Warsaw, Missouri

Commercial Street Improvements
Hilltop Drive to Randall Avenue
Preliminary Engineering Report

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Table of Contents

Heading	Page Number
Introduction	**1**
Executive Summary	**2**
Existing Conditions	**6**
General	6
Traffic	7
Roadway Sections	7
Sidewalks	8
Storm Water	8
Driveways/Entrances	8
Parking	9
Utilities	9
Bike Lanes	9
Street Lighting	10
Retaining Walls	10
Cultural Significance	10
Design Challenges	**11**
Hilltop Drive to Route 7	11
Route 7 to Randall Avenue	12
Recommendations	**13**
Pavement Improvements	13
Bike Lanes	13
Sidewalks	14
Storm Drainage	15
Parking	15
Street Lighting	15
Easements and Right of way	16
Private Entrances	16
Cost Estimates	16

Attachments

Exhibits A-1 through A-3 Opinions of Probable Costs
Commercial Street Conceptual Layout Exhibits (5 Sheets)
2016 Traffic Counts at Route 7 and Commercial

Introduction

Cook, Flatt & Strobel Engineers (CFS) was hired by the City of Warsaw, Missouri to prepare a preliminary engineering study of Commercial Street to determine appropriate transportation improvements to assist with future planning and funding. The study limits extend from Hilltop Drive at the northern limits of Truman Hills Subdivision and continues southerly across Route 7 to Randall Avenue. Improvements to the intersection of Route 7 and Commercial Street are planned to begin in the summer of 2018. These improvements will include widening to add turn lanes and adding permanent signals.

This study will analyze the feasibility of adding sidewalks, enclosed storm drainage, street lighting, and bicycle accommodations to the corridor. In addition, the study will determine whether roadway widening for additional turn lane storage is needed. Improvements along this corridor will encourage redevelopment as outlined in the city's comprehensive plan entitled *Building on Success to Capitalize on the Future*.

Over the past 19 years, the city of Warsaw, Missouri has taken proactive steps to make community-wide improvements to their infrastructure. This started with a series of planning processes that looked comprehensively at sewer and water, transportation, community recreation and tourism. The goal of the City was to overcome deficiencies in the infrastructure, develop a more livable community and create an environment that would attract businesses and tourists. The catalyst for creating a livable community derived from a series of strategies and planning documents that were continually updated to reflect successes and short falls. These studies and planning documents outlined community needs and recommended improvements with priorities and cost estimates for budgeting. The City aggressively sought out funding for these much needed improvements with great success. The City has made significant upgrades to its existing utility network and recreational facilities as well as some improvements to the transportation system. The City is now focusing on its attention on addressing the transportation network to better accommodates the citizens of Warsaw along with the increasing number of visitors to the area. In addition, the City desires to improve accessibility to all modes of transportation throughout the community that will encourage the attraction of new residents and businesses.

This new direction by the City of Warsaw was initiated with the adoption of the community's new Comprehensive Plan. This Comprehensive Plan includes a section entitled "Warsaw Livable Community Transportation Improvement Plan (TIP)". The TIP is a very thorough plan on how to improve the community's transportation system that provides great connectivity throughout the City, and capitalizes on the exceptional waterfront trails system that currently exists. The goal of the transportation improvements plan is to create a network of multi-modal streets and pathways that link to the trail system to create a unique transportation system for all who live, visit or conduct business in Warsaw. These highly visible projects will make a statement that Warsaw is a progressive city that is willing to invest in improving the quality of life for all who live, work or visit their community. These improvements will provide everyone with great flexibility, safety and comfort to enjoy the many unique and abundant outdoor beauty and experience opportunities that Warsaw has to offer.

Executive Summary

The Commercial Street Preliminary Engineering Report (PER) project limits extend from the intersection of Hilltop Drive southward for approximately 0.5 miles to Randall Avenue. The purpose of the PER is to evaluate the condition of the existing infrastructure, identify conflicts, issues and limitations for motorists, pedestrians and cyclists, discuss critical needs and determine improvements that will promote multi-modal transportation choices, as well as health and safety for citizens of the community.

The PER addresses needed improvements such as ADA compliant sidewalks, potential for bike lanes, improved storm drainage, streetscapes, lighting, parking access management and traffic flow and pavement marking and signage.

The PER also discusses the environmental permitting process and probable issues that will need to be addressed for agency approval, depending upon which funding source is utilized.

The report provides conceptual design with cost estimates for engineering and surveys, utility adjustments, easements and construction related expenses for various alternatives and includes recommendations for proposed improvements.

The ultimate rationale for the project is to promote Warsaw's goal of developing safe, reliable, and economical transportation choices by investing in walkable and bikeable neighborhoods. As previously mentioned in the 2015 Warsaw Livable Streets Transportation Improvements Plan, Commercial Street was identified as a key street connecting the northern part of the City to the downtown and to the

state's highway system. Commercial Street is the primary north south route through the center of the city.

CFS recommends the following improvements for the Commercial Street corridor within the study limits:

North of Route 7
For the area from Hilltop Drive to Tower Drive there is limited right of way to add bike lanes and sidewalks, without acquiring new right of way or permanent easements. Sidewalks are needed for pedestrian safety and would be the priority improvement. Constraints to acquiring additional right of way include significant impacts to parking lots, private signage and utility poles. The existing right of way through Truman Hills is 50 feet wide and Commercial Street does not appear to be centered within the right of way. The west side of the roadway becomes very close to the right of way about midway through this section of the project. Realigning the roadway to be centered on the right of way is not recommended. We recommend a roadway cross section that includes 2 – 11 foot lanes, 2 foot curb and gutter with enclosed storm drainage and 5 foot sidewalks on each side separated from the back of curb by a 3 to 4 foot vegetative buffer. A 6 inch barrier curb should be constructed across parking lots at the back of the right of way line and minor strips of right of way will need to be acquired. This roadway cross section will fit within the existing 50 foot wide right of way and allow for at least a 1 foot buffer between the right of way line and the back of the sidewalk.

Between Tower Drive and the south leg of Longview Terrace the roadway should transition to allow for a left turn lane at the intersection of Route 7. Within this section, the lanes should narrow to 3 – 11 foot lanes. Sidewalks should transition from 5 foot where there is a vegetative buffer to 6 foot wide, placed at the back of the curb. This would create a 49 foot roadway cross section and allow a 6 inch buffer on either side within the 50 foot right of way. Pavement repair and milling and overlay of the road is recommended.

The City should consider a major change to the south leg connection of Longview Terrace at Commercial Street. Closing this access would meet resistance from the adjacent gas station, but a major change to the approach to Commercial Street will be required to accommodate any widening or adding sidewalks. Reconstructing the profile grade to accommodate the widening and sidewalks is recommended and this will require revising the entrance to the gas station and possible retaining walls.

Temporary construction easements will be required in order to reconstruct driveways and place curbing at the right of way line. Utility poles could be relocated or sidewalks could meander around them. Any privately owned signs within the right of way will have to be relocated at the owner's expense. Waterlines and sanitary sewer structures may require minor adjustments to accommodate ADA compliant sidewalks.

The three properties on the west side of the roadway between Tower Drive and the O'Reilly Auto Parts should be limited to no more than two driveways per property. Driveway widths should be limited to 24 feet wide or less. We recommend the City provide recommended driveway designs and coordinate with the property owners to determine and acceptable solution. Across these properties a curb should be placed at the edge of the right of way line and new driveways should be constructed with curbing.

Street lighting similar to what exists would be appropriate through this commercial corridor and existing lighting should be used if possible. The nature of this corridor does not seem suited for the themed ornamental period lighting that is used in the older parts of downtown.

Bike lanes extend across both sides of Route 7 and would provide access to the east frontage road of US 65 and to other routes into downtown. The estimated cost to construct improvements north of Route 7 is approximately $619,000 and includes, survey, engineering, right of way and utilities and administration.

South of Route 7
From Route 7 south to just past the J&D Pharmacy (Truman Medical Village), we recommend widening the roadway to include 2 – 11 foot lanes, 2 – 5 foot shoulders and 2 – 5 foot on-street bike lanes. This cross section would transition to connect with the existing paved shoulders that are currently marked as bike lane that extend to Randall Avenue and on to Jackson Street. Curb and gutter with enclosed storm drainage would be costly and is not recommended at this time.

A 5 foot wide sidewalk on the back side of the ditch on the west side of the roadway should be considered from Route 7 to the Randall Avenue intersection. This sidewalk would likely need to meander to achieve ADA compliance and would need to cross the creek at the bottom of the slope with a culvert included.

Temporary construction easements may be required in order to reconstruct driveway. Utility poles and other utilities should not require relocation.

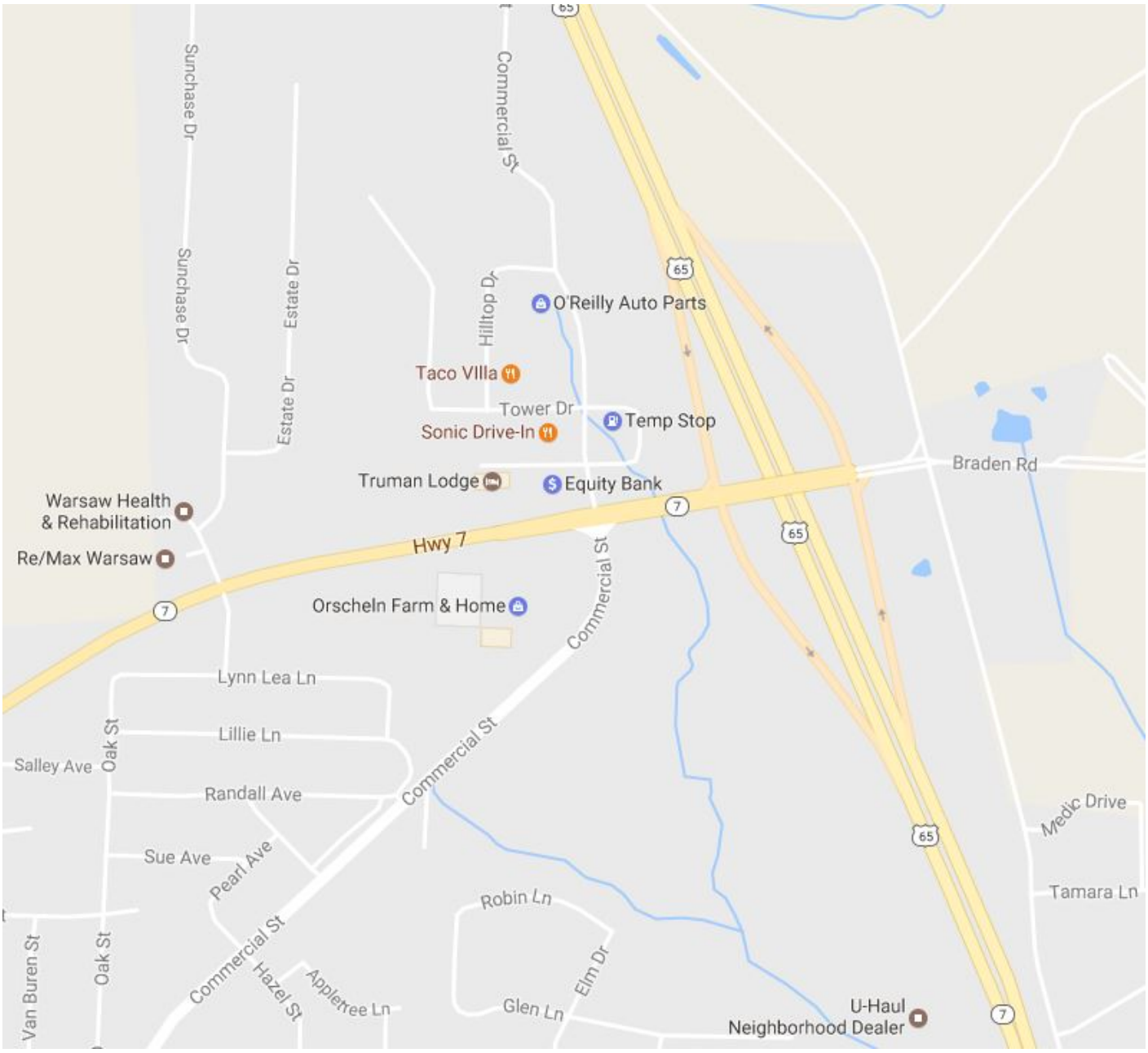
Existing driveways will not need to be narrowed or realigned. The entrances along the west side are in poor condition and the aprons should be reconstructed with this project. The entrance aprons on the east side are concrete and in good condition and should remain in place.

Street lighting should be considered between along the west side of the roadway, which would light the bike lanes as well as the sidewalk. This lighting should be closer to 30 foot tall or 45 foot tall poles to provide the lighting levels needed. The nature of this corridor does not seem suited for the themed ornamental period lighting that is used in the older parts of downtown.

The existing pavement appears in good condition and is not recommended for mill and overlay at this time, but may require it at the time of construction, depending on what year this project is planned for.

The estimated cost to construct improvements south of Route 7 is approximately $334,000. This estimate includes right of way costs, utility adjustments, engineering, construction administration and inspection.

The estimated cost to construct improvements for the combined north and south sections of Route 7 is approximately $893,000. Combining the two segments will be more cost effective. This estimate includes right of way costs, utility adjustments, engineering, construction administration and inspection.



Commercial Street in Warsaw, MO. Vicinity Map

Existing Conditions

General

Commercial Street is about 2,600 feet in length from Hilltop Drive to Randall Avenue. Commercial Street is the longest primary connector through the City, connecting downtown to the northern city limits. The corridor North of Route 7 is within the Truman Hills Subdivision commercial district and has direct access to MO Route 7. Among the businesses in this section of the corridor that affront the roadway are a Sonic Drive-in, banks, realtors, investment companies, a gas station, strip malls, O'Reilly Auto Parts, insurance companies, electrical and a plumbing supply.

South of Route 7, Commercial Street is affronted by businesses for the first 850 feet south of the intersection. These businesses include Orscheln Farm and Home within a strip mall, a gas station and Truman Medical Village. From that location south to Randal Avenue, the corridor is undeveloped.

The roadway grade is rolling with crests at Hilltop, Route 7 and south of Randall. Low areas are at Tower Drive and the creek north of Randall. The horizontal alignment is winding through Truman Hills, straight across Route 7, curves southwesterly from Route 7 and straightens between Truman Medical Village and Randall Avenue.

Traffic

Vehicular traffic along Commercial Street is heavy at the intersection of Route 7. Southbound traffic currently backs up due to the number of vehicles turning left onto Route 7. This backup can sometimes extend to Tower Drive. Northbound traffic onto Commercial Street at the Route 7 at the intersection is heavy from the west. Traffic counts at this intersection were taken for a 13 hour period on August 30, 2016 and are included in the Appendix. During this 13 hour period the total amount of traffic passing through the intersection form all directions was 10,288 vehicles. The southbound approach from north of the intersection totaled 2,802 vehicles, the northbound vehicles from the south totaled 2,003, the eastbound vehicles totaled 2,477 and the westbound approach totaled 3,006 vehicles. 2014 traffic volumes on Route 7 to the west of US 65 were 4,895 vehicles per day. The overwhelming amount of this traffic is continuing along Route 7 via US 65 Highway, or traveling along Commercial Street to and from downtown Warsaw or the shopping centers to the north. A low percentage of the traffic continues easterly, beyond the interchange to the east frontage road.

The speed limit along Commercial Street is 25 mph through the project limits except for south of the entrance to J&D Pharmacy, where the posted speed is 35 mph.

Roadway Sections

Commercial Street is an asphalt roadway through the limits of the study area. North of Randall Avenue for a distance of 660feet, up to the entrance to J&D Pharmacy, the roadway is 32 feet wide consisting of 2 -12 foot travel lanes and 2 – 4 foot bike lanes. The right of way in the area is 80 feet wide. For the next 500 feet northward, the roadway is between 22 and 24 feet wide with turf shoulders. Through this region to Route 7, the right of way widens to 160 feet. From this location to the Route 7 intersection, the roadway consists of 2 – 11 foot lanes and 8 foot aggregate shoulders. At the south approach to the intersection the lanes continue as 11 foot wide and beginning at the radius return, the shoulders are asphalt and widen to 10 feet.

North of Route 7 to Longview Terrace, the roadway is two lanes wide with 2 foot curb and shoulders on either side. The total roadway width is 31 feet from back of curb to back of curb. From Longview Terrace to Ferguson Street the roadway is 24 feet wide with a 2 foot curb and gutter along the east side of the roadway.

From Ferguson Street northward to Hilltop Drive, the roadway is approximately 24 feet wide with turf shoulders on either side. MoDOT right of way ends about 160 feet north of the intersection of Route 7 and Commercial Street. From here the right of way is 50 feet wide to the end of the project at Hilltop Drive.

The roadway is in fair condition for most of the corridor with some sections in need of repair. The area from Longview Terrace to Route 7 is in very poor condition and is planned for reconstruction in 2018. Cracking and settlement distress is present along the edge of pavement in a number of locations.

Sidewalks

Sidewalks are not present within the project limits.

Storm Water

The storm water and drainage system along Commercial Street is mostly handled in roadside ditches and culverts under side roads and driveways. From Route 7 the storm water drains southerly in open ditches and drains to a cross road culvert about 300 feet north of Randall Avenue. From Randall Avenue the Commercial Street drainage flows northerly to this same location. From there the storm water drains in a creek southeasterly to US 65 Highway and ultimately outlets in the Osage River backwater slough by the City's main influent lift station.

North of Route 7 the storm water runoff drains from Route 7 to Longview Terrace where it is collected in inlets off the roadway west and east of Commercial Street. From here the runoff is captured by pipe culverts that outlet into a ditch about 300 feet east of Commercial, on the north side of Route 7. The drainage then passes through a culvert under Route 7 and heads southerly, behind J&D Pharmacy to ultimately collect in the creek mentioned above.

From Hilltop Drive the storm water drains southward in shallow swales and through underground pipe culverts into the collection system at Longview Terrace. Adjacent parking lots and side streets also drain into this system.

Driveways/Entrances

There are many commercial driveways along the corridor. Driveways are paved in either asphalt or concrete. Some driveways have pipe culverts extend under them. Driveway grades are gentle to moderate and should not present major challenges to widening the roadway or adding sidewalks. Side street approaches are gentle, with the exception of Longview Terrace which drops off steeply. The profile grade of some driveways may require reconstruction beyond the right of way due to steeper grades. While other driveways (such as to the right) can remain in place.

There are several properties that affront Commercial Street in the Truman Hills Subdivision that have a completely open frontage to the roadway with no defined driveways. Across these properties there is nothing preventing vehicles from parking on the right of way. Access management to define driveway openings in this area is needed. This will require coordinating with the property owner to reconfigure parking lot striping for parking stalls and traffic flow.

Parking

On-street parking is not allowed along the corridor. As mentioned above, vehicles are currently parking on the right of way, where property frontages are wide open. This should be resolved with the Commercial Street improvements. Placing a curb at the back of the right of way is typical in commercial properties to define the right of way line.

Utilities

Utilities along the Commercial Street corridor include water, sanitary sewer, natural gas, telephone, cable and overhead power. Most of the waterlines and sanitary sewer in this area are in good condition and should not require much, if any adjustment. The overhead power lines may need to be relocated in some areas to accommodate a widened roadway section with storm sewers and sidewalks.

Bike Lanes

Currently bike lanes do not exist along Commercial Street north of Route 7. The right of way is constricted in this area and the combination of bike lanes and sidewalks is not feasible without right of way acquisition.

South of the Truman Medical Village, 4 foot wide on-street bike lanes are present southward into downtown.

Along Route 7, 5 foot bike lanes are present through the limits of the intersection from the east frontage road of US-65 to beyond the west city limits.

Street Lighting

The existing street lighting along Commercial Street is non-continuous and is present at the following locations: A single light pole in the southwest quadrant of the Route 7 intersection; at the southwest corner of Tower Drive; along the west side of the road, just south of O'Reilley's; and at the northwest corner of Hilltop Drive. All of the lights are of the standard cobra head design and appear to be approximately 30 feet in height. Parking lot lighting exists in several locations that also contribute to the roadway lighting.

Retaining Walls

There is a concrete and stone retaining wall at the north end of the project at the east side of the right of way. This wall is about 2 feet tall and 172 feet long and is at the front of the raised parking lot for BA Plumbing and Electrical. This wall would not be impacted by the proposed project improvements.

Cultural and Environmental

There do not appear to be any historic or cultural resource issues within the project limits, as the developments in Truman Hills and just south of Route 7 were constructed within the past 25 years.

Existing environmentally sensitive areas do not appear to be present, with the possible exception of the creek crossing north of RandallAvenue.

Design Challenges

Hilltop to Longview Terrace

This section of Commercial Street is winding and is on a moderate slope downhill southward and does not present any major grade challenges. The existing roadway does not appear to be centered within the right of way and has limited space for widening along the west side of the roadway. The 50 foo wide right of way does not allow for adding bike lanes and sidewalks without realigning the roadway and a small acquisition of right of way. The existing Truman Hills subdivision plat and property boundaries do not line up well with property pins located from survey and the property boundary description are in error. Future roadway improvements will require a thorough analysis of the right of way along Commercial Street.

Undefined entrances and uncontrolled property access along the west side of the street has resulted in parking spots located within the right of way. Any improvements to add bike lanes, sidewalks and curb and gutter along the west side will result in loss of parking and require reconfiguration of parking layouts within one or two of these properties, A loss of parking will likely make it difficult to acquire right of way and easements from these property owners.

The Phillips 66 gas station has driveway access very close to the corner of Tower Drive and Longview Terrace. This is another example of lack of access management along this corridor that will create problems. The nearest entrance connections to both of these streets should be removed, but this will probably be unfavorable to the property owner and business. Nevertheless, these access issues are problematic for widening or adding sidewalks and should be corrected.

Gas station entrance at Tower Drive

Gas station entrances at Longview Terrace

Longview Terrace is located too close to the Route 7 intersection and is within the functional limits of a standard 200 foot minimum storage lane. If at all possible, Longview Terrace should be converted to a right-in, right-out access to Commercial Street. The Longview Terrace approach grade to Commercial Street from the east is steep a should be reconstructed with a better approach grade that would allow a sidewalk through the intersection. This will require some change in access to the gas station, and likely a retaining wall for a portion of the reconstruction limits. The existing Phillips 66 Gas Station sign and possibly a portion of their driveway/parking area next to the car wash appear to be located within the right of way. Survey and property research will be required to confirm the location of the right of way and whether there are additional easements or limitations within this area.

Route 7 to Randall Avenue

There are challenges with side slopes over this section of roadway. At the Route 7 intersection the side slopes drop away at approximately 4 to 1 for a distance of about 400 feet to the south and will require a large amount of earthen fill to widen to construct both bike lanes and sidewalks along the roadway. A more practical solution would be to construct sidewalks off the roadway on the back side of the ditches. Another side slope challenge is at the creek crossing north of Randall Avenue. Widening to add sidewalks a the creek crossing will require extending the existing pipe culvert and clearing trees.

Driveway spacing is adequate and should not be an issue. Utilities appear to be out of the way.

The environmental concerns of a Commercial Street project are minimal. Section 106 clearance and likely 404 permits will be required. Clearing does not appear to be needed. Other environmental concerns will most likely be covered by a Storm Water Pollution Protection Plan (SWPPP). The NEPA process must be adhered to if federal funds are utilized for improvements to the corridor.

Recommendations

Pavement Improvements

The existing pavement north of Route 7 should receive full depth pavement repair where needed and include asphalt milling and a 2 inch asphalt overlay. The roadway should be narrowed to 2 - 11 foot lanes to accommodate widening for curb & gutter and sidewalks. Between Tower Drive and the south leg of Longview Terrace the roadway should transition to allow for a left turn lane at the intersection of Route 7. Within this section, the lanes should narrow to 3 – 11 foot lanes. Sidewalks should transition from 5 foot where there is a vegetative buffer to 6 foot wide, placed at the back of the curb. This would create a 49 foot roadway cross section and allow a 6 inch buffer on either side within the 50 foot right of way.

CFS recommends a major revision to the connection of Longview Terrace at Commercial Street. Closing this access would meet resistance from the adjacent gas station, so we recommend reconstructing the profile grade to accommodate the widening and possible future sidewalk on the east side. We also recommend access management of the wide open, uncontrolled entrances to the gas station from Tower Drive and Longview Terrace. At a minimum, extending the curbing around the radius returns of Longview Terrace and Tower Drive will reduce the overall width of the entrances. A small block retaining wall would likely be required on the north side of Tower Drive to make this improvement.

South of Route 7, the roadway should remain as 2 – 11 foot lanes. Widening should be provided as described below.

Bike Accommodations

Extending bike lanes northward up Commercial Street to the Route 7 intersection would provide connectivity between two of the major bike routes through town. Route 7 would be a good terminus as it provides bike lanes from west of town to the east frontage road of Route 65 (East Main Street). East Main Street is one of the proposed bike routes for Warsaw, which would provide bike access from the Main Street corridor northward along the eastern portion of the City up to Truman Dam Access Road and beyond. Extending bike lanes north of Route 7 along Commercial Street would be costly and would require right of way acquisition. The east frontage road provides a good parallel north-south bike route that has low traffic volumes and is a short distance from Commercial Street. For these reasons, we don't recommend widening the roadway for bike lanes north of Route 7.

Beginning just south of the Truman Medical Village, bike lanes should be added by constructing a 10 foot wide shoulder on both sides of the roadway and striping them for a 5 foot shoulder with a 5 foot bike lane on the outside. The existing shoulders are a mix of turf and aggregate and would require minimal grading to add 10 foot of paved shoulder/bike lane on each side. At the Route 7 intersection, the existing paved shoulders are 8 foot wide and should be widened and could accommodate a 4 foot shoulder and foot bike lane around the radius returns.

Driveway aprons may need to be reconstructed to accommodate the flatter slope of the shoulder. Survey and design will determine where the driveway reconstruction limits would end.

Sidewalks

Between Hilltop Drive and Route 7 sidewalks are recommended for pedestrian safety. We recommend a roadway cross section that includes 2 – 11 foot lanes, 2 foot curb and gutter with enclosed storm drainage and 5 foot sidewalks on each side separated from the back of curb by a 3 to 4 foot vegetative buffer. Constructing a sidewalk on the east side of the road between Tower Drive and Route 7 will be difficult due to the steep drop off of the slope. Adding the sidewalk in this area at this time will require retaining walls and a handrail across the gas station and a large amount of fill between Longview Terrace and Route 7.

The existing Phillips 66 Gas Station sign and possibly a portion of their driveway/parking area next to the car wash appear to be located within the right of way. Survey and property research will be required to identify the location of the right of way and whether there are additional easements or limitations within this area that would confirm the status of the sign and parking area. This determination will be needed before a recommendation can be made for including a sidewalk across this frontage.

A 6 inch barrier curb should be constructed across parking lots at the back of the right of way line and minor strips of right of way will need to be acquired. This roadway cross section will fit within the existing 50 foot wide right of way and allow for at least a 1 foot buffer between the right of way line and the back of the sidewalk.

A sidewalk should be constructed from Randall Avenue to Route 7. The sidewalk should be at least 5 feet wide and should be constructed on the back side of the ditch.

A sidewalk should be constructed along the west side of Commercial Street initially and as more of the area develops a sidewalk should be constructed on the east side.

The west side of the roadway is fairly flat and cleared of trees and brushy vegetation. Minimal grading would be need to place the sidewalk in this location.

At Route 7 the sidewalk should gradually climb the grade to the roadway and will need to meet ADA compliance for running slope and cross slope. This will require increasing the length of the sidewalk and providing earthen embankment.

A recommended option for crossing the creek north of Randall Avenue, would be to align the sidewalk around the treeline and follow an existing path adjacent to the existing power line and terminate at the Randall Avenue/Boring Avenue intersection. This can be accomplished without any clearing of trees, but would require a pipe culvert where the sidewalk crosses the creek.

Storm Drainage

With the addition of curb and gutter to Commercial Street north of Route 7, an enclosed storm sewer system will be required. This storm sewer system would collect and divert the runoff to existing ditches along the roadway and collect runoff from parking lots. Re-use of the existing culvert pipes as part of a larger storm sewer system would save budget and should be investigated in future design phases. For the purposes of this report, new inlet structures and piping will be assumed to be required throughout the corridor.

It is possible for Commercial Street to be upgraded with new sidewalks without the addition of curb and gutter, but curb and gutter would help to define entrances, provide access management and dissuade vehicles from driving across sidewalks.

Parking

Private parking will need to be reconfigured on the west side of the street, between O'Reilley Auto Parts and Tower Drive in the Truman Hills Subdivision. This will be required due to parking lots currently encroaching on the right of way.

Parking should not be allowed along the shoulders south of Route 7, except for emergencies.

Environmental

Section 106 clearance will be required for potential impacts to properties and structures. Section 404 permits would be required for work done in the creek north of Randall Avenue. Other environmental concerns will most likely be covered by a Storm Water Pollution Protection Plan (SWPPP). There are not likely to be any issues with threatened and endangered species and no farmland will be impacted. The National Environmental Protection Act (NEPA) process must be adhered to if federal funds are utilized for improvements to the corridor.

Street Lighting

Street lighting is present on existing poles at three locations in the Truman Hills section of Commercial Street and one pole is located at the southwest corner of the Route 7 intersection. Conventional street lighting should be added to supplement the lighting within Truman Hills and should be added along

the west side of the corridor south of Route 7. Lighting design should be performed to determine the pole height and wattage of the lights, but would typically be 30 to 45 feet in height and between 200 to 400 watts of light output. Separate lighting controllers will be required for the two areas and it is possible that an existing lighting controller is available for reuse in Truman Hills. Conduit with wiring conductors or cable-conduit would need to be trenched between light poles. The addition of lighting would provide safety for pedestrians, bicyclists and vehicle traffic.

Easements and Right of Way

For the proposed recommended improvements, right of way or permanent easements and temporary easements will be required. Within Truman Hills the right of way acquisition will also involve adjustments to private parking and possibly private sign relocation across commercial property. Reconstruction of Tower Drive and Longview Terrace will impact the existing entrances to Phillips 66 gas station and will require temporary and possibly permanent easements. As mentioned above, survey and property research will be required to identify the location of the right of way and whether there are additional easements or limitations within this area.

South of Route 7 a strip of permanent easement should be acquired for the proposed sidewalk to skirt the perimeter of the treeline at the creek crossing and follow the existing cleared path.

Entrances

Commercial entrances along the corridor should be narrowed wherever possible. Many of the current entrances are very wide, some without much delineation. These entrances should be no more than 24 feet wide depending on the traffic conditions. Reconstruction of most of the entrances and side streets will be required in order to add curb and gutter and sidewalks through the Truman Hills subdivision. Entrances should be constructed as concrete with curbing through the radii.

South of Route 7, the entrances on the east side of the roadway are concrete, in good condition, have grades suitable for extending bike lanes across them and should remain in place. The entrances along the east side are in fair to poor condition and should be reconstructed with the bike lane and sidewalk construction.

Cost Estimates

The estimated cost to construct improvements for the combined north and south sections of Route 7 is approximately $893,000. The improvements could be broken out into two or more projects. The estimated cost to construct improvements north of Route 7 is approximately $619,000. The estimated cost to construct improvements south of Route 7 is approximately $334,000. These estimates include right of way costs, utility adjustments, engineering, construction administration and inspection.

APPENDIX

WARSAW, MISSOURI

Exhibit A1 – Recommended Street Improvements for

Commercial Street from Hilltop Drive to Route 7

OPINION OF PROBABLE COSTS

ITEM		QTY.	UNIT	UNIT COST	COST($)
Removal of Improvements		1	L SUM	$40,000.00	$40,000.00
Common Excavation		500	CY	$25.00	$12,500.00
Compacting Embankment		800	CY	$10.00	$8,000.00
Sidewalk		581	SY	$42.00	$24,402.00
4" Aggregate Base		945	SY	$8.50	$8,032.50
ADA Ramps		50	SY	$80.00	$4,000.00
Truncated Domes		80	SF	$50.00	$4,000.00
Curb & Gutter		769	LF	$36.00	$27,684.00
Type S Curb		390	LF	$42.00	$16,380.00
Small Block Retaining Wall		180	SF	$35.00	$6,300.00
Paved Approach (driveways)		1,083	SY	$70.00	$75,810.00
Curb Inlets		6	EA	$2,750.00	$16,500.00
Storm Pipe		800	LF	$42.00	$33,600.00
Flared End Section		2	EA	$700.00	$1,400.00
Crosswalk Markings (6" White)		280	LF	$6.50	$1,820.00
4 IN Yellow Pavement Marking		1,590	LF	$1.00	$1,590.00
Full Depth Pavement Repair		23	Tons	$95.00	$2,185.00
2 IN Asphalt Milling		1,887	SY	$5.00	$9,435.00
2 IN Asphalt Overlay		210	Tons	$105.00	$22,050.00
Stop Sign		4	EA	$550.00	$2,200.00
Street Lighting		4	EA	$3,500.00	$14,000.00
Lighting Controller		1	EA	$5,500.00	$5,500.00
Cable – Conduit No. 6 AWG		1,400	LF	$2.75	$3,850.00
Erosion Control		1	LSUM	$5,000.00	$5,000.00
Traffic Control		1	LSUM	$10,000.00	$10,000.00
Misc Utility Adjustments		1	L SUM	$5,000.00	$5,000.00
Seed, mulch, etc		1.0	ACRE	$5,000.00	$5,000.00
				subtotal	$366,238.50
Contractor Construction Staking	{1.8%}	1	LSUM	$6,592.29	$6,592.29
Mobilization		1	LSUM	$40,000.00	$40,000.00
Subtotal					**$412,830.79**
Contingency 15%					**$61,924.62**
Total					**$474,755.41**
Engineering & Surveying Costs (15%)					**$71,213.31**
Construction Administration Costs (8%)					**$37,980.43**
Right-of-Way Costs					**$35,000.00**
Grand Total					**$618,949.16**

WARSAW, MISSOURI

Exhibit A2 – Recommended Street Improvements for

Commercial Street from Route 7 to Randall Avenue

OPINION OF PROBABLE COSTS

ITEM		QTY.	UNIT	UNIT COST	COST($)
Removal of Improvements		1	L SUM	$15,000.00	$15,000.00
Common Excavation		450	CY	$25.00	$11,250.00
Compacting Embankment		300	CY	$10.00	$3,000.00
Sidewalk		804	SY	$42.00	$33,768.00
4" Aggregate Base		2,368	SY	$8.50	$20,128.00
ADA Ramps		12	SY	$80.00	$960.00
Truncated Domes		20	SF	$50.00	$1,000.00
Paved Approach (driveways)		593	SY	$70.00	$41,510.00
Storm Pipe		20	LF	$42.00	$840.00
4 IN Yellow Pavement Marking		2,050	LF	$1.00	$2,050.00
4 IN Asphalt Shoulder		280	Tons	$95.00	$26,600.00
Street Lighting		6	EA	$3,500.00	$21,000.00
Cable – Conduit No. 6 AWG		1,485	LF	$2.75	$4,083.75
Lighting Controller		1	EA	$5,500.00	$5,500.00
Erosion Control		1	LSUM	$5,000.00	$5,000.00
Traffic Control		1	LSUM	$5,000.00	$5,000.00
Misc Utility Adjustments		1	L SUM	$5,000.00	$5,000.00
Seed, mulch, etc		0.5	ACRE	$5,000.00	$2,500.00
				subtotal	$204,189.75
Contractor Construction Staking	{1.8%}	1	LSUM	$3,675.42	$3,675.42
Mobilization		1	LSUM	$25,000.00	$25,000.00
Subtotal					**$232,865.17**
Contingency 15%					**$34,929.77**
Total					**$267,794.94**
Engineering & Surveying Costs (15%)					**$40,169.24**
Construction Administration Costs (8%)					**$21,423.60**
Right-of-Way Costs					**$5,000.00**
Grand Total					**$334,387.78**

WARSAW, MISSOURI

Exhibit A3 – Recommended Street Improvements for

Commercial Street from Hilltop Drive to Randall Avenue (Combined)

OPINION OF PROBABLE COSTS

ITEM		QTY.	UNIT	UNIT COST	COST($)
Removal of Improvements		1	L SUM	$50,000.00	$50,000.00
Common Excavation		950	CY	$25.00	$23,750.00
Compacting Embankment		1,100	CY	$10.00	$11,000.00
Sidewalk		1,385	SY	$42.00	$58,170.00
4" Aggregate Base		3,313	SY	$8.50	$28,160.50
ADA Ramps		62	SY	$80.00	$4,960.00
Truncated Domes		100	SF	$50.00	$5,000.00
Curb & Gutter		769	LF	$36.00	$27,684.00
Type S Curb		390	LF	$42.00	$16,380.00
Small Block Retaining Wall		180	SF	$35.00	$6,300.00
Paved Approach (driveways)		1,676	SY	$70.00	$117,320.00
Curb Inlets		6	EA	$2,750.00	$16,500.00
Storm Pipe		820	LF	$42.00	$34,440.00
Flared End Section		2	EA	$700.00	$1,400.00
Crosswalk Markings (6" White)		280	LF	$6.50	$1,820.00
4 IN Yellow Pavement Marking		4,000	LF	$1.00	$4,000.00
Full Depth Pavement Repair		23	Tons	$95.00	$2,185.00
2 IN Asphalt Milling		1,887	SY	$5.00	$9,435.00
2 IN Asphalt Overlay		210	Tons	$105.00	$22,050.00
4 IN Asphalt Shoulder		280	Tons	$95.00	$26,600.00
Stop Sign		4	EA	$550.00	$2,200.00
Street Lighting		10	EA	$3,500.00	$35,000.00
Lighting Controller		2	EA	$5,500.00	$11,000.00
Cable – Conduit No. 6 AWG		2,885	LF	$2.75	$7,933.75
Erosion Control		1	LSUM	$10,000.00	$10,000.00
Traffic Control		1	LSUM	$12,000.00	$12,000.00
Misc Utility Adjustments		1	L SUM	$10,000.00	$10,000.00
Seed, mulch, etc		1.5	ACRE	$5,000.00	$7,500.00
				subtotal	$562,788.25
Contractor Construction Staking	{1.8%}	1	LSUM	$10,130.19	$10,130.19
Mobilization		1	LSUM	$40,000.00	$40,000.00
Subtotal					**$612,918.44**
Contingency 15%					**$91,937.77**
Total					**$704,856.20**
Engineering & Surveying Costs (13%)					**$91,631.31**
Construction Administration Costs (8%)					**$56,388.50**
Right-of-Way Costs					**$40,000.00**
Grand Total					**$892,876.01**

COMMERCIAL STREET CONCEPTUAL LAYOUT EXHIBITS

SCALE

0 20 40 60

15' UTILITY EASEMENT

BUFFER ZONE

EXIST. R/W

5' S/W

COMMERCIAL ST.

2' C&G

2' C&G

5' S/W

BUFFER ZONE

5' S/W

6' S/W

EXIST. R/W

5' S/W

EXIST. R/W

6' S/W

PROP LINE

PROP LINE

PROP LINE

HILLTOP DR.

I.P.

I.P.

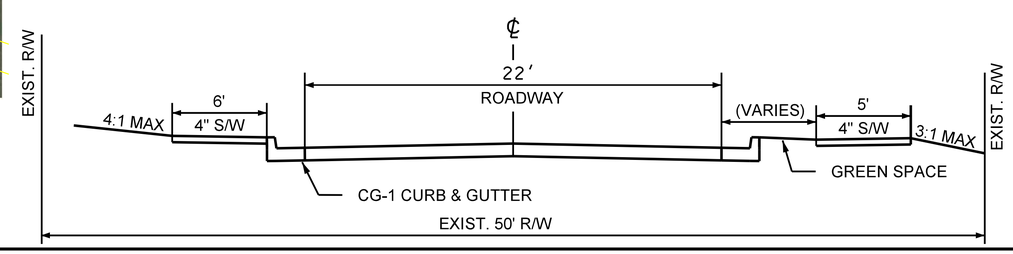
I.P.

I.P.

SSMH

IPF

PROPOSED COMMERCIAL STREET TYPICAL SECTION
HILLTOP DRIVE TO LONGVIEW TERRACE



COMMERCIAL STREET IMPROVEMENTS

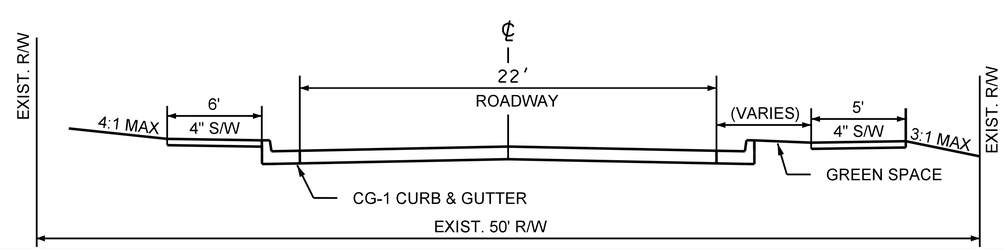
PAGE 01

$FILEL$

SCALE

0 20 40 60

PROPOSED COMMERCIAL STREET TYPICAL SECTION
HILLTOP DRIVE TO LONGVIEW TERRACE



COMMERCIAL STREET IMPROVEMENTS

PAGE 02

$FILEL$

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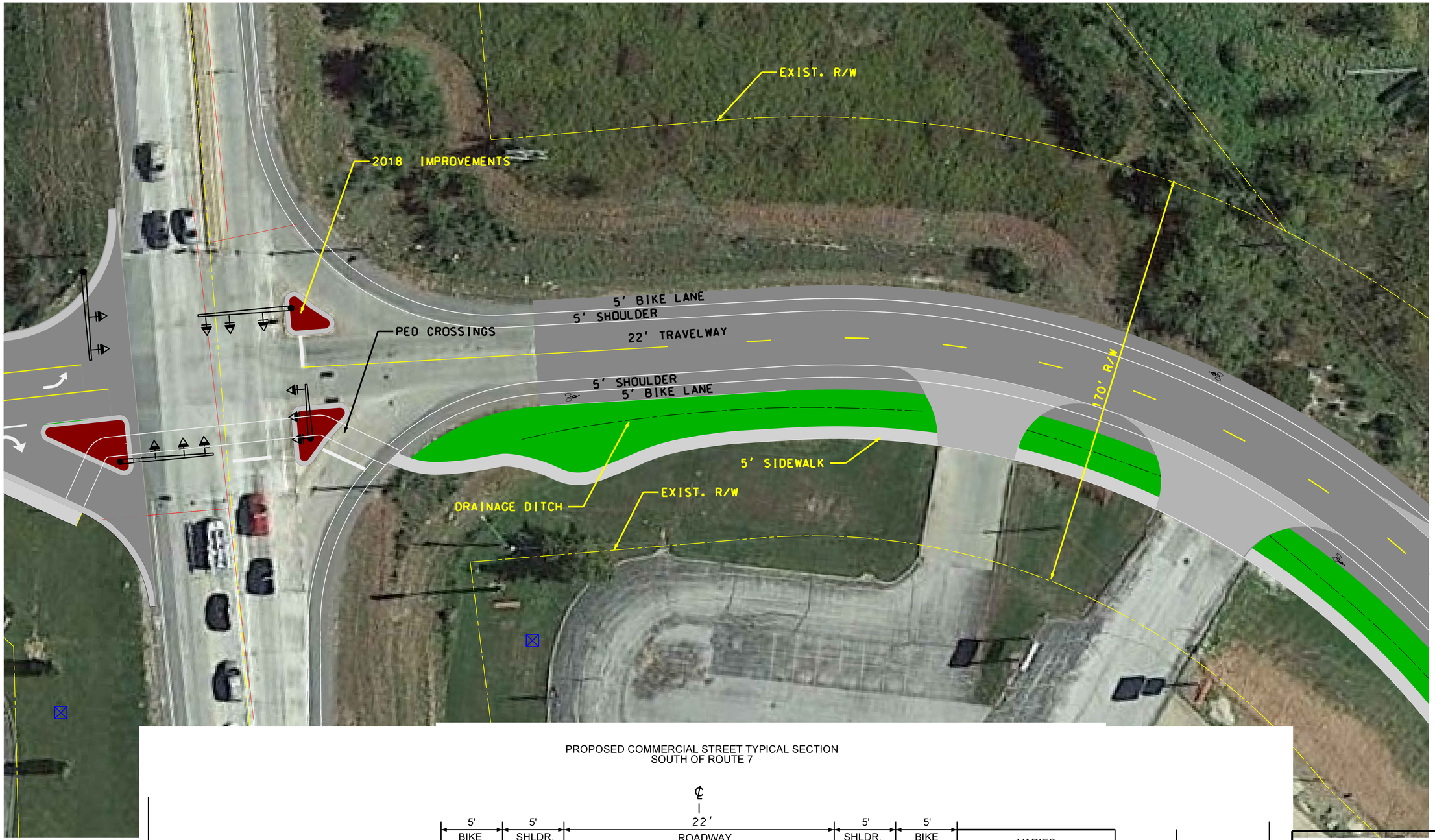
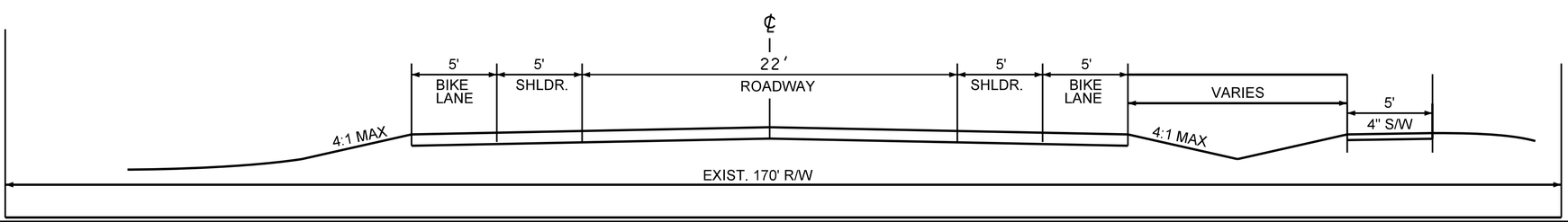


PROPOSED COMMERCIAL STREET TYPICAL SECTION
SOUTH OF ROUTE 7



COMMERCIAL STREET IMPROVEMENTS

PAGE 03

$FILEL$

SCALE

0 20 40 60

EXIST. R/W

MATCH EXIST. BIKE LANES

5' BIKE LANE
5' SHOULDER

COMMERCIAL ST.

22' TRAVELWAY

80' R/W

5' SHOULDER
5' BIKE LANE

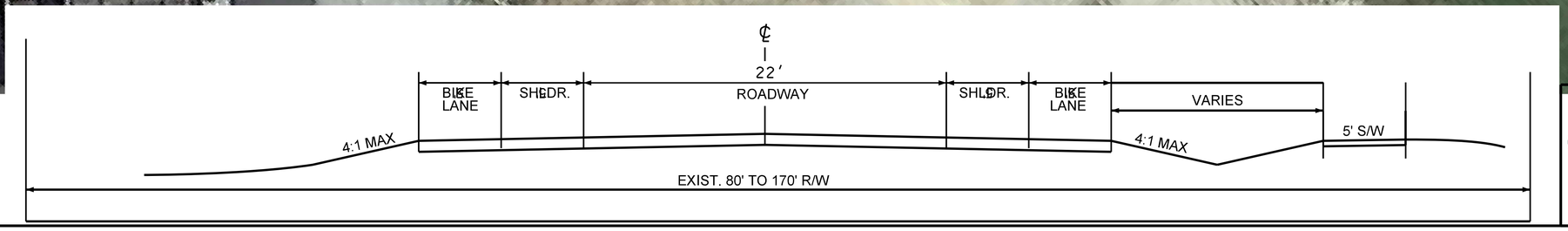
5' SIDEWALK

EXIST. R/W

DRAINAGE DITCH

MATCH EXIST. BIKE LANES

PROPOSED COMMERCIAL STREET TYPICAL SECTION
SOUTH OF ROUTE 7



COMMERCIAL STREET IMPROVEMENTS

PAGE 04

$FILEL$

SCALE

0 20 40 60

EXIST. R/W

80' R/W

5' BIKE LANE

22' TRAVELWAY

COMMERCIAL ST.

5' BIKE LANE

EXTEND S/W TO RANDALL

ADD CULVERT AT CREEK CROSSING

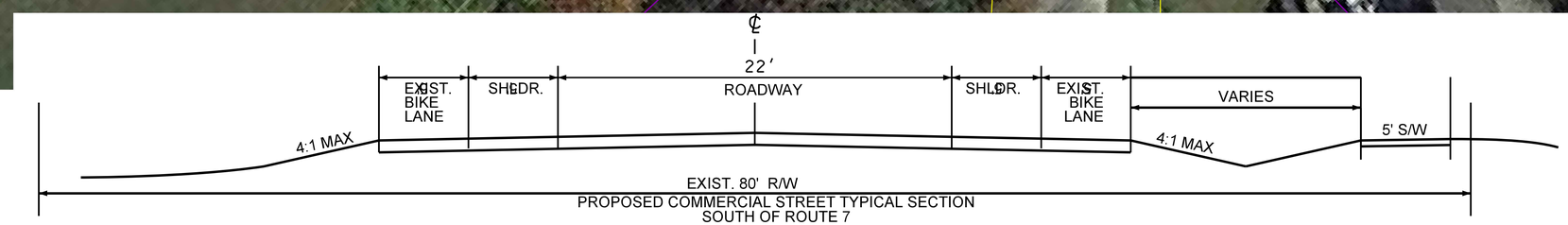
EXIST. R/W

5' SIDEWALK

BORING AVE

RANDALL AVE

FOLLOW EXIST. PATH



PROPOSED COMMERCIAL STREET TYPICAL SECTION
SOUTH OF ROUTE 7

COMMERCIAL STREET IMPROVEMENTS

PAGE 05

#FILEL#

ROUTE 7 AND COMMERCIAL STREET INTERSECTION 13 HR TRAFFIC COUNTS 8-30-2016

Your Company Name Here

This is your address
Your City, State, Zip Code
Your Tagline Here

File Name : 2797_7_Commercial_Warsaw_Aug2016
Site Code : 2797
Start Date : 8/30/2016
Page No : 1

Groups Printed- All Vehicles (no classification)

	Commercial Southbound					MO 7 Westbound					Commercial Northbound					MO 7 Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
06:00 AM	2	1	0	0	3	4	6	1	0	11	2	1	0	0	3	1	11	3	0	15	32
06:15 AM	2	2	1	0	5	4	10	4	0	18	8	5	1	0	14	1	8	0	0	9	46
06:30 AM	2	3	4	0	9	9	15	1	0	25	0	5	0	0	5	1	20	5	0	26	65
06:45 AM	6	5	8	0	19	8	16	2	0	26	7	8	3	0	18	1	28	6	0	35	98
Total	12	11	13	0	36	25	47	8	0	80	17	19	4	0	40	4	67	14	0	85	241
07:00 AM	3	8	4	0	15	17	28	8	0	53	5	7	0	0	12	1	22	8	0	31	111
07:15 AM	12	13	4	0	29	22	35	8	0	65	9	7	1	0	17	5	28	6	0	39	150
07:30 AM	5	18	11	0	34	24	39	13	0	76	9	14	0	0	23	12	32	15	0	59	192
07:45 AM	10	21	16	0	47	33	53	26	0	112	26	14	7	0	47	8	38	10	0	56	262
Total	30	60	35	0	125	96	155	55	0	306	49	42	8	0	99	26	120	39	0	185	715
08:00 AM	7	15	7	0	29	26	32	10	0	68	9	5	7	0	21	11	27	19	0	57	175
08:15 AM	17	16	12	0	45	15	27	18	0	60	13	12	2	0	27	6	19	19	0	44	176
08:30 AM	9	14	10	0	33	24	33	14	0	71	9	17	4	0	30	4	29	21	0	54	188
08:45 AM	16	22	10	0	48	24	26	23	0	73	16	9	3	0	28	3	14	17	0	34	183
Total	49	67	39	0	155	89	118	65	0	272	47	43	16	0	106	24	89	76	0	189	722
09:00 AM	15	16	11	0	42	24	24	10	0	58	16	21	2	0	39	3	24	23	0	50	189
09:15 AM	13	20	20	0	53	24	23	17	0	64	17	19	2	0	38	9	34	15	0	58	213
09:30 AM	19	24	7	0	50	28	24	16	0	68	14	20	4	0	38	5	19	19	0	43	199
09:45 AM	19	25	16	0	60	20	27	12	0	59	23	25	0	0	48	4	17	17	0	38	205
Total	66	85	54	0	205	96	98	55	0	249	70	85	8	0	163	21	94	74	0	189	806
10:00 AM	16	25	16	0	57	26	23	16	0	65	13	19	4	0	36	10	22	21	0	53	211
10:15 AM	17	23	12	0	52	27	27	14	0	68	19	19	1	0	39	3	31	19	0	53	212
10:30 AM	20	28	28	0	76	17	24	15	0	56	21	31	3	0	55	6	23	19	0	48	235
10:45 AM	24	35	19	0	78	14	30	19	0	63	16	38	5	0	59	10	21	20	0	51	251
Total	77	111	75	0	263	84	104	64	0	252	69	107	13	0	189	29	97	79	0	205	909
11:00 AM	17	28	17	0	62	25	29	13	0	67	23	40	3	0	66	4	28	28	0	60	255
11:15 AM	24	30	20	1	75	23	28	12	0	63	15	33	5	0	53	4	25	21	0	50	241
11:30 AM	18	22	24	0	64	25	25	18	0	68	14	32	3	0	49	11	24	19	0	54	235
11:45 AM	18	35	25	0	78	28	21	20	0	69	16	32	2	0	50	6	29	18	0	53	250
Total	77	115	86	1	279	101	103	63	0	267	68	137	13	0	218	25	106	86	0	217	981
12:00 PM	27	25	22	0	74	20	36	16	0	72	15	55	3	0	73	5	21	21	0	47	266
12:15 PM	23	32	19	0	74	26	15	14	0	55	18	37	4	0	59	2	25	25	0	52	240
12:30 PM	17	31	25	0	73	22	22	7	0	51	17	39	6	0	62	6	32	22	0	60	246
12:45 PM	28	32	20	0	80	27	16	17	0	60	14	33	4	0	51	10	27	28	0	65	256
Total	95	120	86	0	301	95	89	54	0	238	64	164	17	0	245	23	105	96	0	224	1008

Your Company Name Here

This is your address
Your City, State, Zip Code
Your Tagline Here

File Name : 2797_7_Commercial_Warsaw_Aug2016
Site Code : 2797
Start Date : 8/30/2016
Page No : 2

Groups Printed- All Vehicles (no classification)

	Commercial Southbound					MO 7 Westbound					Commercial Northbound					MO 7 Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
01:00 PM	21	31	20	0	72	19	36	17	0	72	16	25	5	0	46	4	34	22	0	60	250
01:15 PM	24	32	27	0	83	26	31	12	0	69	13	18	4	0	35	5	26	25	0	56	243
01:30 PM	25	32	14	0	71	22	37	16	0	75	9	36	4	0	49	4	19	23	0	46	241
01:45 PM	25	23	18	0	66	16	36	15	0	67	16	33	3	0	52	1	29	24	0	54	239
Total	95	118	79	0	292	83	140	60	0	283	54	112	16	0	182	14	108	94	0	216	973
02:00 PM	28	25	27	0	80	27	28	9	0	64	14	26	4	0	44	1	26	15	0	42	230
02:15 PM	24	28	19	0	71	14	38	11	0	63	14	18	3	0	35	9	28	24	0	61	230
02:30 PM	23	27	17	0	67	22	24	19	0	65	15	32	5	0	52	5	34	12	0	51	235
02:45 PM	15	29	27	0	71	24	21	22	0	67	14	21	2	0	37	7	20	23	0	50	225
Total	90	109	90	0	289	87	111	61	0	259	57	97	14	0	168	22	108	74	0	204	920
03:00 PM	21	23	22	0	66	25	30	13	0	68	24	20	4	0	48	10	41	14	0	65	247
03:15 PM	20	31	24	0	75	25	20	15	0	60	18	22	3	0	43	5	29	23	0	57	235
03:30 PM	27	25	19	0	71	21	42	21	0	84	20	38	0	0	58	1	32	27	0	60	273
03:45 PM	28	29	17	0	74	13	27	21	0	61	15	27	7	0	49	7	37	18	0	62	246
Total	96	108	82	0	286	84	119	70	0	273	77	107	14	0	198	23	139	82	0	244	1001
04:00 PM	23	20	19	0	62	16	37	14	0	67	18	23	3	0	44	5	28	10	0	43	216
04:15 PM	18	26	13	0	57	8	34	12	0	54	13	21	6	0	40	7	25	14	0	46	197
04:30 PM	22	21	22	0	65	17	22	19	0	58	19	30	6	0	55	9	44	11	0	64	242
04:45 PM	16	22	13	0	51	16	18	12	0	46	15	23	9	0	47	5	33	12	0	50	194
Total	79	89	67	0	235	57	111	57	0	225	65	97	24	0	186	26	130	47	0	203	849
05:00 PM	17	14	23	0	54	17	28	10	0	55	23	21	4	0	48	6	37	14	0	57	214
05:15 PM	13	10	27	0	50	13	32	9	0	54	11	15	1	0	27	3	26	9	0	38	169
05:30 PM	16	11	18	0	45	13	27	9	0	49	9	22	2	0	33	3	27	15	0	45	172
05:45 PM	9	16	14	0	39	14	19	8	0	41	11	9	2	0	22	4	39	15	0	58	160
Total	55	51	82	0	188	57	106	36	0	199	54	67	9	0	130	16	129	53	0	198	715
06:00 PM	15	16	19	0	50	15	15	6	0	36	15	10	3	0	28	2	18	12	0	32	146
06:15 PM	14	16	18	0	48	9	12	8	0	29	7	18	1	0	26	3	24	3	0	30	133
06:30 PM	9	10	9	0	28	2	15	5	0	22	3	7	1	0	11	3	21	11	0	35	96
06:45 PM	5	11	6	0	22	7	6	3	0	16	3	10	1	0	14	0	15	6	0	21	73
Total	43	53	52	0	148	33	48	22	0	103	28	45	6	0	79	8	78	32	0	118	448
Grand Total	864	1097	840	1	2802	987	1349	670	0	3006	719	1122	162	0	2003	261	1370	846	0	2477	10288
Apprch %	30.8	39.2	30	0		32.8	44.9	22.3	0		35.9	56	8.1	0		10.5	55.3	34.2	0		
Total %	8.4	10.7	8.2	0	27.2	9.6	13.1	6.5	0	29.2	7	10.9	1.6	0	19.5	2.5	13.3	8.2	0	24.1	