.

ROUTE	STATE
RT: P	MO
DISTRICT	SHEET NO.
SL	2

COUNTY

ST. LOUIS

JOB NO.

J6S3273

CONTRACT ID.

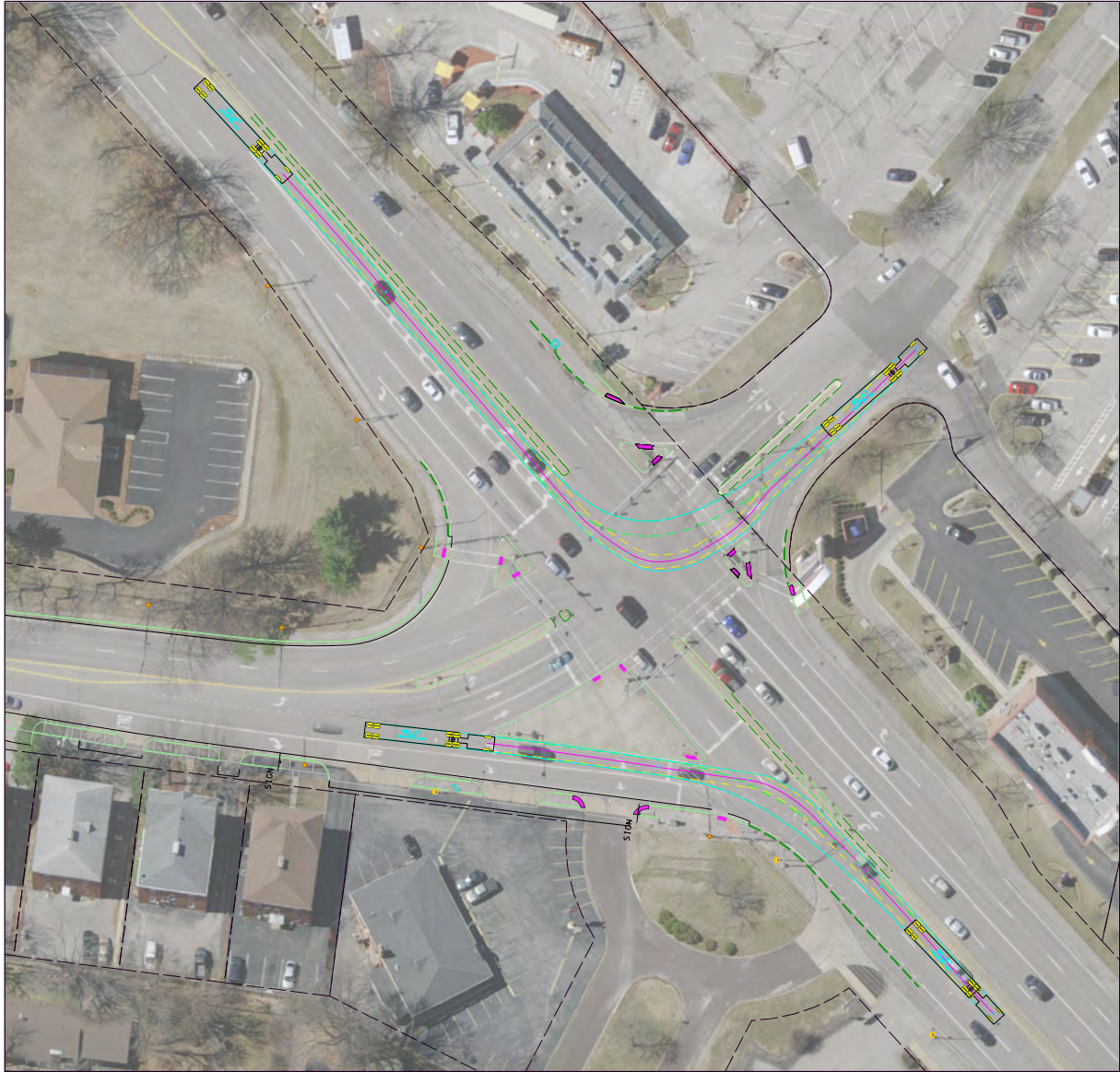
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2/27/2018

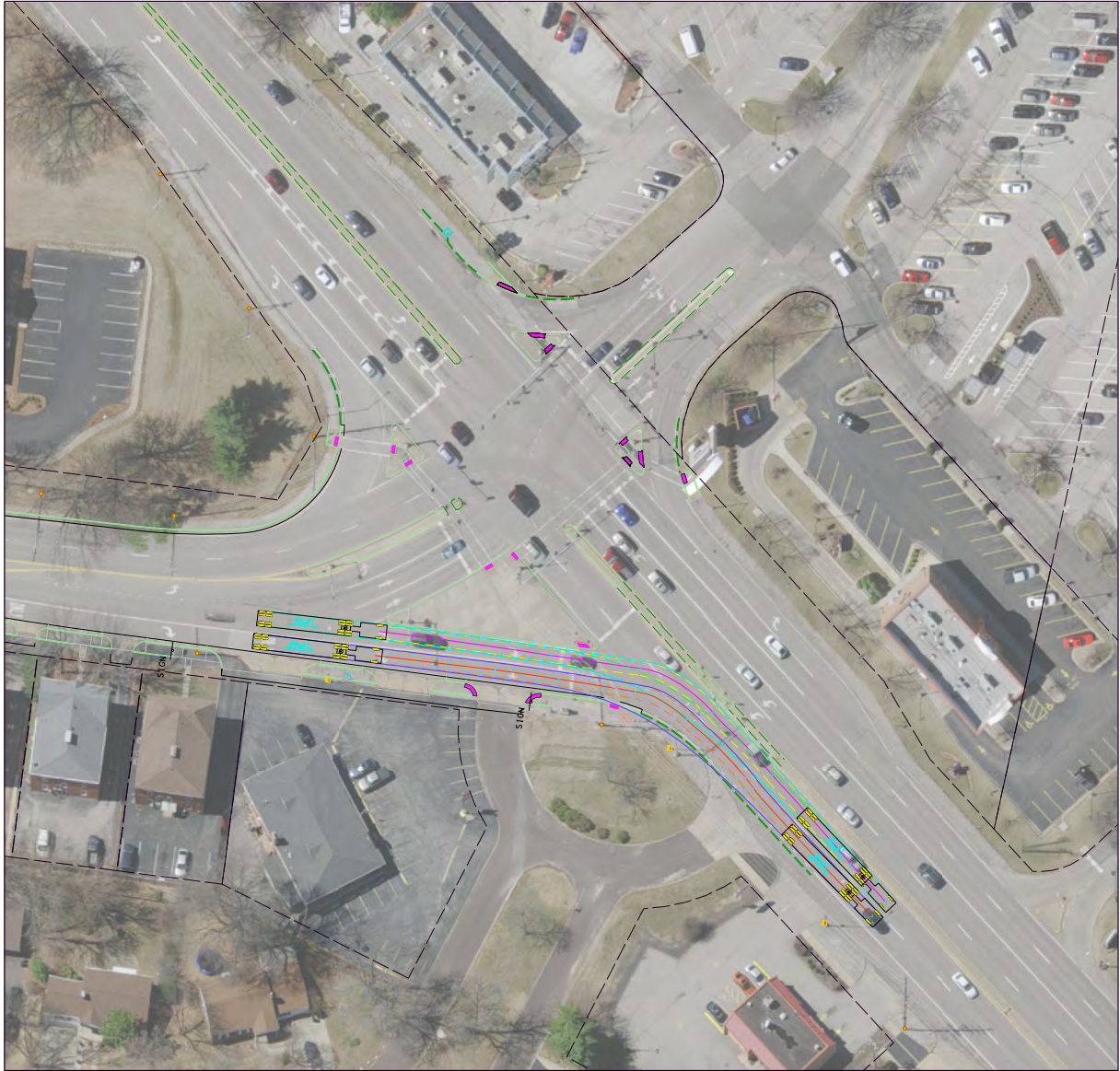
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EASTBOUND WATSON RD TO NORTHBOUND ROUTE P &  
NORTHBOUND ROUTE P TO EASTBOUND WATSON RD



DUAL TURN NORTHBOUND P TO EASTBOUND WATSON RD

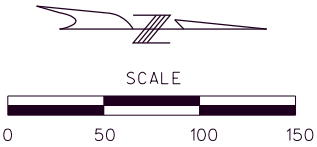


EXHIBIT A  
AUTOTURN  
ROUTE P (MACKENZIE RD)  
SHEET 3 OF 4

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J6S3273

COUNTY  
ST. LOUIS

DISTRICT  
SL

ROUTE  
RT P

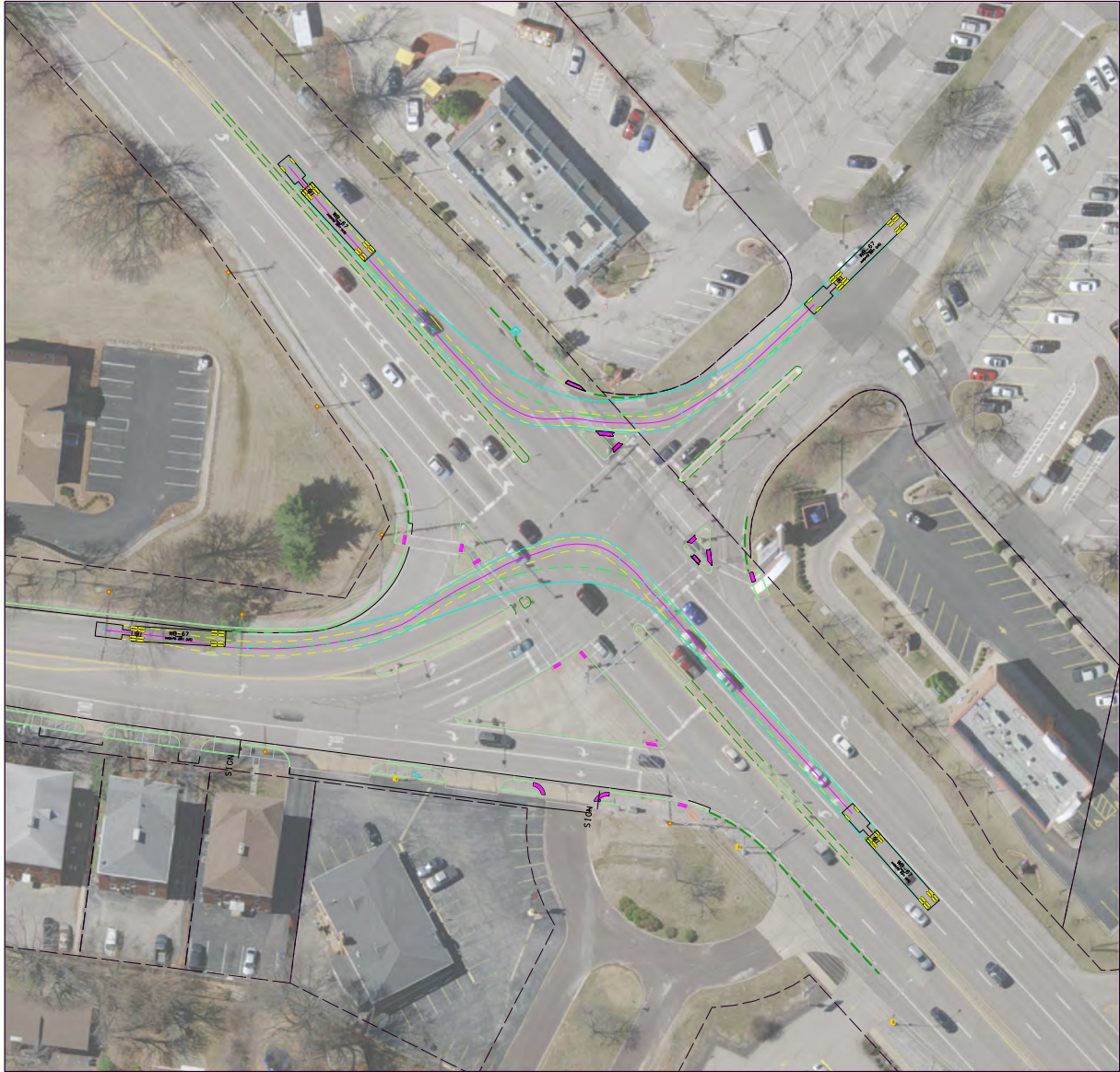
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WESTBOUND WATSON RD TO SOUTHBOUND ROUTE P &  
SOUTHBOUND ROUTE P TO WESTBOUND WATSON RD



DUAL TURN WESTBOUND WATSON RD TO SOUTHBOUND P

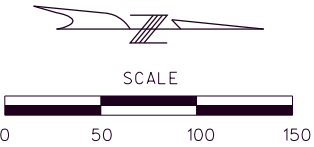


EXHIBIT A  
AUTOTURN  
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SHEET 4 OF 4

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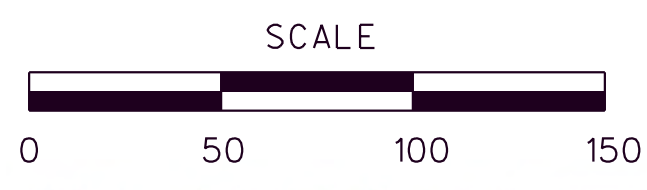
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- 3 WOELFERT ELAINE M TRUSTEE
- 4 OTEENLIPS BERNARD J & PATRICIA A H/W
- 5 MCCARTY DENNIS & LEANN H/W

- 11 BAXTER CARLOS LEE & PATRICIA ALIENE

- 12 KOLLINGER FRANK P III & MARTHA A H/W
- 13 DOLIC MIRSAID & SARAJLIJA SENANODA T/E
- 14 BACKHAUS HARRIET A

- 15 BEST INVESTMENT ENTERPRISES LLC
- 16 MCCORMICK WILLIAM M JR & JACQUELYN H/W
- 17 WATSON LAURA & TODD H/H

- 18 MCINTOSH MICHAEL J ROBERTA J H/W
- 19 GILL DAVID W & SHARON LOU H/W
- 24 FENWICK MARTHA JEAN

- 26 STOECKLEIN PAUL ET AL J/T
- 28 LAHNE MICHAEL L JOYCE M H/W
- 30 MACKENZIE PLACE LIHTC LP

LEGEND

- TEMPORARY CONSTRUCTION EASEMENT (TCE)
- NEW ROW
- EXISTING ROW
- PAVEMENT REMOVAL
- RESURFACING
- SIDEWALK
- A3 RAISED SHOULDER
- RAISED CONCRETE MEDIAN
- ASPHALT DRIVEWAY
- APPROACH PAVEMENT
- WALL
- BUS STOP
- EXISTING POWER POLE

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4/20/2018

ROUTE RT P STATE MO  
DISTRICT SL SHEET NO. 1

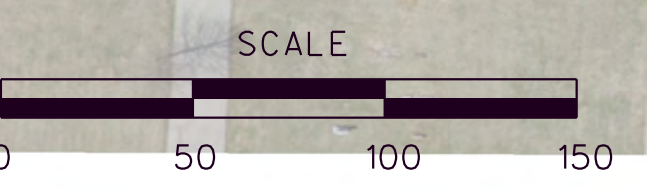
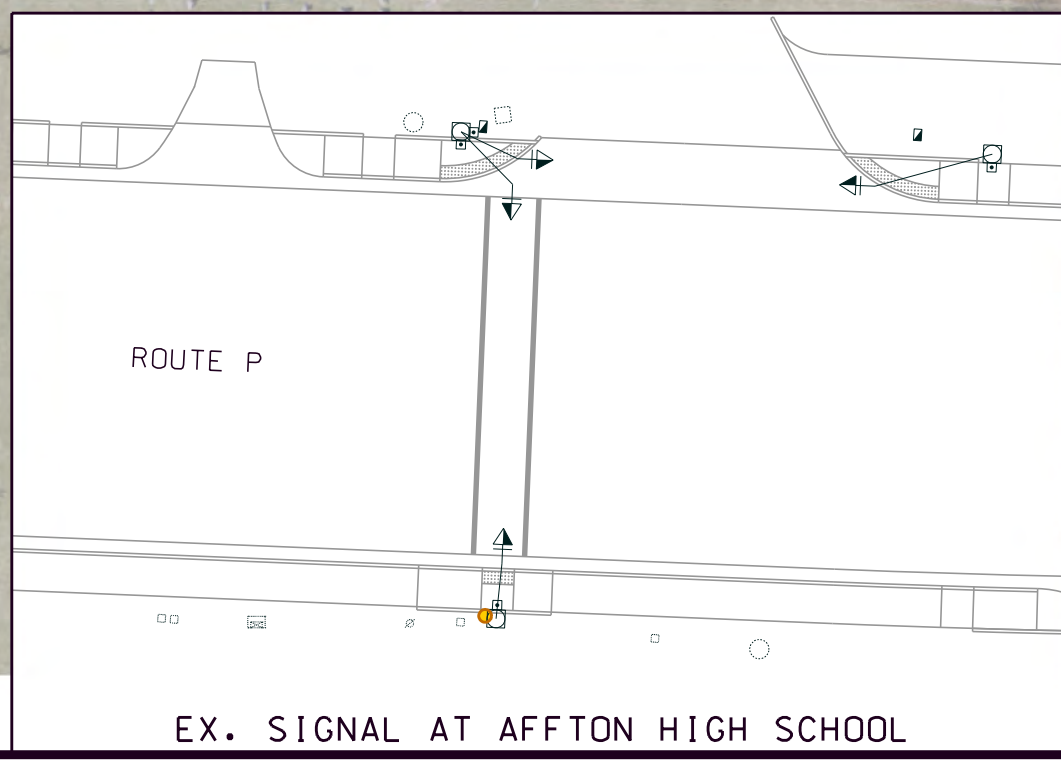
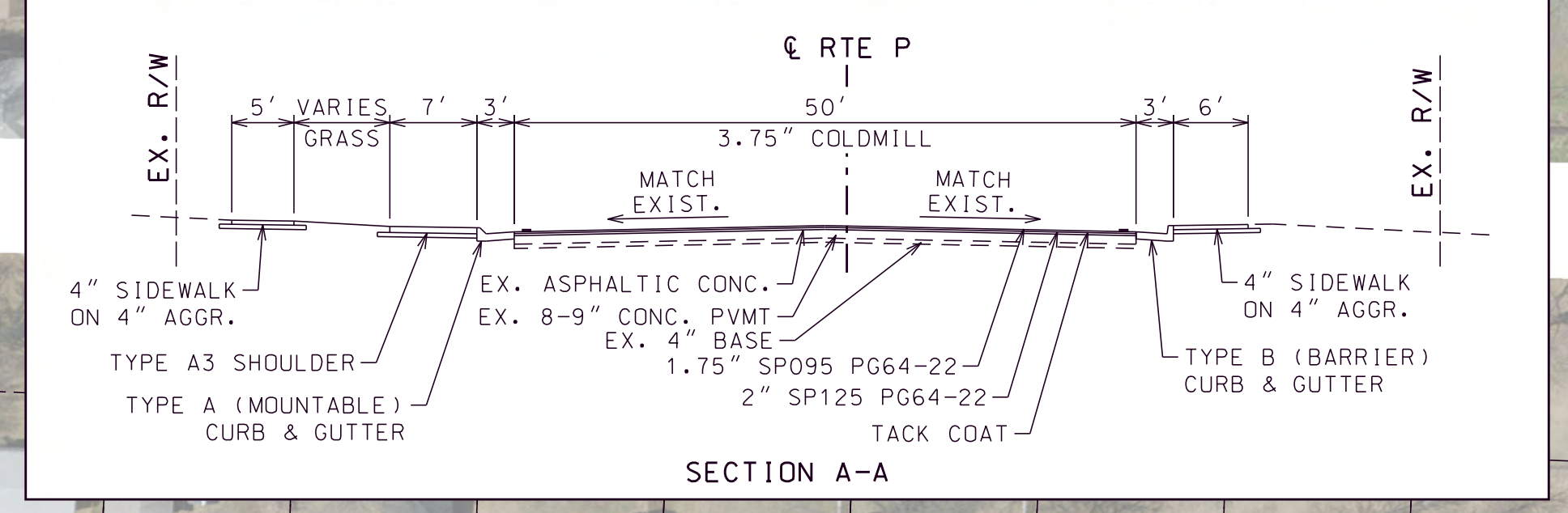
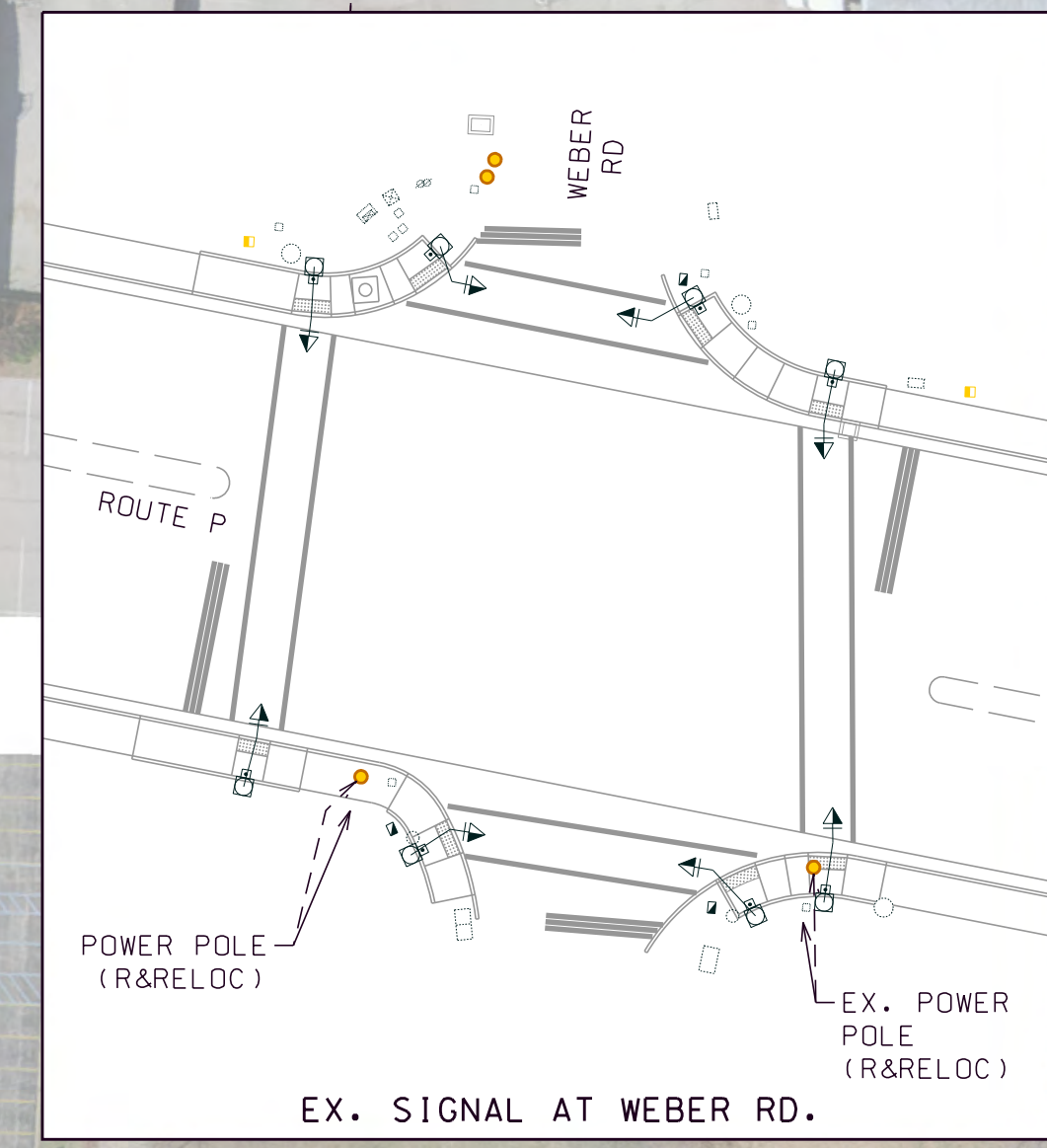
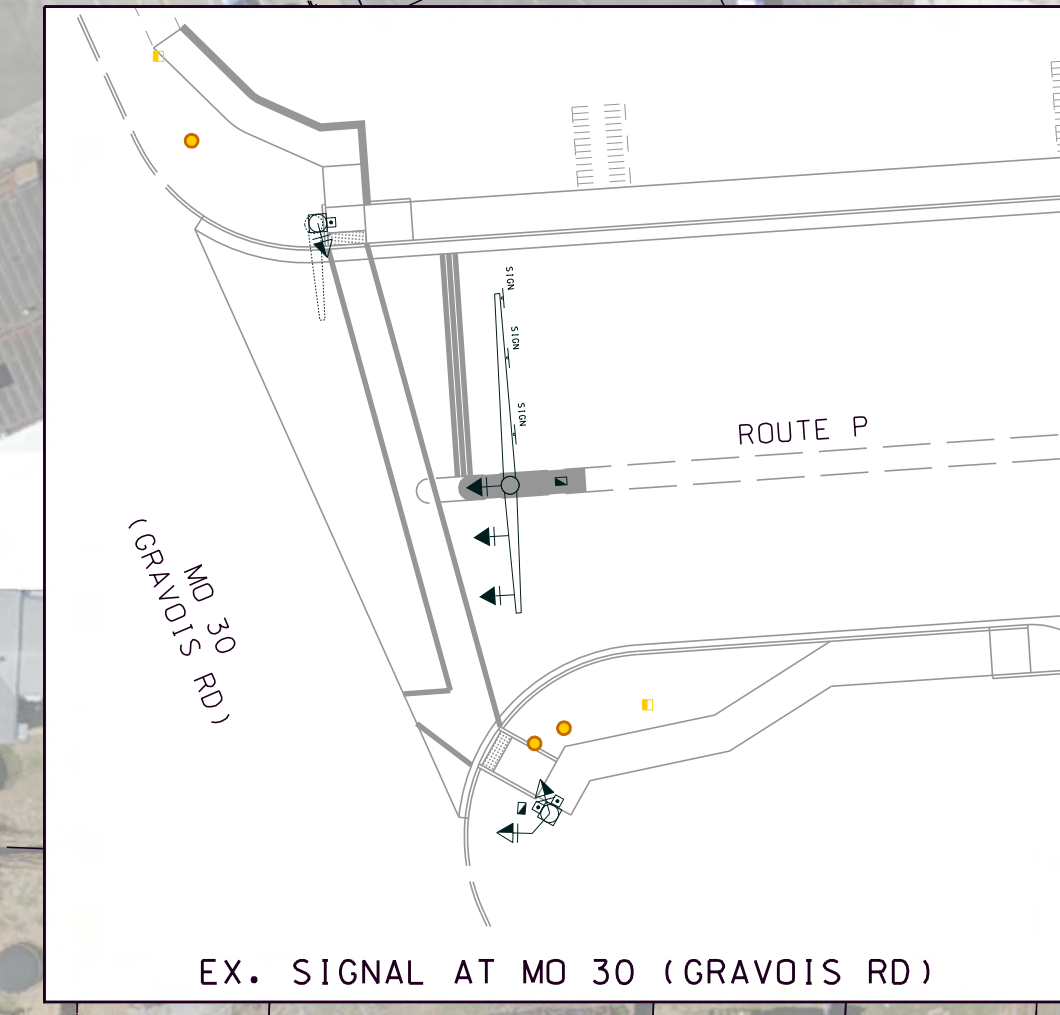
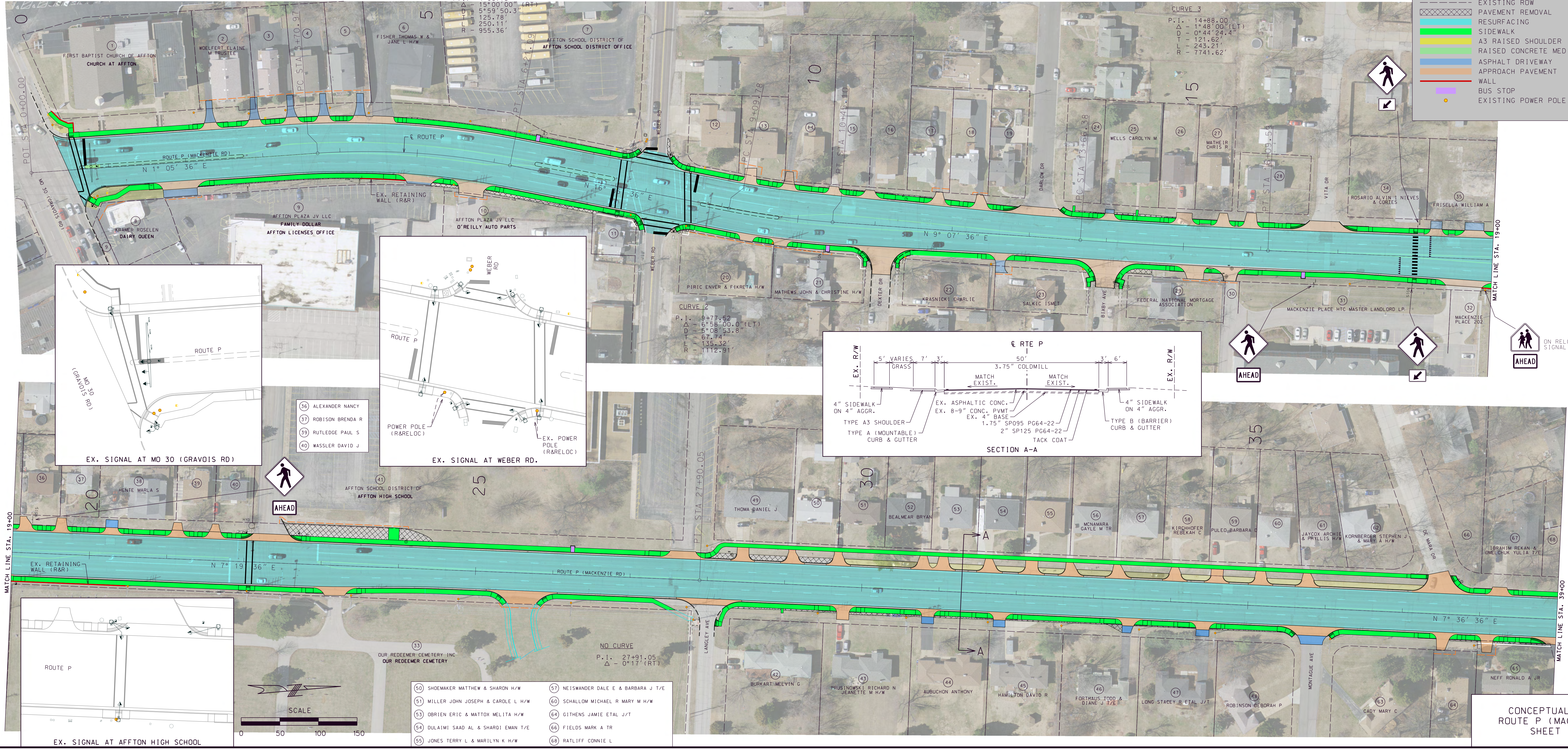
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- 50 SHOEMAKER MATTHEW & SHARON H/W
- 51 MILLER JOHN JOSEPH & CAROLE L H/W
- 53 OBRIEN ERIC & MATTOX MELITA H/W
- 54 DULAIMI SAAD AL & SHARAI EMAN T/E
- 55 JONES TERRY L & MARILYN K H/W
- 57 NEISWANDER DALE E & BARBARA J T/E
- 60 SCHALLON MICHAEL R MARY M H/W
- 64 GITHENS JAMIE ETAL J/T
- 66 FIELDS MARK A TR
- 68 RATLIFF CONNIE L

CONCEPTUAL STRIPMAP  
ROUTE P (MACKENZIE RD)  
SHEET 1 OF 3

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

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JEFFERSON CITY, MO 65102

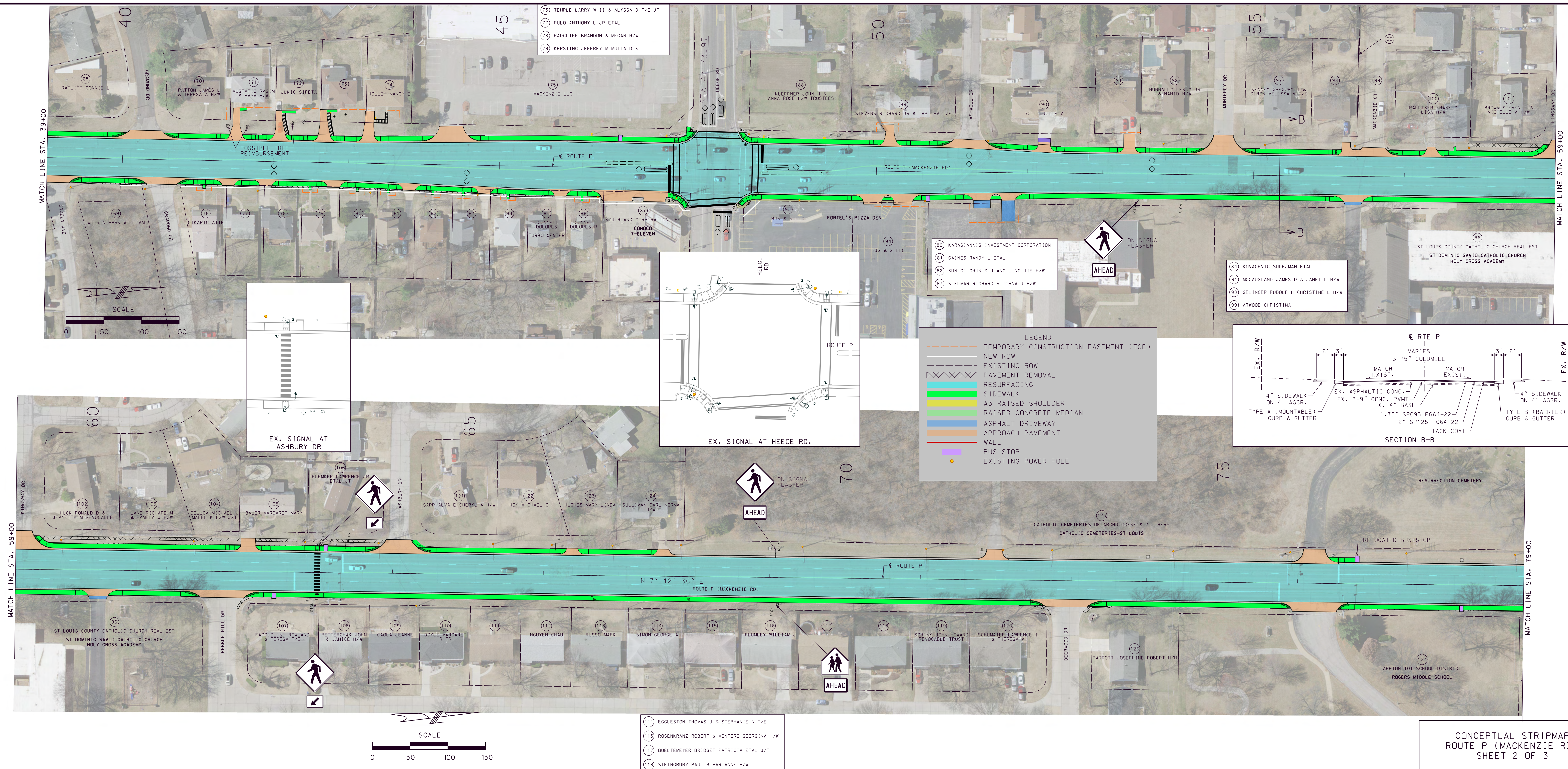
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DISTRICT SL	SHEET NO 2

COUNTY  
ST. LOUIS

JOB NO.  
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MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION



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JEFFERSON CITY, MO 65102

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EFK•Moen, LLC

## Civil Engineering Design

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Missouri Certificate of Authority: 001578

CONCEPTUAL STRIPMAP  
ROUTE P (MACKENZIE RD)  
SHEET 2 OF 3



