Municipality of Anchorage
Public Works Department

Project Management & Engineering Division

WEST DIMOND BOULEVARD UPGRADE
JODHPUR STREET to SAND LAKE ROAD

DRAFT
Design Study Report

JULY 2013
MOA Project No. 05-05

Prepared by:

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EXECUTIVE SUMMARY

The Municipality of Anchorage (MOA) is proposing to upgrade West Dimond Boulevard from Jodhpur Street to Sand Lake Road. West Dimond Boulevard within the project area is a two-lane, east-west collector without shoulders, curbs or pedestrian amenities.

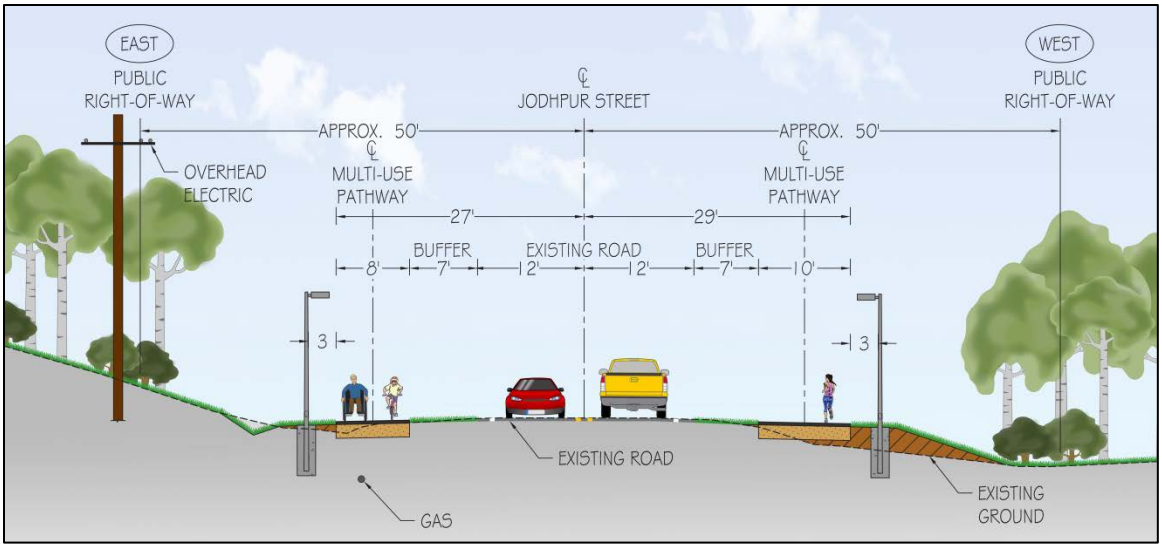
The project's primary objectives are to:

- Provide pedestrian and bicycle amenities within the project corridor;
- Improve safety by:
  - Improving horizontal and vertical geometry.
  - Separating vehicles from pedestrians and bicyclists.
  - Calming traffic.
- Upgrade the roadway and intersections to current municipal road standards;
- Upgrade a public facility which has adequate capacity for the future growth and development of the area for the next 20-30 years;
- Provide major intersections that will operate at adequate service levels in the future; and
- Reduce long-term road maintenance by providing greater durability to the road surface.

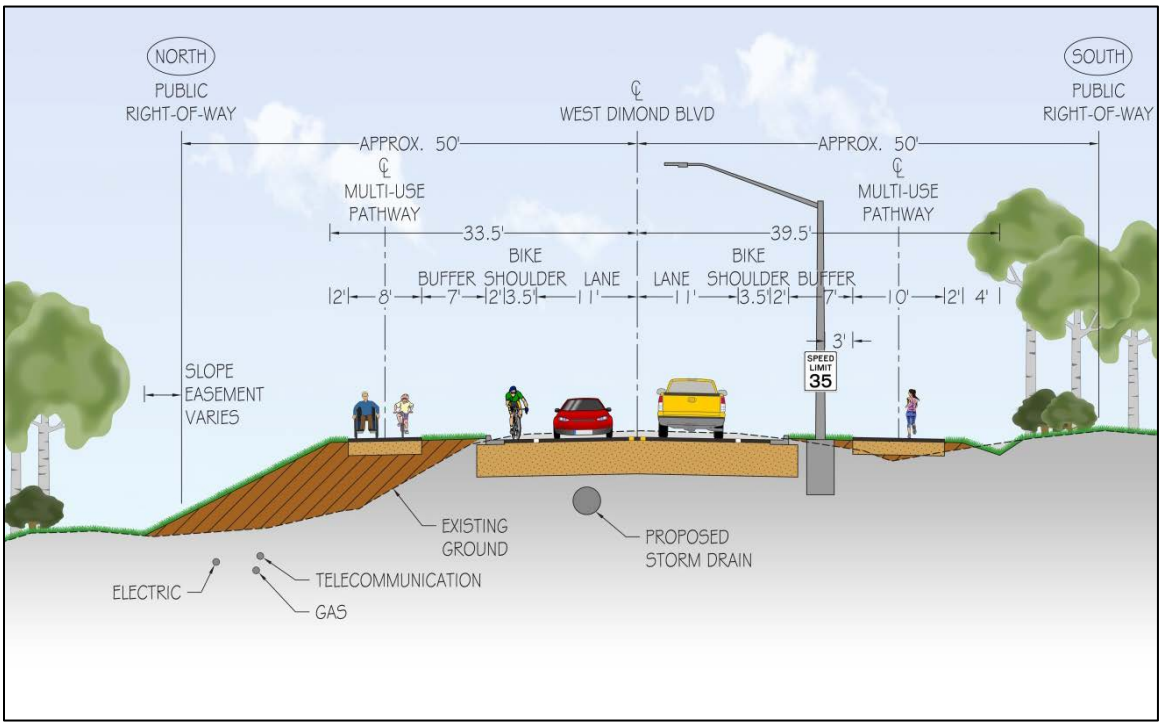
The proposed improvements will adhere to current standards for a Class I Collector, improve intersection movements to increase traffic flow and provide traffic calming measures to control vehicle speeds, thereby improving pedestrian and bicycle safety.

Recommended improvements along the corridor include:

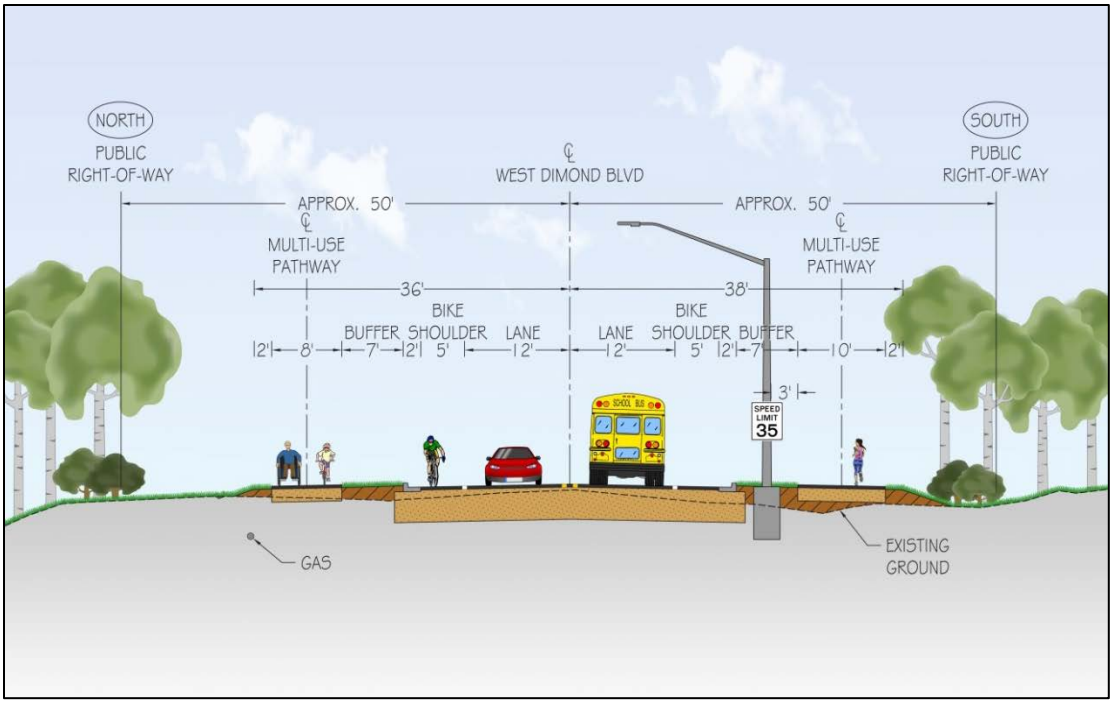
- Reconstruction of the roadway surface and structural section with two-inches of asphalt pavement, including shoulders to curb and gutter, with separated pathways on each side of the roadway.
- Roadway drainage will be collected along the curb and gutter and conveyed through catch basins and storm drain pipes to low spots, matching the existing drainage patterns. Whenever possible, the multi-use pathway will sheet flow to a ditch or swale located on the outside of the shoulder and discharge into existing low spots.
- A continuous roadway lighting system, utilizing Light Emitting Diode (LED) technology.
- Landscaping which will focus on preserving the natural, rural character of the roadway. The roundabout center islands provide an opportunity for a gateway into the neighborhood and will be landscaped as such.
- Modern single-lane roundabouts at Sand Lake Road and Westpark Drive intersections, with diameters between 115 feet to 130 feet.



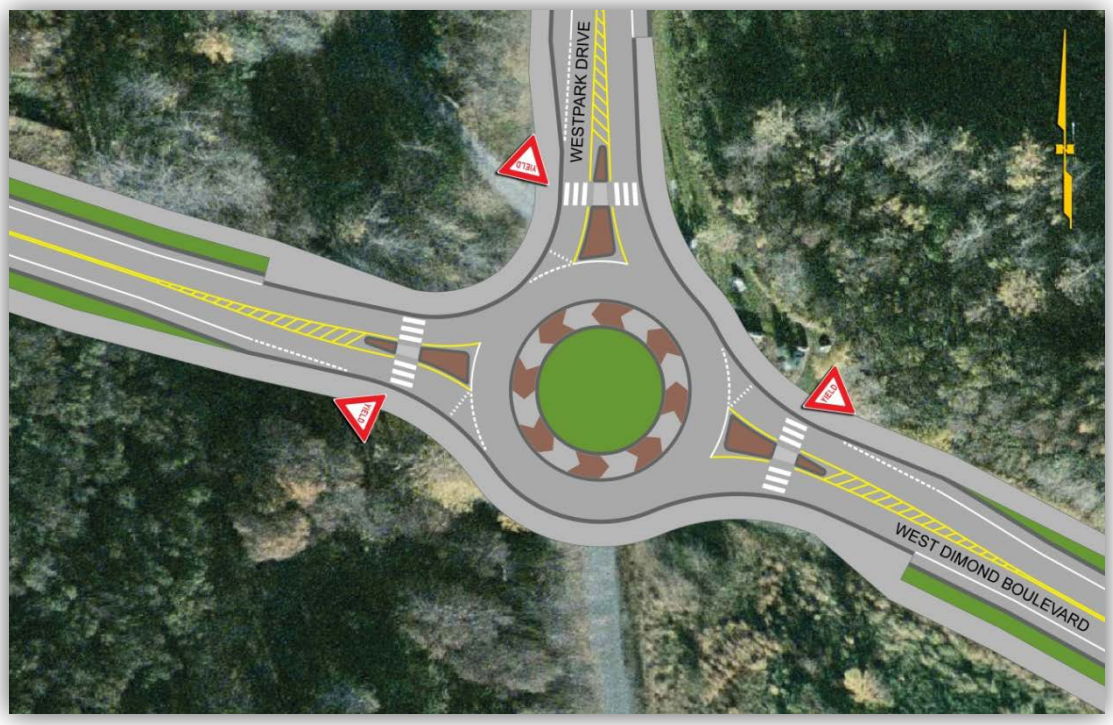
Recommended Alternative Jodhpur Street, Typical Section



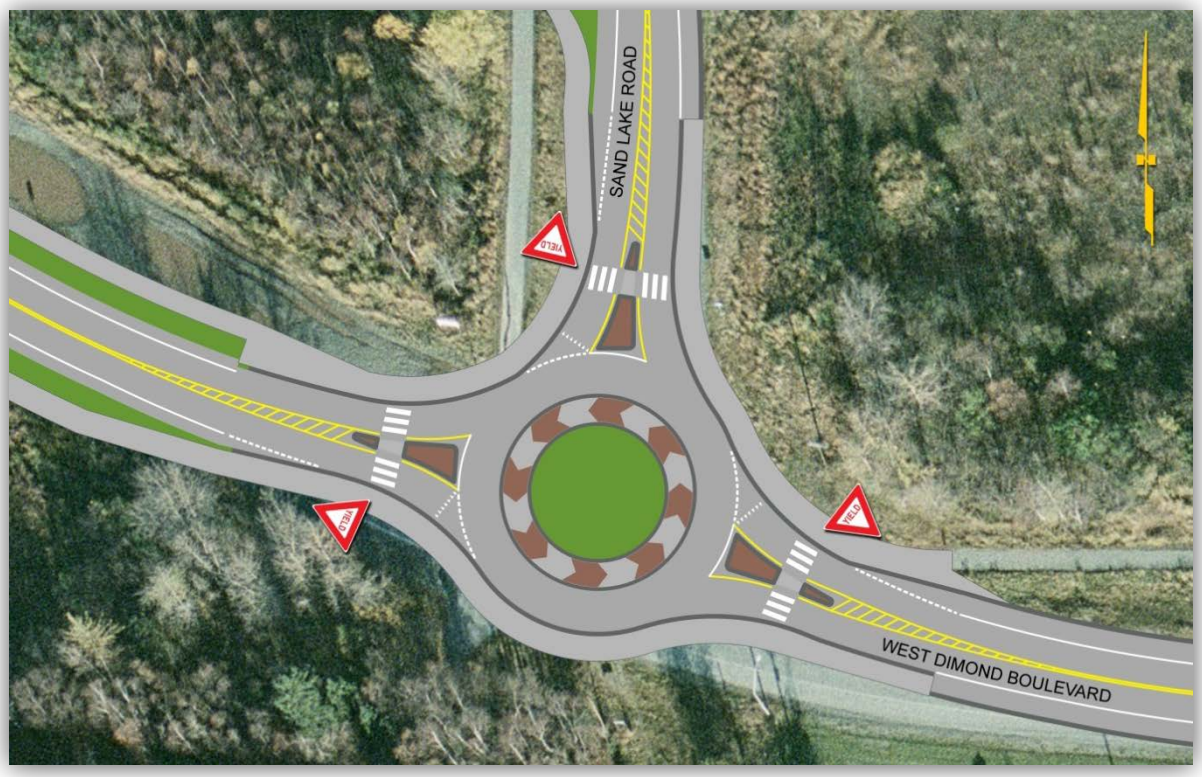
Recommended Alternative West Dimond Blvd
Jodhpur Street to Westpark Drive, Typical Section



Recommended Alternative West Dimond Blvd - Westpark Drive to Sand Lake Road, Typical Section



Single-Lane Roundabout at Westpark Drive Intersection



Single-Lane Roundabout at Sand Lake Road Intersection

The estimated costs for the preferred alternative are summarized as follows:

Cost Estimate

DESCRIPTION	ITEM	CALCULATION	ESTIMATED COST
Construction	A		$8,400,000
Utility Relocation	B		$650,000
Right-of-Way Acquisition	C		$500,000
Subtotal	D	A+B+C	$9,550,000
Construction Engineering	E	20% of D	$1,910,000
Contingency	F	30% of D	$2,865,000
Total (rounded)	**G**	**D+E+F**	**$14,400,000**

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LIST OF ACRONYMS

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway & Transportation Officials
ACS	Alaska Communications System
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Accessibility Guidelines
AMATS	Anchorage Metropolitan Area Transportation Solutions
AMC	Anchorage Municipal Code
APDES	Alaska Pollutant Discharge Elimination System
ASD	Anchorage School District
AWWU	Anchorage Water and Wastewater Utility
BMP	Best Management Practices
BOP	Beginning of Project
CAC	Citizen's Advisory Committee
CEA	Chugach Electric Association
CL	Centerline
CMP	Corrugated Metal Pipe
CSS	Context Sensitive Solutions
DCM	Design Criteria Manual
DIP	Ductile Iron Pipe
DOT&PF	Alaska Department of Transportation and Public Facilities
DSR	Design Study Report
EOP	End of Project
FHWA	Federal Highway Administration
F/O	Fiber Optic
GCI	General Communication
HDPE	High-Density Polyethylene
ICD	Inscribed Circle Diameter
IES	Illuminating Engineering Society
LED	Light Emitting Diode
LID	Low Impact Development
LOS	Level of Service
mph	Miles Per Hour
MOA	Municipality of Anchorage
MUTCD	Manual of Uniform Traffic Control Devices
OS&HP	Official Streets and Highway Plan
PCM	Alaska DOT&PF Highway Preconstruction Manual
PM&E	Project Management & Engineering
PZC	Planning and Zoning Commission
R&M	R&M Consultants
ROW	Right-of-Way
Sta	Station (100 ft)
SWPPP	Storm Water Pollution Prevention Plan
TRB	Transportation Research Board
UDC	Urban Design Commission

UGE	Underground Electric
USPS	United States Postal Service

WEST DIMOND BOULEVARD UPGRADE
JODHPUR STREET TO SAND LAKE ROAD
DRAFT DESIGN STUDY REPORT

1.0 INTRODUCTION

1.1 General

The MOA has contracted with R&M Consultants, Inc. (R&M) to provide engineering services associated with the upgrade of West Dimond Boulevard from Jodhpur Street to Sand Lake Road. The project repairs and enhances the existing roadway corridor and extends new pathways on a portion of Jodhpur Street from West Dimond Boulevard to provide a connection to the entrance of Kincaid Park's Jodhpur Street entrance. This section of roadway is located in southwest Anchorage and contained within the Sand Lake Community Council (see Figure 1.1 and 1.2).

The scope of this project is to plan, design and construct upgrades to the existing facilities of West Dimond Boulevard between Jodhpur Street and Sand Lake Road. This Design Study Report (DSR) is part of the planning process and documents the analysis responsible for the selection of the preferred alternatives. Studies conducted include: Geotechnical Recommendations, Illumination Recommendations, and Traffic, Safety and Alternatives Analysis.

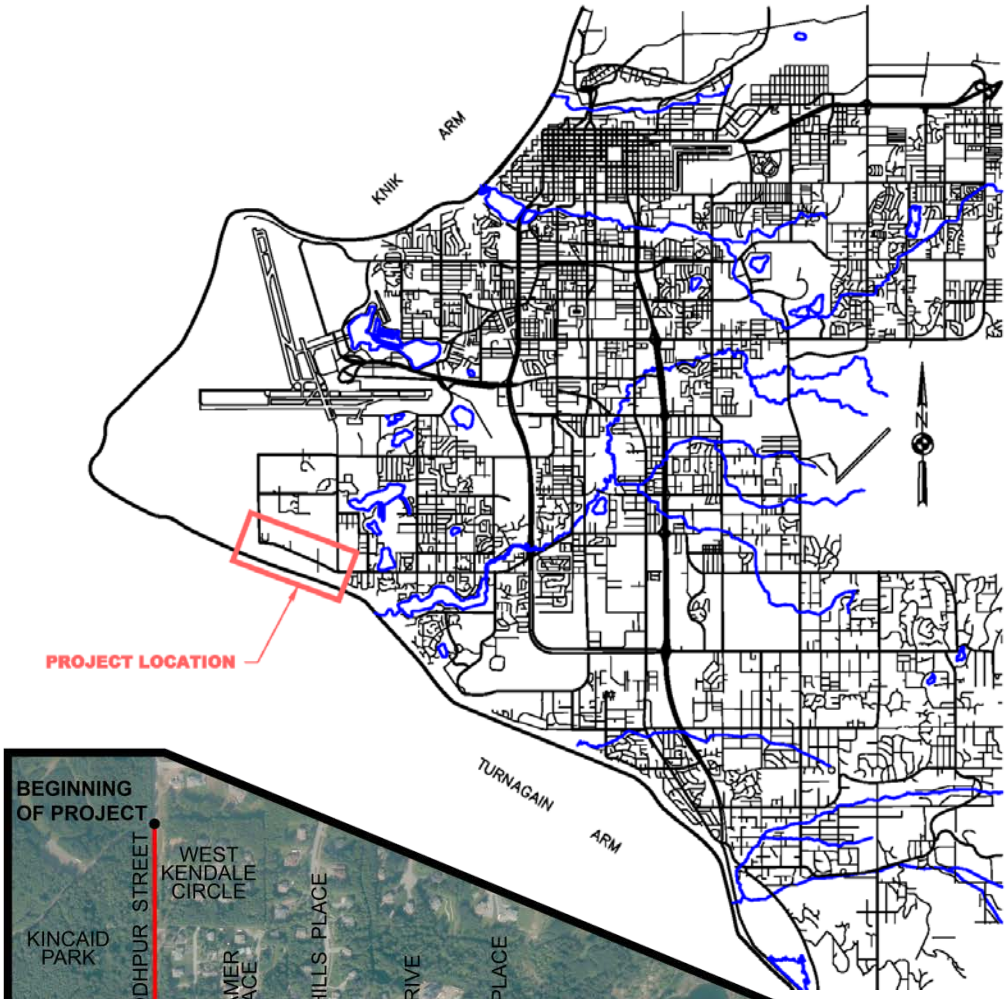
1.2 Purpose

Areas adjacent to the West Dimond Boulevard Upgrade project are experiencing residential population growth which will increase demand on the existing roadway and pedestrian facilities, especially the growth caused by the continued development of the Westpark Subdivision. There are also proposed school sites planned for the area to meet growing demand. The intersection of West Dimond Boulevard with Sand Lake Road is forecasted to exceed capacity sometime between 2025 and 2035 if no improvements are made.

The purpose of the project is to:

- Construct dedicated pathways and pedestrian amenities in the project corridor
- Improve safety by:
  - Improving horizontal and vertical geometry
  - Providing safe areas for pedestrians and bicycle use
  - Implementing traffic calming

Figure 1.1 Location Area



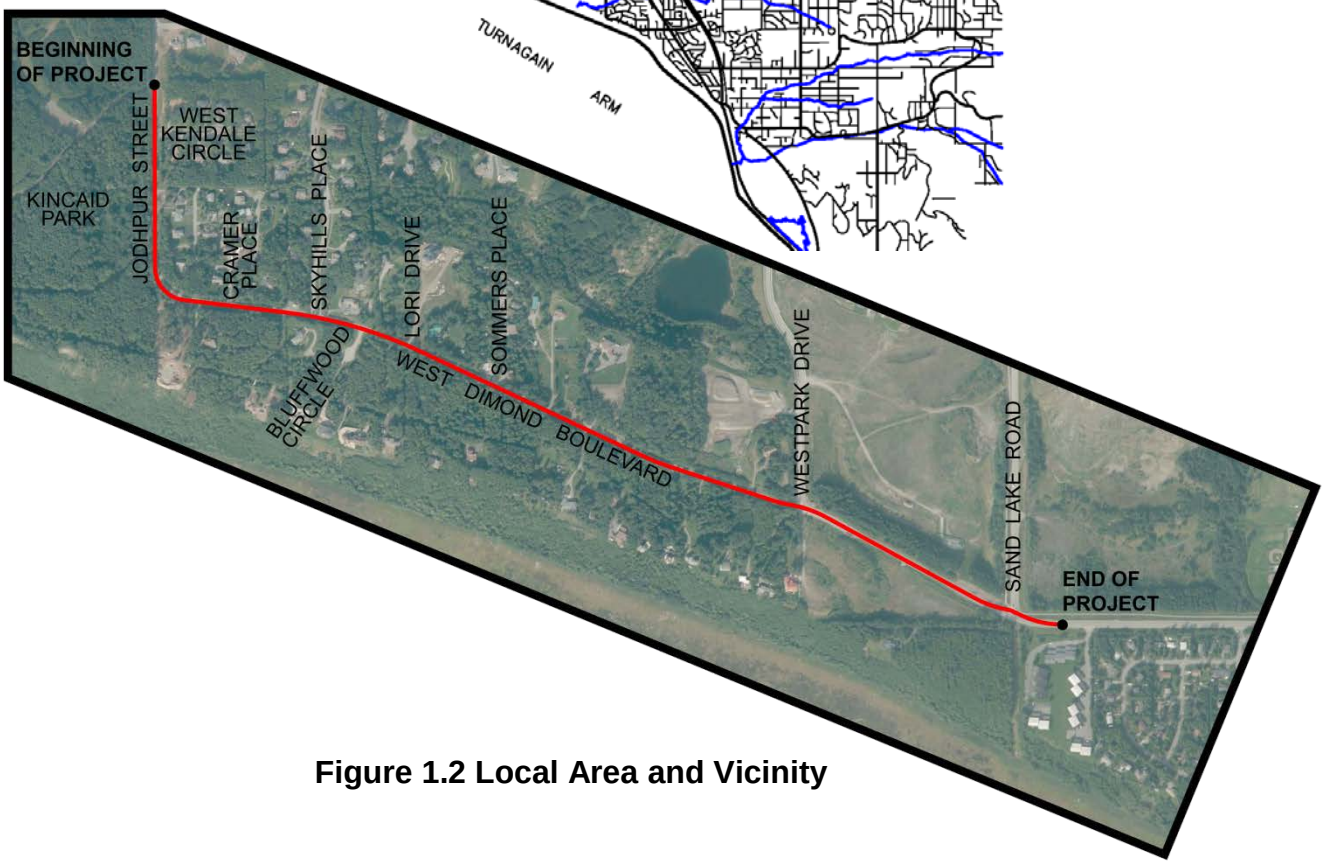


Figure 1.2 Local Area and Vicinity

- Upgrade the roadway and intersections to current municipal standards
- Construct a transportation facility which has adequate capacity for future growth and development of the area
- Improve major intersections to operate at adequate service levels in the future
- Provide a lasting and maintainable road surface

1.3 Project Needs

The process of this design study has highlighted specific needs which will be addressed by the proposed project. Other needs may exist, but those listed below were identified during the project scoping.

Problems identified during design study:

- No pedestrian and bicycle facilities (see Figure 1.3)
- Substandard horizontal and vertical geometry limiting intersection sight distance
- Excessive speeding
- Sand Lake Road intersection:
  - Skewed approach affecting sight distance and gap selection
  - Stop-sign control will not have adequate capacity in the future
- Pavement deterioration due to structural section fatigue (see Figure 1.4)

Figure 1.3 Sand Lake Road Intersection Looking West Showing Bicycle-Vehicle Conflicts (Source: Google Street View)

Figure 1.4 West Dimond Boulevard Showing Pavement Deterioration

1.4 Context Sensitive Solutions Summary/Project Goals

The West Dimond Blvd Project began in 2006 and closely followed the Context Sensitive Solutions (CSS) policy guidelines before CSS was officially adopted and implemented by MOA in 2009. CSS policy goals include involving stakeholders during the early stages of the project to help define the problems to be solved and to provide input on conceptual solutions to the problems. A concept phase summary including public involvement activities that have been completed to date are included in Appendix G and E, respectively. Goals identified from input from the public and agency stakeholders include:

- Provide pedestrian and bicycle facilities
- Improve safety
- Extend the trail on Jodhpur Street to Kincaid Park
- Address speeding
- Provide traffic calming
- Improve the curvature of the road in some sections
- Improve drainage
- Improve pavement conditions

- Provide shoulders
- Improve side street intersections with West Dimond Boulevard
- Reduce rolling hills along West Dimond Boulevard
- Provide turning lanes at West Park Drive and Sand Lake Road intersections
- Maintain the character of each section of roadway
- Include street lighting only in some sections
- Where practical, retain vegetation buffer

The design study phase and the DSR evaluates the improvements to the roadway, within the CSS policy framework, the Design Criteria Manual (DCM), the Official Streets and Highways Plan (OS&HP), Title 21 Land Use and Development Regulations and other adopted plans and standards to achieve these goals. The design study did not consider the No Action Alternative as viable as it would not solve or resolve the problems identified. The CSS project development process will continue through the design phase and will include opportunities for stakeholders to participate, evaluate and provide input through open houses, the project website, e-mails, phone calls, user group and community council presentations.

2.0 PROJECT HISTORY

West Dimond Boulevard is a major east-west transportation corridor in southwest Anchorage. The segment of West Dimond Boulevard from Jodhpur Street to Sand Lake Road represents the westernmost end of the alignment. According to the design documents entitled *Territory of Alaska – Alaska Highway and Public Works Department, Highway Division, Project No. 5202(1)*, the corridor was constructed in 1958 and was originally named Kincaid Road. The roadway was subsequently paved in the mid-1960s and served a former Nike military ground-to-air missile site and borough car dump which became park land in 1978. Jodhpur Street, the western terminus of the project, forms the eastern boundary of Kincaid Park. Since that time, Kincaid Park has transformed into 1,500 acres of rolling, forested hills and beautiful scenery that is now a major recreational destination for thousands of residents and visitors each year.

R&M began preliminary engineering for this project in February 2006. During 2006 and the spring of 2007, the topographic survey and geotechnical site investigations were completed, public involvement was started, and the preliminary engineering resulted in the Draft DSR submission on May 30, 2007. The Draft DSR underwent an internal review at MOA Project Management & Engineering (PM&E) but did not move forward for public review or boards and commission approval. The project was put on hold in 2007 pending available funding to complete the design and construct the improvements.

The MOA decided to resume the planning efforts once funding became available.

3.0 EXISTING CONDITIONS

3.1 Facility Description, Context, and Setting

Unlike the majority of West Dimond Boulevard, this roadway segment resembles a rural roadway with narrow pavement, ditches and an alignment that follows rolling terrain. MOA's *1996 OS&HP (Amended 2005)* classifies West Dimond Boulevard as a Class I Collector. This same classification was retained on the 2012 draft OS&HP. The project segment is also classified as an Urban Collector (Minor) by the State of Alaska Department of Transportation and Public Facilities (DOT&PF).

The roadway section from Jodhpur Street to Westpark Drive is generally contained within a 100' right-of-way (ROW) and consists of two 10-foot wide lanes with no shoulders. East of Westpark Drive, West Dimond Boulevard has two 12-foot lanes, 2-foot paved shoulders, 4-foot gravel shoulders, and is located on open, level terrain.

Figure 3.1 West Dimond Boulevard Between Jodhpur Street And Westpark Drive

Figure 3.2 West Dimond Boulevard Between Westpark Drive And Sand Lake Road

Non-motorized (pedestrians, bicyclists, etc.) facilities currently do not exist within the project corridor. Several intersecting roadways do have dedicated non-motorized facilities. Skyhills Drive, which provides access for two adjacent residential developments, Skyhills Subdivision and Barnhill Subdivision, has pedestrian facilities that intersect into West Dimond Boulevard. In addition, separated pathways exist along the west side of Westpark Drive and Sand Lake Road, as well as on the north side of West Dimond Boulevard east of Sand Lake Road, outside of the project boundaries.

3.2 Traffic Conditions

Kinney Engineering completed a Traffic, Safety and Alternatives Analysis in February 2013. The analysis is summarized below and the full version is included in Appendix D.

3.2.1 Existing Traffic Volumes

Average Annual Daily Traffic (AADT) volumes were obtained from DOT&PF's *Central Region Annual Traffic Volume Report* (2000-2011). Values from these reports are tabulated in Table 3.1 below. These historical traffic volumes are used for evaluation of the crash history and projection of future traffic volumes.

Table 3.1 AADT Traffic Volume 2011

ROADWAY	SEGMENT	AADT 2011
West Dimond Blvd	Sand Lake Rd to Jodhpur St	1,199
West Dimond Blvd	Edinburgh Dr to Sand Lake Rd	4,472
Sand Lake Rd	West Dimond Blvd to Kincaid Rd	2,574
Jodhpur St	West Dimond Blvd to Kincaid Rd	423

The Design Year traffic volumes can be found in section 4.3 and Appendix D.

3.2.2 Speed Data

Three speed studies (radar) were conducted within the project limits during February 2006 on Jodhpur Street, Sand Lake Road, and West Dimond Boulevard. The MOA also conducted a speed study for West Dimond Boulevard in May 2006. Existing speed data from the traffic studies within each project segment are summarized below:

Table 3.2 Speed Data Summary

LOCATION	MEAN SPEED	85TH PERCENTILE SPEED	POSTED SPEED	HIGHEST SPEED RECORDED
Jodhpur St	32 mph	34 mph	35 mph	35 mph
West Dimond Blvd Jodhpur St to Westpark Dr	44–45 mph	48-50 mph	45 mph	>65 mph
West Dimond Blvd Westpark Dr to Sand Lake Rd	38 mph	44 mph	45 mph	53 mph

3.2.3 Crash Rates

Crash information was provided by the Central Region Traffic and Safety Section of DOT&PF and by the Municipality of Anchorage, Traffic Department for 2000 to 2009. There were 22 crashes during this period including 1 fatality. These were sorted into intersections and segment locations; however, the single crash at Westpark Drive intersection is included in both analyses.

Table 3.3 Intersection Crash Rates 2000 - 2009

INTERSECTION	FATALITY	MINOR INJURY	PROPERTY DAMAGE	TOTAL
Sand Lake Rd West Dimond Blvd	0	5	9	14
Westpark Dr West Dimond Blvd	0	0	1	1

Table 3.4 Segment Crash Rates 2000-2009

SEGMENT	FATALITY	MINOR INJURY	PROPERTY DAMAGE	TOTAL
West Dimond Blvd. Sand Lake Rd to Jodhpur St	1	2	5	7
Jodhpur St West Dimond Blvd to Kincaid Park Entrance	0	0	1	1

3.2.4 Intersection Turning Movements

Turning movement data were collected in February and March of 2006 at the Skyhills Drive and Sand Lake Road intersections with West Dimond Boulevard. The Westpark Drive and West Dimond Boulevard intersection turn movements were counted in January of 2013.

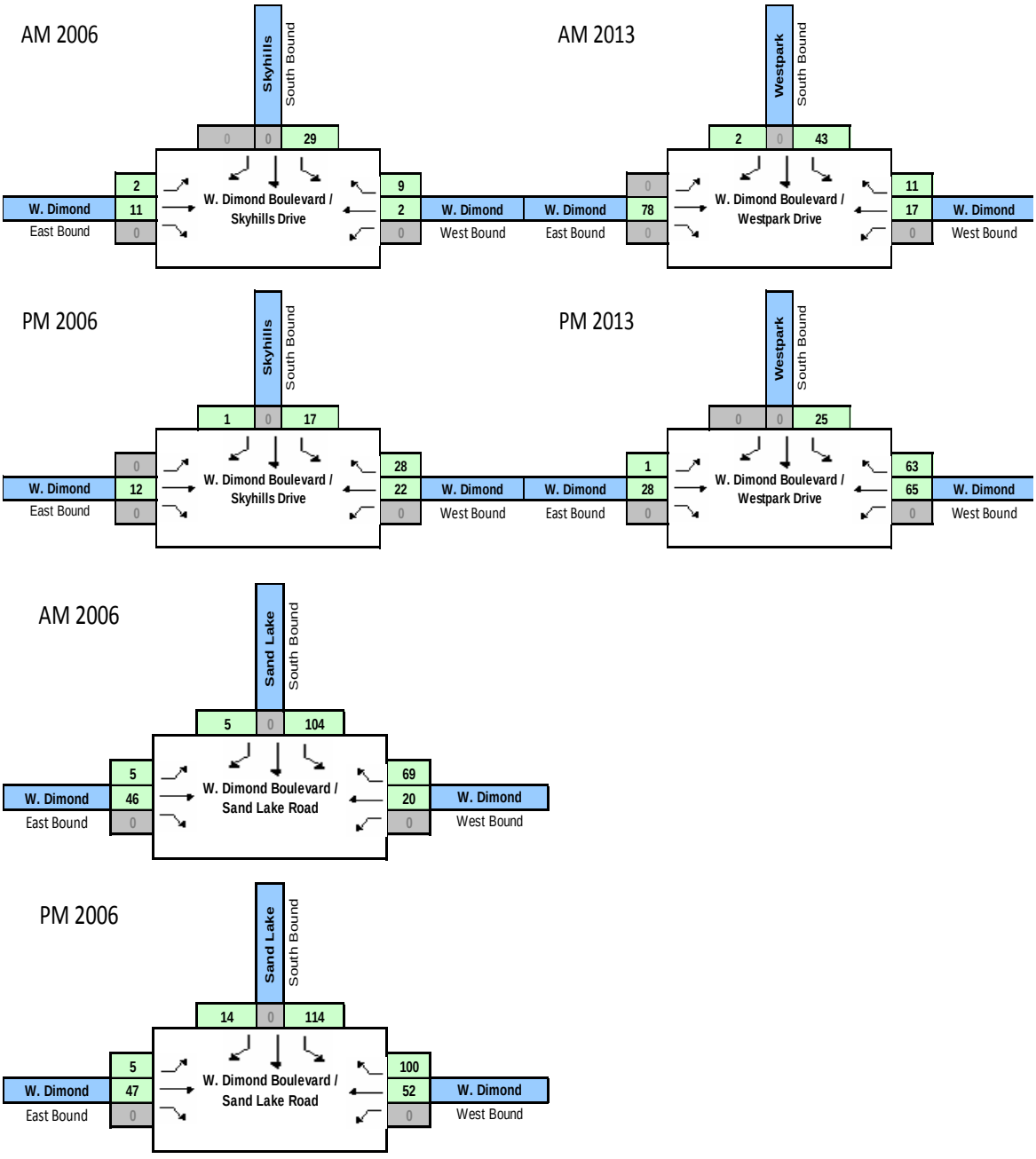


Figure 3.3 2006 and 2013 Peak Hour Turning Movement Counts

3.3 Land Use and Ownership

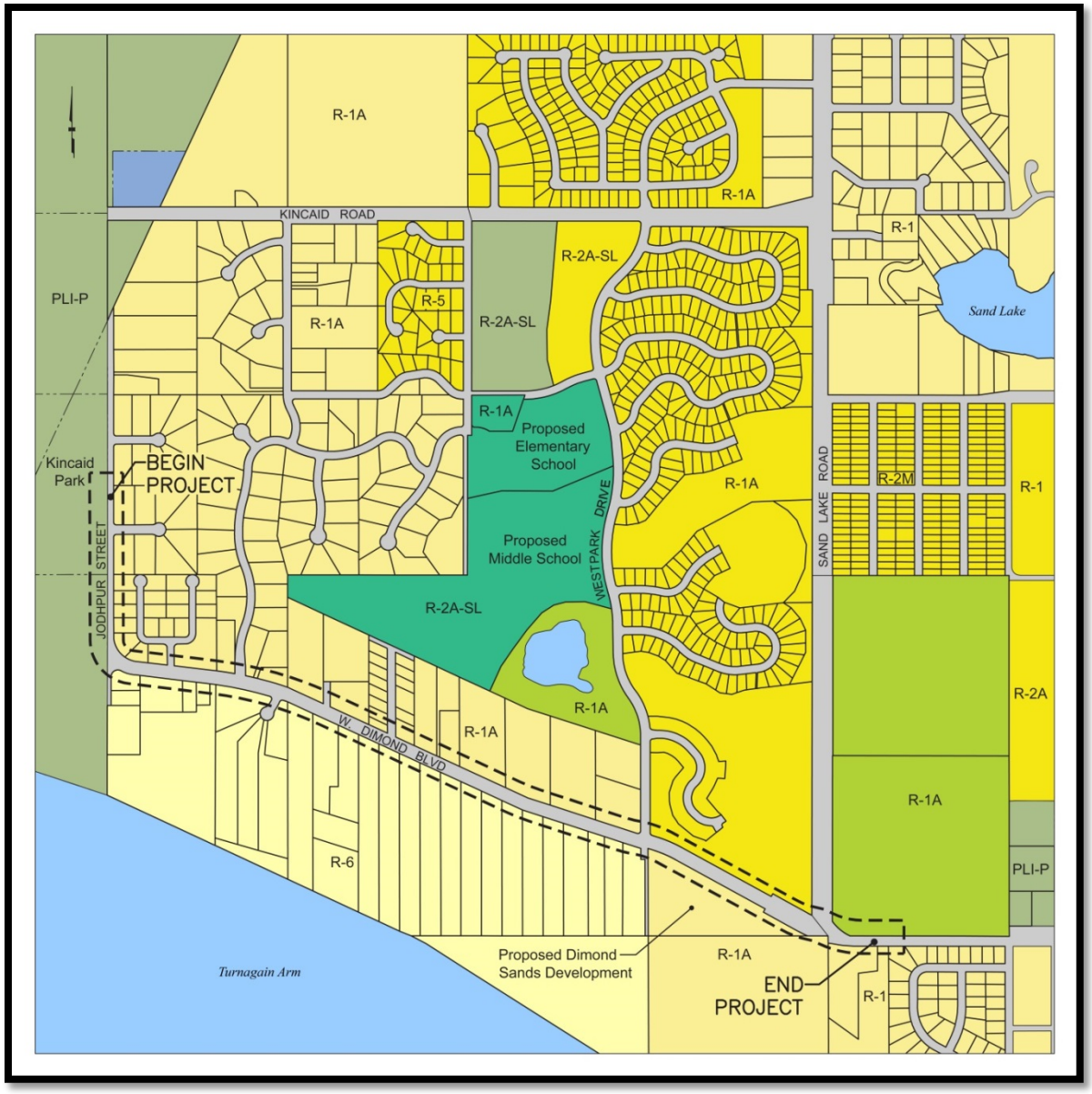
The land adjacent to the West Dimond Boulevard corridor is currently a mix of both large-lot residential development set back from the roadway, single family residential and vacant land tracts zoned for medium density residential development. The corresponding zoning districts are R-6 (Suburban Residential District), PLI-P (Public Lands Institutional), and R-1A (Single Family Residential).

Kincaid Park is a dedicated Municipal park on the western boundary of the project corridor along Jodhpur Street and is zoned PLI-P. East of Jodhpur Street and north of West Dimond Boulevard, R-1A zoning extends easterly along the entire length of the project to Sand Lake Road. R-1A zoning also exists on the south side of the corridor from Westpark Drive to Sand Lake Road. The remainder of the zoning south of Dimond Boulevard from Jodhpur Street to Westpark Drive is R-6 (see Figure 3.4 Land Use and Zoning).

The MOA and the Anchorage School District (ASD) owns two vacant tracts north of West Dimond Boulevard within the Westpark Subdivision that is a future site for both an elementary and middle school to serve the future needs of the area as it develops. Westpark Drive is a dedicated Municipal right-of-way that is a north-south collector connecting Kincaid Road to West Dimond Boulevard. West Dimond Boulevard between Jodhpur Street and Sand Lake Road is also owned by MOA.

There are several large tracts of vacant, buildable land zoned for residential development (R-1A) adjacent to West Dimond Boulevard within the project corridor. One of these includes the Dimond Sands property south of West Dimond Boulevard between Westpark Drive and Sand Lake Road which show preliminary plans for attached single-family residential dwellings on 44 lots. Coordination to ensure that development plans and the West Dimond Boulevard upgrade project are ongoing and will continue during subsequent phases of the project. Another planned development within the project area is the Sonoma Glen at Westpark Planned Unit Development Phase 1 on the southern end of the Westpark Subdivision. Sonoma Glen at Westpark is approximately 39 acres and is being phased in five parts for the construction of approximately 220 dwelling units with a mix of both single family and residential duplexes north of West Dimond Boulevard between Westpark Drive and Sand Lake Road.

The DOT&PF owns several roadways and the corresponding intersection rights-of-way in the area including Jodhpur Street, Sand Lake Road, and Dimond Boulevard east of Sand Lake Road. Improvements for this project will be coordinated with DOT&PF.



ZONING AND LAND USE

- R-6 Residential Limited Intensity
- R-1, R-1A Residential Low Intensity - Detached Houses
- R-1A, R-2A, R-2A-SL, R-5 Residential Low Intensity - Attached & Detached Houses
- PLI-P Parks and Natural Resource
- R-1A Other Area that Functions as Park & Natural Resource
- R-1A, R-2A-SL Schools & Community Institutional
- PLI-P Public Utility / Facility
- Project Perimeter

Figure 3.4 Land Use and Zoning

3.4 Landscaping

The landscape inventory includes an overview of existing vegetation, fences, views and elements related to the aesthetics of the area including neighborhood character. Initial observations were performed in the fall when most of the deciduous vegetation was bare. The area is marked by large stands of native forest. Most of the forest immediately adjacent to the road includes mature alder, willow and cottonwood, all of which are indicative of disturbance. Mature spruce forest with some birch and cottonwood trees forms the major vegetative patterns outside areas of disturbance. Large alder and willow penetrate the roadway prism, making the road feel narrow and providing a rural element.

The road has a rollercoaster alignment in terms of vertical curves. The existing road tends to follow the gentle and steep bits of terrain that characterize the area. Numerous cut and fill slopes occur on either side of the roadway, most are heavily vegetated with mature alder. Many long narrow gravel driveways provide access to adjacent residences, particularly on the south side of West Dimond Boulevard. Access drives on the north side of West Dimond Boulevard and the east side of Jodhpur Street are generally paved, providing shared access or leading to housing developments. Mailboxes cantilever over the roadway shoulder along much of the alignment adding to the rural character. Fences, landscape trees, shrubs and lawns are atypical.

The roadway corridor is within a low-density residential neighborhood with many relatively older homes. The neighborhood to the south includes homes located between the bluff and the road. Zoning for these homes is R-6, large-lot residential with all lots developed. On the north side of the road, between Sand Lake Road and Jodhpur Street, the character along the road is changing. Newer homes and entries to new subdivisions are visible. Still, there are large areas of native vegetation that line and distinguish the roadway corridor. Zoning on the north side is typically R1-A which is fairly low density with minimum lot sizes of 8,400 sf. To the north, the Westpark subdivision includes new internal subdivision streets and residential sited into land that was once a large gravel pit. Approximately three quarters of the lots are developed. To the south of the intersection a large parcel of land is currently vacant, but devoid of vegetation.

According to the Anchorage Wetlands Management Plan, there are no wetlands within or adjacent to the project corridor.

3.5 Drainage

Existing drainage within the project area consists of sheet flow from roadway pavement into ditches along the roadway which outfalls into existing low areas. These low areas collect drainage but have no further conveyance. Runoff from storm events most likely infiltrates into the surrounding grade.

Figure 3.5 Infiltration Basin Near Skyhills Drive

Figure 3.6 Standing Water

There are no primary watercourses (major waterways or streams) that enter, cross or exit the project area. Standing water has been observed alongside the roadway between Westpark Drive and Sand Lake Road, likely due to the flat grade and lack of outfall.

The existing drainage along the West Dimond Boulevard Upgrade project area is made up of eight drainage basins to the north and four to the south. The basins are delineated on the drainage plans found in Appendix C and described as follows:

3.5.1 North Basins

Beginning of Project (BOP) to Skyhills Drive: This basin sheet flows south along Jodhpur Street and then turns east along West Dimond Boulevard into a low area northwest of Skyhills Drive. There is a culvert crossing of Cramer Place, along West Dimond Boulevard that conveys the flow from the ditch east towards the low area.

Skyhills Drive: This basin is bounded by Skyhills Drive to the east, West Dimond Boulevard to the south and a high area in the northeast which directs drainage to an existing retention basin.

Skyhills Drive to Lori Drive: This basin is bound by high points on all sides and includes Lori Drive. There are two identifiable low areas; the first located in the project ROW and the second being located in the southeast corner of Lot 7B, Block 2, Seaview Heights Subdivision. Drainage typically flows from west to east through two culverts to reach the low area on Lot 7B.

Lori Drive to Station (Sta) 68+00: This basin area is bound by high spots on all sides (includes Sommers Place) and drains towards a low area located in portions of Lots 6, 7A and 5C, Block 2, Seaview Heights Subdivision.

Sta 68+00 to 71+00: This basin is bound on three high sides, and drains towards the north and eventually into the lake located in Tract 10, Kincaid Estates Subdivision. There are two identifiable low areas in Tract 4, Block 2, Seaview Heights Subdivision. However, these low areas are not large enough to retain a significant amount of water.

Sta 71+00 to Westpark Drive: This basin drains from the west (Tract 3, Block 2 Seaview Heights Subdivision) and the east (Tract 1B) and collects in a low area located in Tract 2 along West Dimond Boulevard. There is an existing berm to the north of the low area. During a large storm event, this berm could cause water to flow across the roadway towards the low area to the south.

Westpark Drive to Sand Lake Road: This basin sheet drains from West Dimond Boulevard towards the north and down into the Kincaid Estates Subdivision. The east side of Westpark Drive and the west side of Sand Lake Road also drains into the subdivision.

Sand Lake Road to End of Project (EOP): This basin is bound by Sand Lake Road to the west and West Dimond Boulevard to the south and sheet drains to the north east. The low area is well to the north of the project area.

3.5.2 South Basins

BOP to Bluffwood Circle: This basin drains along the road before heading south away from the project area and towards the inlet. There are two existing culverts along this stretch of roadway. The first is a driveway crossing at Sta 49+00 and the second crosses Bluffwood Circle.

Bluffwood Circle to Sta 69+20: This basin sheet drains from the south towards a low area at Sta 68+00. There is another low area at Sta 69+20 just east of an existing driveway that does not seem to continue flowing elsewhere. A corrugated metal pipe (CMP) end section was located 850 feet east of Lori Drive near the low area at Sta 68+00. The north end of the pipe was not found. It is assumed that this pipe drains the south basin toward the lower north basin.

Sta 69+20 to Westpark Drive: This basin sheet drains from the south towards a low area at Sta 78+00. There are two other low areas in this basin. The first is located at Sta 76+50 and drains into the low area at 78+00. The second low area is located just east of a driveway at 79+50 and does not appear to continue flowing elsewhere.

Westpark Drive to EOP: This basin drains towards the center into several low areas with the largest being located 215 feet from centerline at Sta 97+00. The low areas eventually drain south towards the inlet. There is one CMP at Sta

92+50 which facilitates ditch flow into an existing swale and towards the low areas.

3.6 Utilities

Existing utilities within the project perimeter consist of drinking water, sanitary sewer, storm sewer, gas, electricity, and communication. The majority of properties along this reach of West Dimond Boulevard have on-site well and septic systems.

The locations of the utilities were recorded during field surveys along with record drawing research. Additional surveys will be performed during the design phase. A brief description of each utility is found below.

3.6.1 Water

An Anchorage Water and Wastewater Utility (AWWU) owned 30-inch ductile iron pipe (DIP) transmission main (installed in 1999) enters the project limits from the east and runs along West Dimond Boulevard and then turns 90 degrees north at Sand Lake Road along the eastern right-of-way limit. A 12-inch DIP leg extends approximately 300 feet along West Dimond before turning north into the Westpark Subdivision. An 8 and 12 inch DIP main terminate at West Dimond Boulevard at Skyhills Drive and Westpark Drive, respectively. Furthermore, a 12 inch main runs west along West Kendale Circle and turns north onto Jodhpur Road.

The residential subdivision (Tract B, Dimond Sands) is in the planning stages with a proposed extension of the 12-inch main. The only fire hydrant in the project limits is located in the northeast quadrant of the Sand Lake intersection.

3.6.2 Sanitary Sewer

A 16-inch DIP (installed in 2005) owned by AWWU runs along the south side of West Dimond Boulevard to serve the residential subdivision (Tract 1, Kincaid Estates) to the northwest. This system flows southeast from the subdivision via lift station, crosses West Dimond Boulevard, and then flows east by gravity along West Dimond Boulevard. Once the system reaches the manhole approximately 400 feet east of the intersection with Sand Lake Road, the pipe size downstream increases to 24-inch DIP. Currently, there are no other connections to this system in the project area, though the residential subdivision (Tract B, Dimond Sands) is in the planning stages with a possible sewer extension.

3.6.3 Natural Gas

ENSTAR Natural Gas company facilities in the project area consist of underground plastic and steel gas pipe mains and services. The gas main pipe is buried along the north side of West Dimond Boulevard ROW and runs between

Cramer Place and Sand Lake Road, where it meets a 6-inch line in the west Sand Lake Road ROW. The gas main then crosses West Dimond Boulevard to the south and bends 90 degrees to the east, running along the south ROW until exiting the project area. The pipe west of Sommers Place is three-inch plastic and to the east the pipe transitions to six-inch steel. All gas service lines located in the project area are plastic and range in size from 5/8 to 4 inches.

3.6.4 Telephone

Underground telephone communications cables owned by Alaska Communications System (ACS) exist in 10-foot wide easements along the north side of the West Dimond Boulevard ROW in two locations; the first being underground communications cable running 350 feet southeast of the Sommers Place intersection, and the second is an underground Fiber Optic (F/O) cable running 400 feet northwest of the Sand Lake Road intersection. The underground F/O cable begins at an F/O pedestal and then crosses the Sand Lake Road ROW from the west to the east and terminates at a telephone pedestal located at the east end of the crossing.

Figure 3.7 Roadway Illumination Pole

3.6.5 Electric Utilities

There are a number of Chugach Electric Association (CEA) owned overhead electric utility poles along West Dimond Boulevard. Overhead electric lines parallel West Dimond Boulevard from Jodhpur Street to Lori Drive and Westpark Drive to Sand Lake Road. Overhead electrical lines also cross West Dimond Boulevard at 7 locations. The existing illumination system consists of luminaires mounted on steel poles at the Sand Lake and West Dimond Boulevard intersection and on wooden poles for the rest of the project area. The power for the luminaires is supplied via aerial cable from pole to pole or from pole mounted transformers. Control is accomplished using photoelectric cells at each of the luminaires. Most of the lights are provided by Chugach Electric and are paid for at a flat rate. The luminaires are non-cutoff and

Figure 3.8 Utilities near Lori Drive

are 150 or 250 Watt. Load centers are located at West Kendale Circle and Bluffwood Circle.

3.6.6 Cable

Existing cable facilities, owned by General Communication Inc. (GCI), traverse West Dimond Boulevard between Skyhills Drive and Lori Drive and again just east of Sommers Place. These facilities consist of aerial coaxial and F/O cables mounted on treated wood poles. The poles are shared-use and owned by CEA.

3.6.7 Storm Drain

In 2006, a horizontal directional drill was employed to construct a 24 inch High-Density Polyethylene (HDPE) storm drain outfall for the Westpark Subdivision. The bore began near the existing sanitary sewer lift station and crossed West Dimond Boulevard near the intersection with Sand Lake Road. From there, the pipe continued on a southerly heading, centered within the section easement, to finally outfall into Turnagain Arm.

3.7 Mailboxes

Mail delivery to the residents along West Dimond Boulevard is accomplished through single-serve mailboxes located on the south side of the roadway, except for the Campbell Point, Sky Hills, and Wood Cliff subdivisions, which are served by cluster mailboxes located outside the project footprint. Approximately 35 single-serve mailboxes are located within the project perimeter, ranging from one to nine per location.

Figure 3.9 Grouped Individual Mailboxes at Sommers Place

3.8 Geotechnical Investigations Summary

A geotechnical investigation for the West Dimond Boulevard Upgrade, Jodhpur Street to Sand Lake Road was performed in fall 2006. The investigation included 20 test borings to depths of 16.5 to 21.5 feet. Soil classification of the test borings found highly variable soil conditions along the alignment, with frost classifications ranging from S1/S2 to F4. The existing structural section ranged in thickness from less than 2 feet to about 4.5 feet thick. Fill material greater than 10 feet thick was encountered in some areas. No groundwater was observed during the investigation (see Appendix B, Geotechnical Investigation).

3.9 Environmental

According to mapping obtained from MOA's Watershed Management Service, there are no streams or wetlands within the project boundary. Erosion control measures will be limited to silt fencing, jute matting, topsoil and seeding. Jute matting is required whenever slopes are steeper than 2H:1V. To avoid a temporary degradation of water quality and to meet Alaska Pollutant Discharge Elimination System (APDES) permit requirements, Best Management Practices (BMP) will be implemented. The contractor will develop a *Storm Water Pollution Prevention Plan* (SWPPP), Type 3, detailing the project-specific measures to prevent pollutant discharge and minimize erosion.

4.0 DESIGN STANDARDS AND CRITERIA

4.1 General

West Dimond Boulevard is classified as a Class I Collector by the OS&HP. The project design year is 2035, assuming a construction year of 2015.

The segment from Westpark Drive to Jodhpur Street has rolling topography and ROW widths of 100 feet. The roadway segment between Sand Lake Road and Westpark Drive has ROW widths up to 150 feet.

4.2 Design Standards

The design guidelines and references used for this project are:

Table 4.1 References

Author	Name	Year
AASHTO	Guide for Development of Bicycle Facilities	2012
AASHTO	A Policy on Geometric Design of Highways and Streets	2011
AASHTO	Roadside Design Guide	2011
AASHTO	Guide for the Planning, Design, and Operation of Pedestrian Facilities	2004
AMC	Title 21 Land use Planning	current

Author	Name	Year
DOT&PF	Alaska Traffic Manual	2012
DOT&PF	Alaska Highway Preconstruction Manual	2005
DOT&PF	Standard Specifications for Highway Construction	2004
FHWA	Manual on Uniform Traffic Devices (MUTCD)	2009
FHWA	Roundabouts: An Informational Guide	2000
IES	Roundabout Lighting	2008
MOA	Standard Specifications (MASS)	2009
MOA	Design Criteria Manual	2007
MOA	Drainage Design Guidelines	2007
MOA	Anchorage Wetlands Management Plan	1996
MOA - AMATS	2035 Metropolitan Transportation Plan	2012
MOA - AMATS	Anchorage Bicycle Plan	2010
MOA - AMATS	Anchorage Bowl 2025 Long Range Transportation Plan with 2027 Revisions	2007
MOA - AMATS	Anchorage Pedestrian Plan	2007
MOA - AMATS	Official Streets and Highways Plan	2005
MOA - AMATS	Areawide Trails Plan (ATP)	1997
TRB	Highway Capacity Manual	2010
TRB	Practices for Resurfacing, Restoration and Rehabilitation	1987
TRIAD ENGINEERING	Westpark Subdivision Drainage Impact Analysis	2012
US Dept. Justice	ADA Standards for Accessible Design (28 CFR Part 36)	2011

4.3 Design Criteria

All geometric features of the roadway, including horizontal and vertical geometry, typical section configuration, non-motorized amenities, etc. are controlled by the selected design criteria. The design criteria was developed based on the functional classification of the roadway, current and projected traffic characteristics (volume, speed), and public involvement input. Table 4.1 provides a listing of the critical design criteria. Complete design criteria are presented in Appendix A. Identified Design Criteria Waivers are provided in Section 20.0 – Design Variances.

Table 4.2 Abbreviated Design Criteria

CRITERIA	JODHPUR STREET TO WESTPARK DRIVE	WESTPARK DRIVE TO SAND LAKE ROAD
Design Year AADT	2,184	5,627
Design Vehicle	WB-50	WB-50
Design Speed	40 mph	40 mph
Posted Speed	35 mph	35 mph
Lane Width	11 ft	12 ft
Shoulder Width	3.5 ft	5 ft
Multi-Use Pathway Buffer Width	7 ft	7 ft
Multi-Use Pathway Width	8-10 ft	8-10 ft
Clear Zone	14 ft	14 ft

Multi-use pathways will be added to both sides of the roadway, as required by the DCM. Multi-use pathways, separated from the roadway, have been selected to optimize snow storage and safety.

The multi-use pathway vertical grade will match the roadway grade. Therefore, the longitudinal grade at times exceeds the desired maximum grade of 5%. According to AASHTO's *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, grades in excess of 5% are permissible as long as they do not exceed the adjacent roadway grade. No feasible alternatives exist to reduce the pathway grade.

According to the DCM, Figure 1-11 and Section 4.2 I, paved multi-use pathways are typically 8 to 10 ft. wide. A higher volume of users is anticipated on the south multi-use pathway due to its connectivity with Kincaid Park. Therefore, it was decided to provide a 10 ft. wide multi-use pathway on the south side of West Dimond Boulevard.

4.4 Accessibility Guidelines

The project will be designed and constructed in accordance with the Americans with Disabilities Act Accessibility Guidelines (ADAAG), as adopted per the MOA's DCM Section 1-11. Below are the most important accessibility guidelines:

- Pedestrian travel route cross slopes not to exceed 2%
- Minimum 4 ft. wide curb ramps with running slopes not to exceed 8.33%
- 4 ft. wide landings at top and bottom of curb ramps

- Minimum pathway width of 5 ft. with minimum 3 ft. wide bypasses at driveways
- Detectable street crossing boundaries

5.0 TYPICAL SECTION ALTERNATIVES

5.1 General

Various design alternatives were investigated for the West Dimond Boulevard Upgrade project, including a no-action alternative and typical section alternatives. They are summarized in the following table and discussed in greater detail in the subsequent sections.

Table 5.1 Typical Section Alternatives

ALTERNATIVE	JODHPUR STREET TO WESTPARK DRIVE	WESTPARK DRIVE TO SAND LAKE ROAD	JODHPUR STREET
No-Action	✗	✗	✗
Uncurbed Section	✗	✗	N/A
Curbed Section	✓	✓	N/A
Multi-Use Pathway only	N/A	N/A	✓

Legend: ✗ not recommended ✓ preferred

5.2 No-Action Alternatives

The No-Action Alternative is the same for all segments and assumes acceptance of the existing conditions, without construction changes, but continued maintenance through the design year of the study period. The benefit is the near term construction cost savings. The downside is increased delays during peak hours at the Sand Lake Road and Westpark Drive intersections and not addressing the problems defined by stakeholders including the need for pedestrian and bicycle facilities, reducing opportunities for vehicles to speed, improving intersection delays and providing for future increased traffic projections from growth and development of homes and schools to serve the area.

5.3 Jodhpur Street to Westpark Drive

The rural character of the roadway corridor between Jodhpur Street and Westpark Drive fits the context for an uncurbed collector. However, the zoning north of the roadway is classified as R-1A or single-family urban residential zoning. Therefore, either curbed or uncurbed collector standards would be appropriate. The most significant difference

between the two collector types is the method by which storm water is collected and discharged. Both standards were analyzed and discussed in Sections 5.3.1 and 5.3.2.

The typical section for this roadway segment includes pathways and buffers on both sides of the alignment, consistent with requirements in the DCM for collectors and the connected roadway segment to the east. Each typical section alternative provides improved roadside conditions and the clear zone would be largely obstacle free.

The Citizen's Advisory Committee (CAC) provided significant input on typical sections for this rural segment. Some individual issues included natural setting preservation, minimization of impacts, providing pedestrian and bicycle paths, and providing roadway bike lanes (shoulders).

5.3.1 Curbed Typical Section

Using curb and gutter to capture roadway drainage reduced impacts by narrowing the total width of the improvements. This is accomplished by removing the need for a sizable ditch along the outside of the pathway. Drainage from the curb can be captured in catch basins the routed through buried pipes and discharged at ditch locations matching existing drainage patterns. Shoulders would be set at 3.5-foot width to the lip of curb, consistent with DCM requirements for curbed collectors. This shoulder width has an added benefit of satisfying the minimum width for bicycle lanes.

In comparison to the uncurbed typical section, there is a reduction in the impacts to existing vegetation and properties outside the ROW. It also reduces the overall excavation and backfill requirements for the roadway segment. Capturing roadway drainage in the curb eliminates sheet drainage washing over the pathways improving the pedestrian experience and decreasing maintenance needs of the pathway surface.

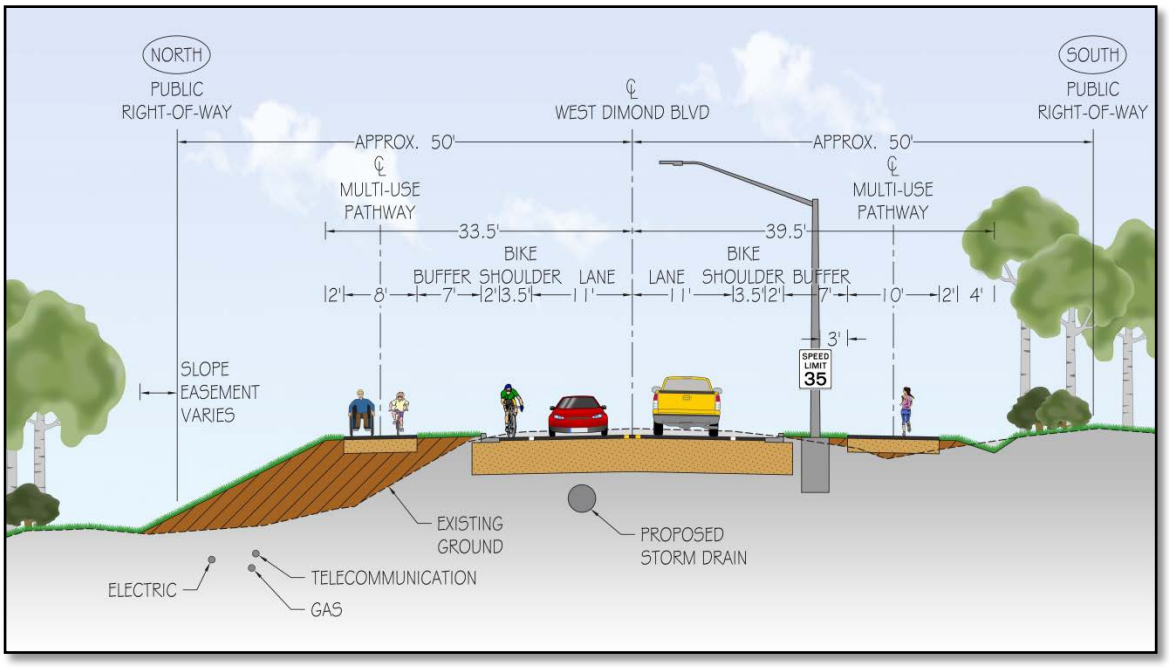


Figure 5.1 Curbed Typical Section – Jodhpur Street to Westpark Drive (preferred)

5.3.2 Uncurbed Typical Section

Eliminating the curb and gutter results in sheet flow drainage collected in parallel ditches. Placing this ditch between the roadway and pathway (per DCM 1-12) would significantly widen the footprint of the improvements due to the need for flatter ditch slopes within the clear zone. Therefore, as shown in Figure 5-3, the drainage ditch is located beyond the pathway.

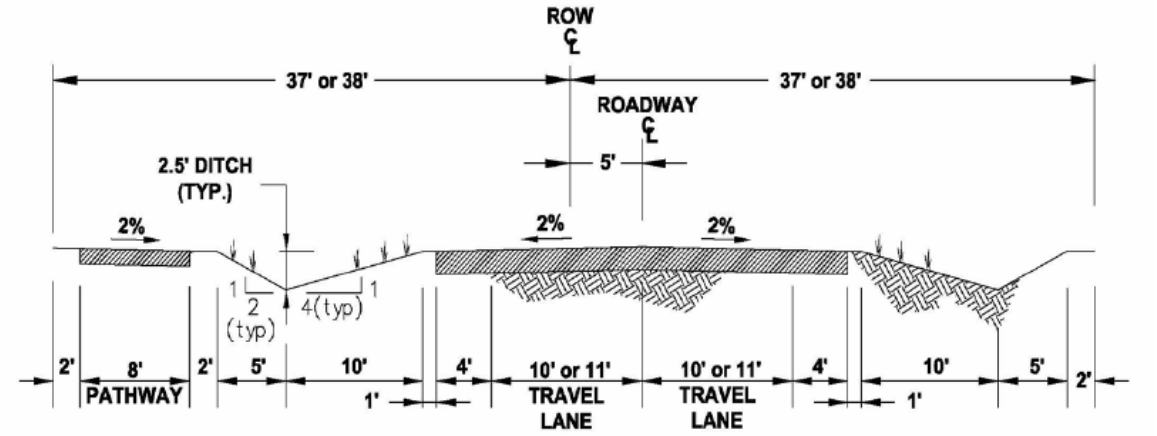


Figure 5.2 DCM Figure 1-12, Uncurbed Typical Section (not preferred)

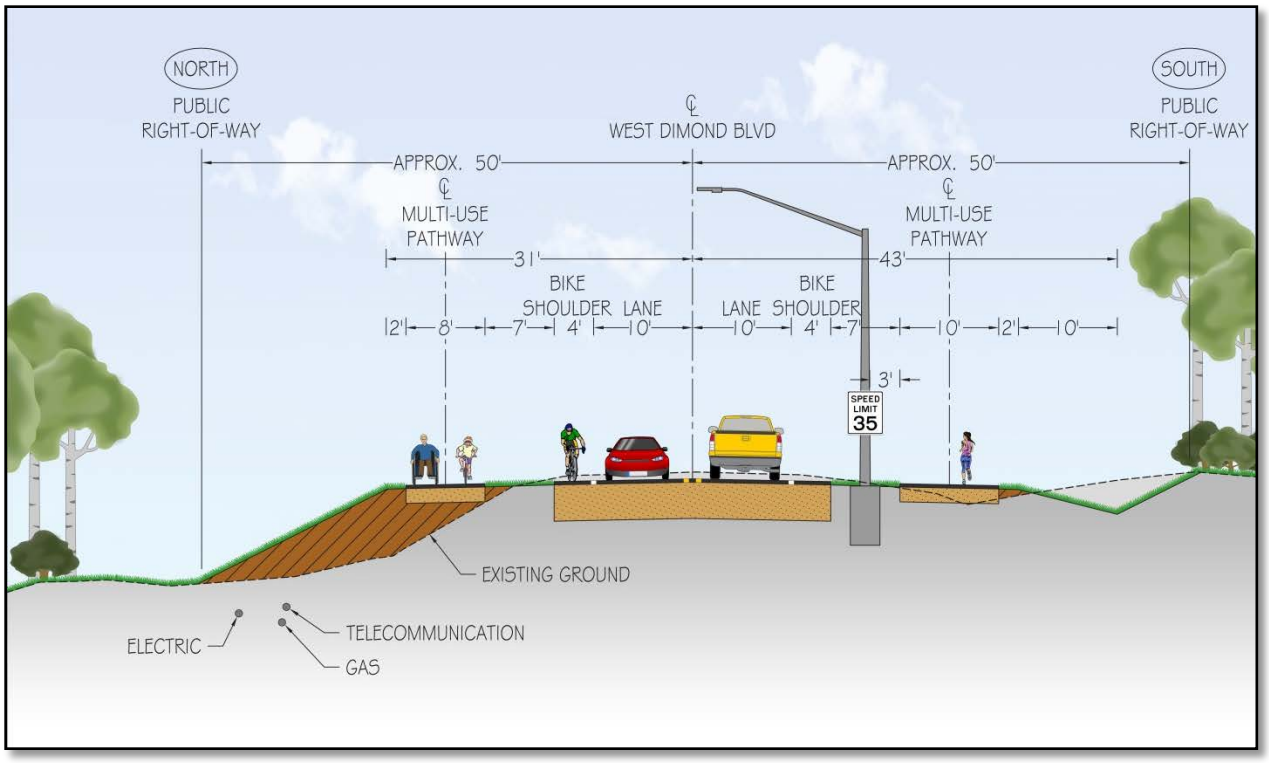


Figure 5.3 Uncurbed Typical Section
Jodhpur Street to Westpark Drive (not preferred)

The uncurbed typical section, without the added cost of curbs, allows for sheet drainage to be collected in ditches along the outside of the roadway improvements. Drainage would then be directed from the ditches into existing drainage patterns, similar to the curbed typical section alternative. This option is less desirable due to its increased ROW impact and decreased comfort to the pathway users as a result of the increased sheet flow.

5.4 Westpark Drive to Sand Lake Road

This roadway segment links the Westpark subdivision with the existing pathway and West Dimond Boulevard east of Sand Lake Road. Furthermore, the continued development of the Westpark area will increase pressure on this segment over the life of the project. Therefore, it is essential that a sufficiently sized transportation facility be provided to accommodate the expected growth and continue to meet functional requirements.

5.4.1 Curbed Typical Section

A curbed typical section with 5-foot shoulders and 12-foot lanes was selected for this roadway segment due to projected traffic volumes and residential

development already underway. The use of curb eliminates the need for sizable ditches along the outside of pathways.

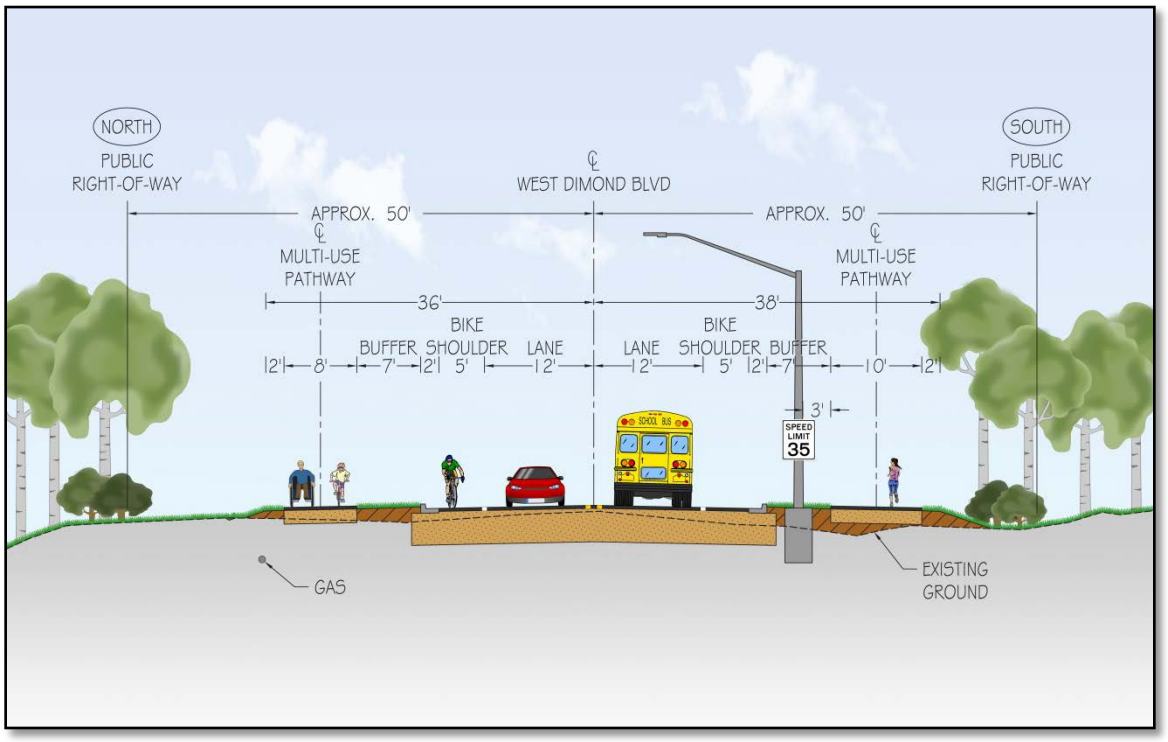


Figure 5.4 Curbed Typical Section
Westpark Drive to Sand Lake Road (preferred)

Very little existing vegetation would be disturbed by application of the desirable elements of the curbed typical section as shown in the DCM. The level terrain allows for the footprint to be contained within the existing ROW. The use of 12-foot lanes would be consistent with the Sand Lake intersection.

This configuration was presented to the project stakeholders through the public and agency involvement process. Positive feedback from the public, including the CAC and agency representatives, indicated the proposed typical section was acceptable. No further alternative elements were proposed for the roadway segment from Westpark Drive to Sand Lake Road.

5.5 Jodhpur Street

Pathways would be added to both sides along this segment of roadway to provide logical connectivity to neighborhoods and Kincaid Park. The multi-use pathway begins at the entrance to Kincaid Park (west side) and West Kendale Circle (east side) before continuing south to the beginning of the roadway improvements. The existing roadway will be resurfaced.

5.5.1 Pathway-only Typical Section

The existing roadway consists of two 10-foot paved travel lanes with 2-foot gravel shoulders on each side. A 7-foot wide buffer will be provided between the roadway shoulder and the edge of the pathway, consistent with subsequent sections. Ditches will be constructed beyond the pathway to capture and route the storm water. No other alternatives were evaluated.

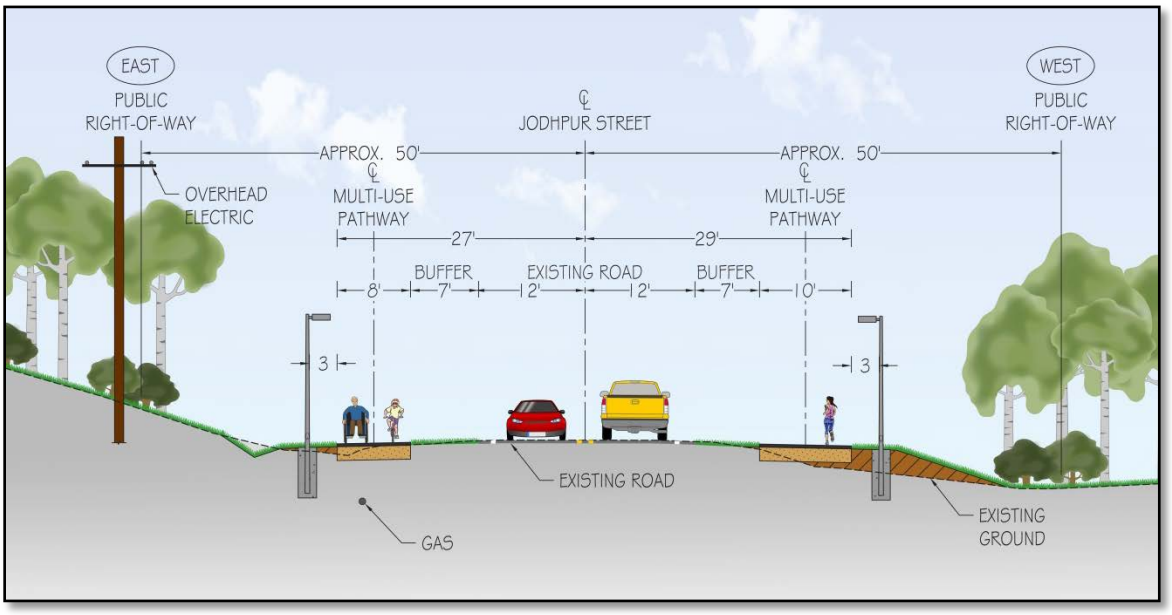


Figure 5.5 Pathway Typical Section – Jodhpur Street (preferred)

6.0 INTERSECTION ALTERNATIVES

6.1 General

Several intersection type alternatives were evaluated. The range of feasible intersection control alternatives was evaluated based on predicted traffic volumes and performance in the Traffic, Safety and Alternatives Analysis Report (Appendix D). An intersection is considered to have adequate capacity when it is functioning at Level of Service (LOS) C or better. The selected alternatives will undergo an independent peer review by a nationally recognized expert prior to final design.

The alternatives are summarized in the following table and discussed in greater detail in the subsequent sections.

Table 6.1 Intersection Alternatives

ALTERNATIVE	INTERSECTION WITH WESTPARK DRIVE	INTERSECTION WITH SAND LAKE ROAD
No-Action	✗	✗
Right Turn Lane	✗	✗
All-Way Stop Control	⊘	✗
Modern Roundabout	✓	✓
Traffic Signal	⊘	✗

Legend: ✗ not recommended ⊘ warrant not met – not analyzed ✓ preferred

6.2 Sand Lake Road

Sand Lake Road, a side street, is currently stop-controlled at the intersection with West Dimond Boulevard. The horizontal curve along West Dimond Boulevard through the intersection results in a less than desirable viewing angle for vehicles stopped at the Sand Lake approach, which is very near the limit of intersection skew recommended by AASHTO. Comparison of predicted benefits for each alternative is discussed below.

The horizontal skew of the Sand Lake approach could be reduced by realigning Sand Lake Road to approach more perpendicular to the intersection with West Dimond Boulevard for better vehicle visibility.

6.2.1 No Action

The side street stop sign on Sand Lake Road allows for free flow of traffic on West Dimond Boulevard. The no change alternative is predicted to reach a LOS E in the design year. Furthermore, pedestrians wanting to cross West Dimond Boulevard would experience a LOS F in the design year.

6.2.2 Add Westbound Right Turn Lane

Adding a right turn lane on West Dimond Boulevard would improve the design year LOS to D for the southbound movement. However, this solution would not serve pedestrians well because the crossing of West Dimond Boulevard east of Sand Lake Road would become longer, increasing pedestrian delay.

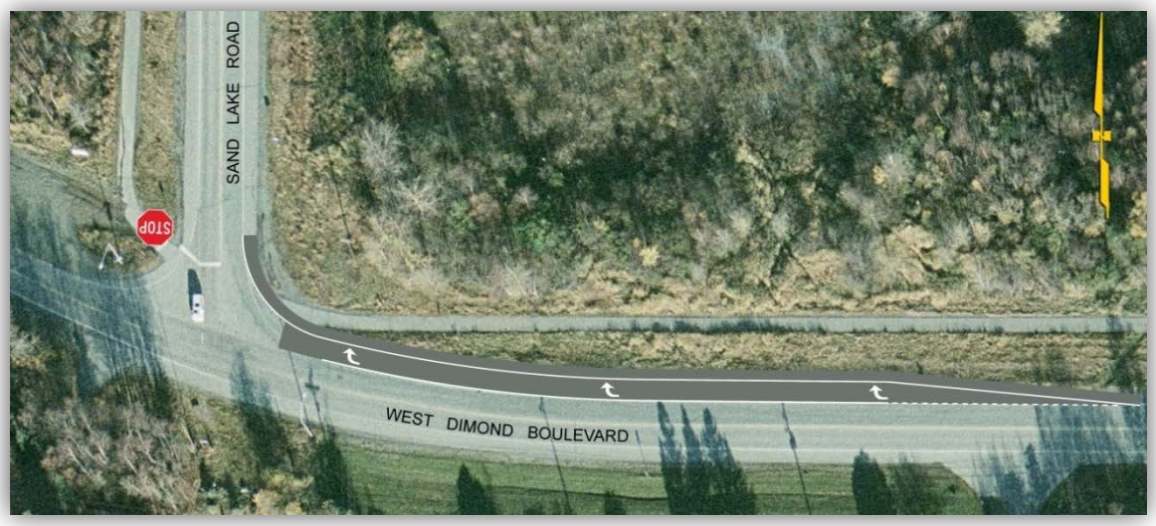


Figure 6.1 Westbound Right Turn Lane

6.2.3 All-Way Stop-Controlled

The MUTCD summarizes all-way stop controlled warrants.

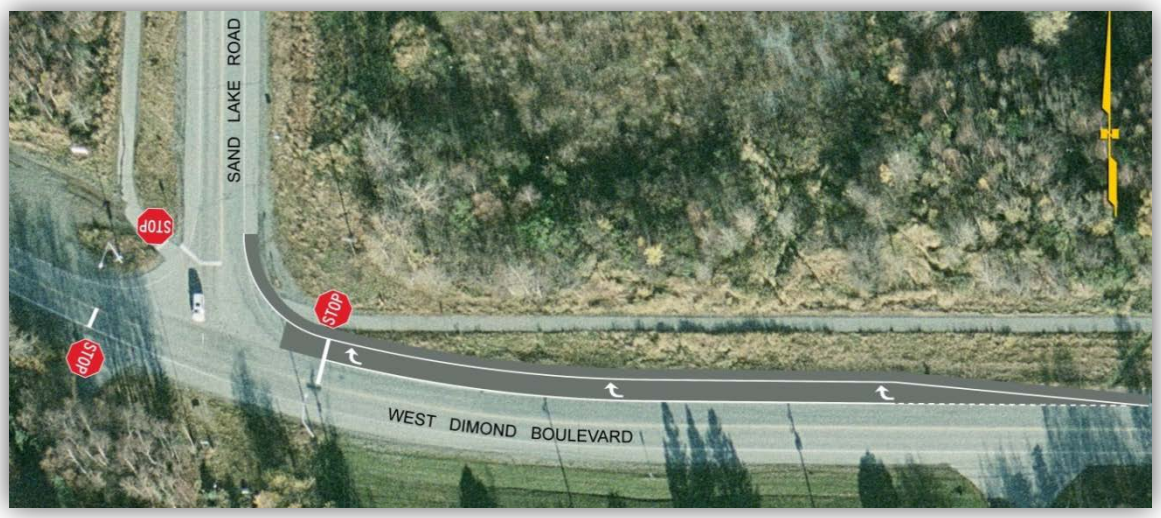


Figure 6.2 All-Way Stop Control with Westbound Right Turn Lane

Applying these criteria, the intersection would warrant all-way stop control between 2025 and 2035. Furthermore, to provide an acceptable LOS of C, a right turn auxiliary lane would need to be added. Adding the all-way stop would enhance safety for crossing pedestrian.

6.2.4 Roundabout

A single lane, modern roundabout with an Inscribed Circle Diameter (ICD) of 115 feet to 130 feet is predicted to provide a LOS B or better in the design year. The Sand Lake Road approach, as well as the West Dimond Boulevard approaches, would be realigned as part of the intersection design to provide optimum approach angles to the roundabout. Pedestrian crossings are integrated into the intersection for enhanced visibility and safety by adding splitter island refuges that decrease crossing distances. The driveway south of the intersection serves a single residence and can therefore be connected directly to the circulating lane.

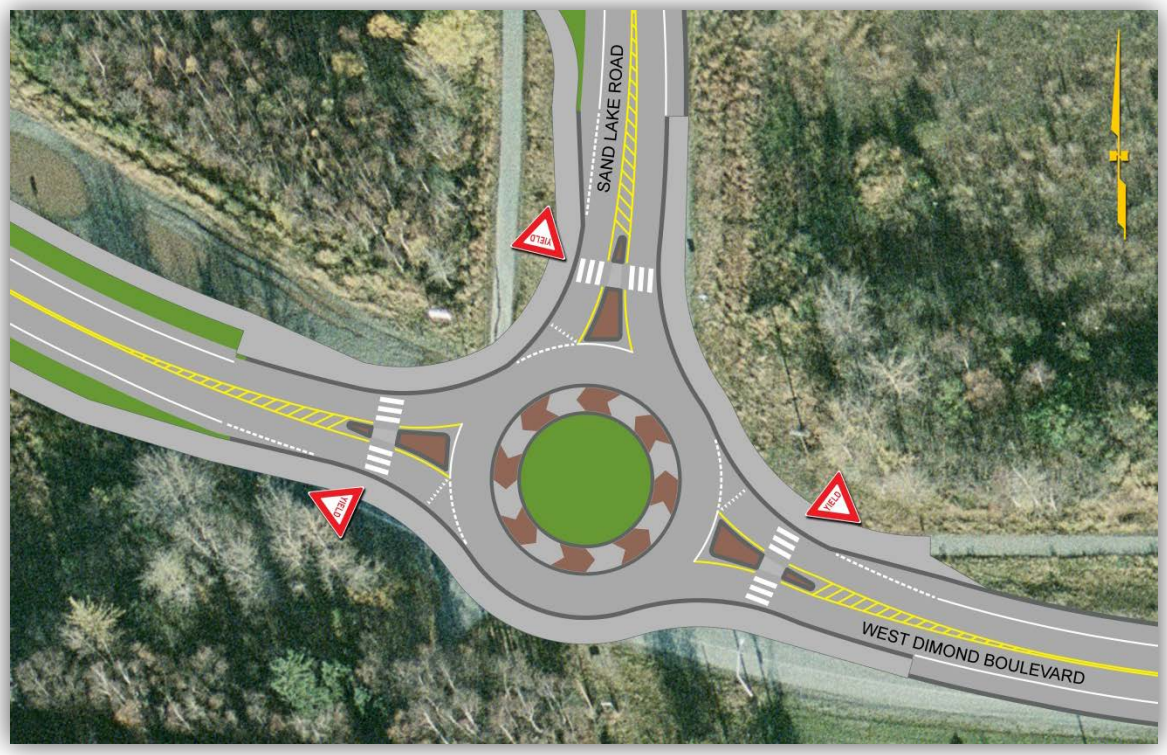


Figure 6.3 Single-Lane Modern Roundabout At Sand Lake Road

The potential of a high-speed crash is significantly reduced by the roundabout configuration, providing increased safety over stop or signal controlled intersections. The roundabout also provides traffic calming benefits over signalized intersections by requiring all vehicles traveling through the intersection to slow or stop.

6.2.5 Signalized Intersection

Signalization of the intersection provides a LOS B or better in the design year and controlled pedestrian crossings but requires a 350 foot long westbound right turn lane. The horizontal skew of the Sand Lake approach could be reduced as

in the other stop sign controlled alternatives, but reducing the skew is less imperative for signalized intersections. This alternative has the highest construction and long-term maintenance cost in comparison to the other intersection alternatives.

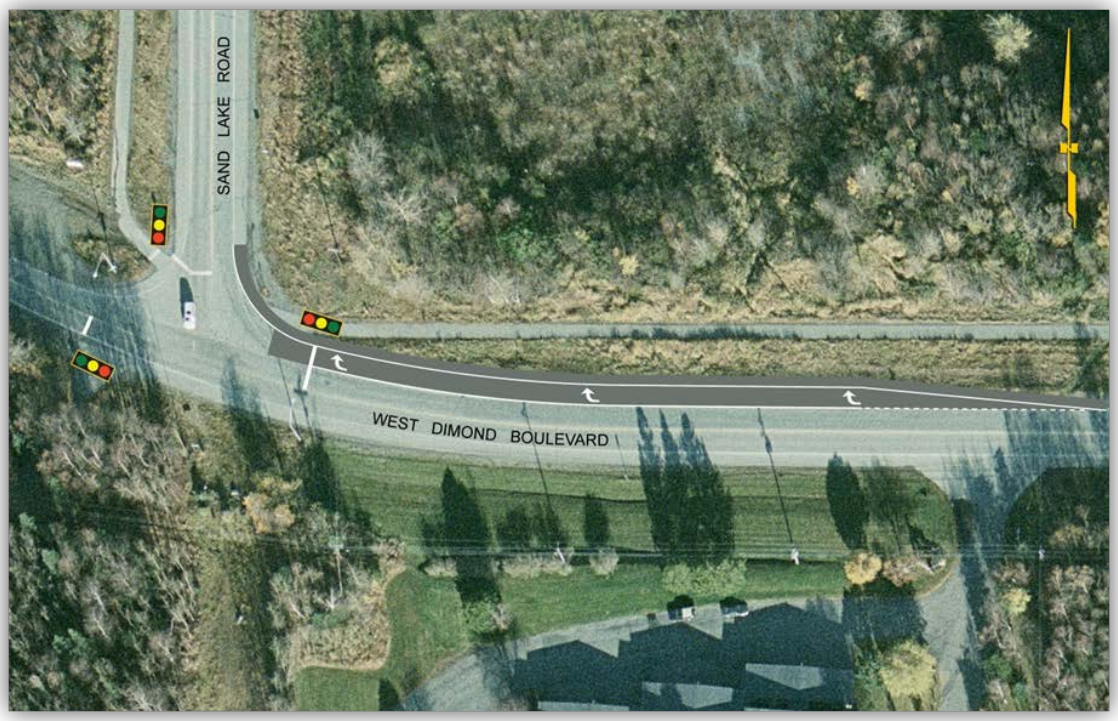


Figure 6.4 Signalized Intersection At Sand Lake Road Alternative

6.3. Westpark Drive

Westpark Drive is currently a side street stop-controlled at the intersection with West Dimond Boulevard at a skew of approximately 70 degrees to West Dimond Boulevard. The westbound approach to Westpark Drive has an existing right-turn only lane that is 180 feet long with a 20:1 entry taper. The range of feasible intersection control alternatives was explored in the Traffic, Safety and Alternatives Analysis (Appendix D). Traffic volumes and predicted intersection performance for the design year is detailed in the Traffic, Safety and Alternatives Analysis (Appendix D).

6.3.1 No Action

Predicted intersection traffic volumes for the design year do not warrant changing the intersection control from side street stop-control on Westpark Drive. Proposed residential development on the north side of West Dimond Boulevard will increase the peak turning traffic, but the overall increase is not significant enough to warrant consideration of full stop control for the intersection, with exception for the westbound right-turn traffic. The No Action alternative lacks a safe north-south crossing for pedestrians.

6.3.2 Right-Turn Only Lane Extension

The existing length of the right-turn only lane does not accommodate vehicle deceleration.

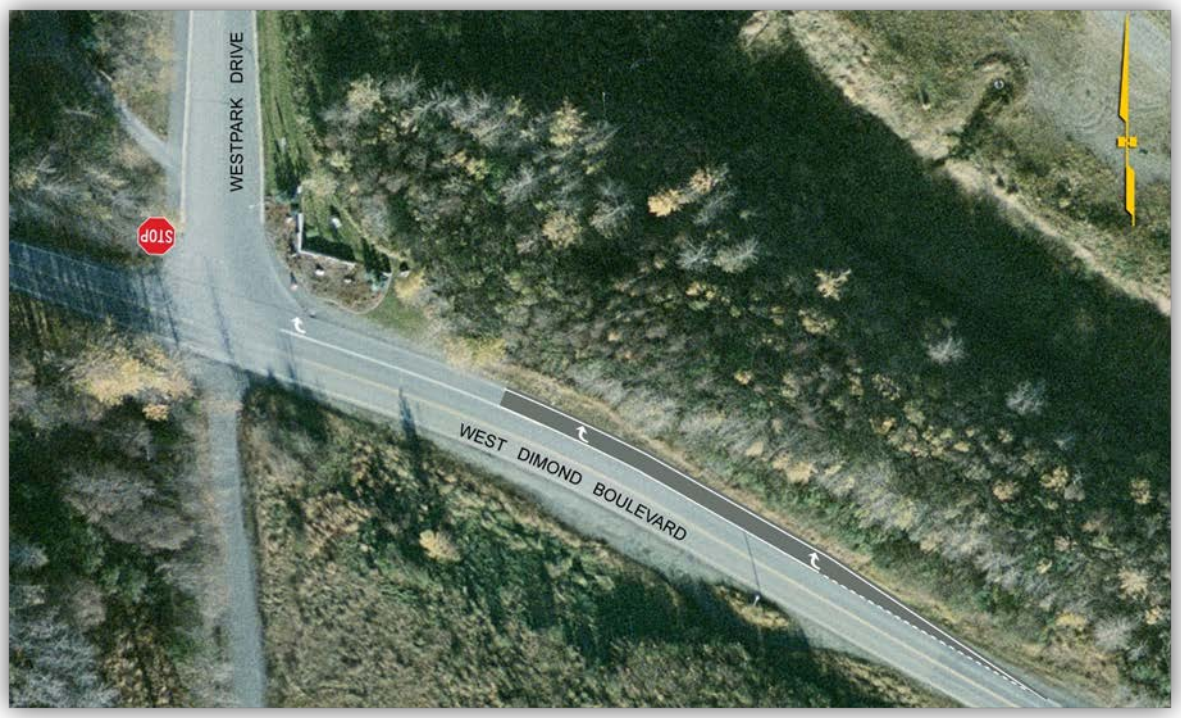


Figure 6.5 Right Turn Lane Extension At Westpark Drive

Extending the length will decrease the likelihood of rear-end collisions and will improve the southbound left-turn flows during the peak. The additional length in the right-turn only lane will allow westbound vehicles to decelerate in the right-turn lane rather than in the through lane, as well as remove them from conflict with the southbound left-turning traffic on Westpark Drive. Predicted intersection performance will be LOS C in the design year, and will have lower construction cost than the roundabout.

6.3.3 Roundabout

A single lane, modern roundabout with an ICD of 115 feet to 130 feet is predicted to provide a minimum LOS B in the design year. The Westpark Drive approach, as well as the West Dimond Boulevard approaches, would be realigned as part of the intersection design to provide optimum approach angles to the roundabout. Pedestrian crossings are integrated into the intersection for enhanced visibility. A southern approach could be added to accommodate the proposed Dimond Sands residential development, including the consolidation of existing driveways. ROW takes would be required at lot corners in each quadrant of the intersection to allow for optimum alignment of each approach. The potential of a high-speed

crash is significantly reduced by the roundabout configuration, providing increased safety of the intersection over stop controlled intersections. The roundabout also provides traffic calming benefits by requiring all vehicles traveling through the intersection to slow or stop, which is not provided by side street stop-controlled intersections.

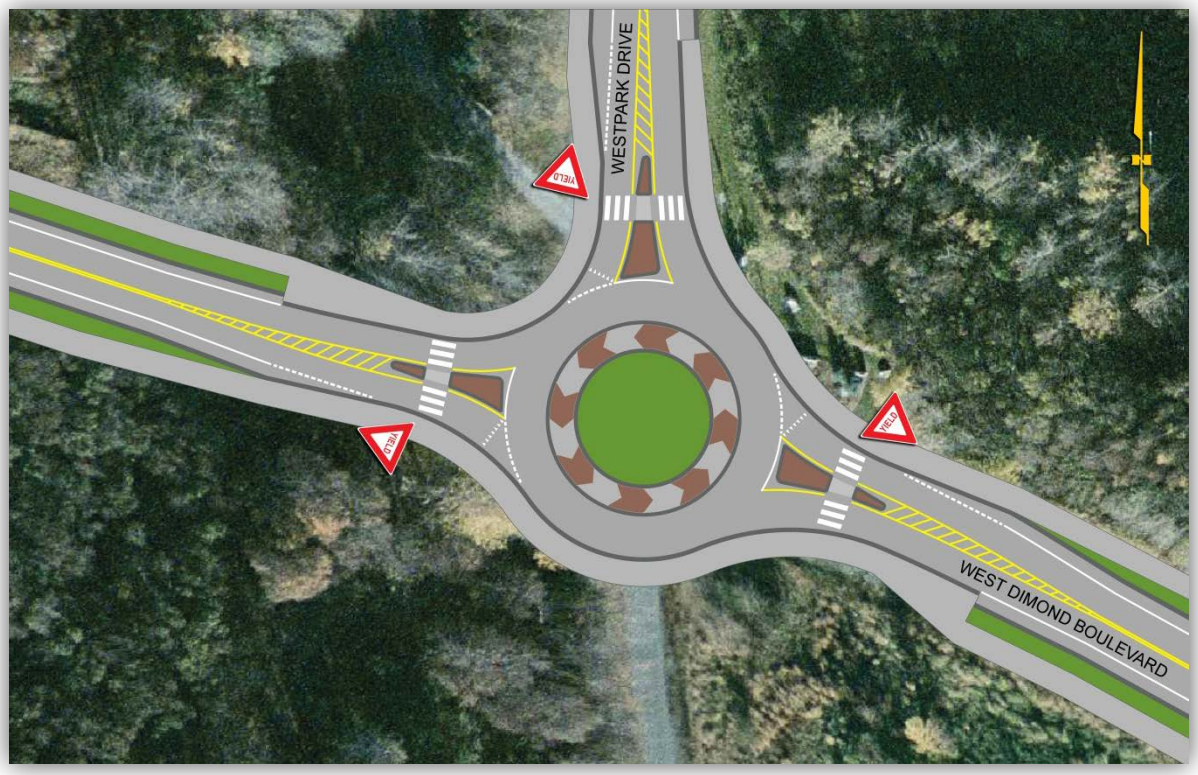


Figure 6.6 Single-Lane Modern Roundabout At Westpark Drive

7.0 EVALUATION AND RECOMMENDATION

7.1 General

The draft design study report evaluated several alternatives that reasonably represent the range of options available for a rehabilitation project. The No-Action Alternative does not meet the purpose and need for this project. The preferred alternative includes the following:

7.2 Typical Section

The curbed typical section alternative narrows the width of the improvements, thereby reducing impacts to existing vegetation, properties outside the ROW and overall earthwork requirements for the roadway segment from Jodhpur Street to Westpark Drive. The curb and gutter configuration conveys the roadway drainage into approximately the same concentration areas as existing patterns. Eliminating sheet

drainage washing over the pathways will improve the experience for the pathway users and decrease maintenance costs of the pathway surface over the service life. The pathway will be sloped away from the roadway in an effort to reduce materials such as vegetative debris from obstructing the gutter flow. A shallow ditch will be constructed beyond the outside pathway shoulder to collect the runoff as well as facilitate the use of driveway culverts.

Figure 7.1 Visualization Of Preferred Alternative (Looking East) On West Dimond Boulevard

The curbed typical section reduces costs, ROW impacts, enhances the experience for pathway users and is therefore the preferred alternative typical section.

7.3 Sand Lake Road Intersection

The roundabout intersection provides the highest level of service (LOS B) for a lesser cost than the signalized intersection. The roundabout provides the highest level of service, safety, and a traffic-calming enhancement not provided by other alternatives and is therefore the preferred alternative.

Table 7.1 Sand Lake Road Intersection Alternatives Comparison

ALTERNATIVE	SAFETY	DESIGN YEAR LOS	PEDESTRIAN CROSSING	COST
No-Action	✗	E	✗	0
Right Turn Lane	✗	D	✗	$
All-Way Stop Control	✓	C	✓	$
Modern Roundabout	✓	B	✓	$$
Traffic Signal	✓	B	✓	$$$

Legend: ✗ no improvement ✓ improvement

7.4 Westpark Drive Intersection

The roundabout intersection provides the highest LOS (B), traffic calming and safety benefits, although it has higher construction costs and some ROW impacts when compared with the other alternatives. The traffic-calming element of the roundabout will address speeding, which was specifically identified in the public involvement process as a concern. The roundabout is the preferred alternative based on safety, traffic-calming and level of service.

The configuration of the roundabout will be finalized during the design process and might need to be adjusted depending upon the adjacent development of the Dimond Sand Subdivision. Shifting the roundabout as far as possible east will also avoid the steepest portion of the crest vertical curve.

Table 7.2 Westpark Drive Intersection Comparison

ALTERNATIVE	SAFETY	DESIGN YEAR LOS	PEDESTRIAN CROSSING	COST
No-Action	✗	B	✗	0
Right Turn Lane Extension	✗	A	✗	$
Modern Roundabout	✓	A	✓	$$

Legend: ✗ no improvement ✓ improvement

7.5 Cluster Mailboxes

Replacing single-serve mailboxes with cluster mailboxes benefits the United States Postal Service (USPS) by reducing delivery times, reducing maintenance for the roadway owner, and enhances security for the mail recipients. However, consolidating single-serve mailboxes over a long stretch of roadway can also be inconvenient to residents.

Positive feedback has been received from the area postmaster and mail carrier regarding improvements to the mailboxes. One location in particular, Sommers Place, is an ideal candidate for an upgrade due to its existing nine grouped single-serve mailboxes. Homeowners will be consulted and if desired cluster mailboxes and turnouts will be considered. Coordination with USPS and homeowners will continue for the final locations and configurations of mailboxes during detailed design.

8.0 SOILS AND PAVEMENT DESIGN

Based on the design methodology presented in the DCM, Chapter 1.10, the total required structural pavement thickness for most of the project would be 8 feet. However, previous experience and calculations using the Reduced Subgrade Strength method indicate that a 4-foot thick structural section will be adequate for the proposed roadway and pathways. The existing structural section is less than 2 feet thick in some areas, and there is no past history of significant frost heaving. Additionally, the area is generally well drained and no groundwater was observed in the test borings drilled for this project. The recommended pavement section (from top to bottom) is 3 inches of asphalt concrete (AC) Pavement - Class D; 2 inches of leveling course; 6 inches of Type II-A Classified Fill and Backfill; and 42 inches of Type II Fill and Backfill over prepared subgrade.

Roadway insulation has been added to the construction cost estimate as a contingency item.

9.0 NON-MOTORIZED ACCESS

9.1 Non-Motorized Facilities

West Dimond Boulevard does not currently have pedestrian facilities or dedicated bicycle facilities. Bicyclists using the facility share the narrow roadway with motorized vehicles traveling at high speeds within the project corridor, even though it is typical to see bicyclists, runners, walkers and even skiers using the road and its shoulders. The proposed typical section includes multi-use pathways on both sides of the roadway, with seven feet of separation from the back of curb. Roadway crossings are proposed mid-block near West Kendale Circle (Jodhpur Street) and through the proposed roundabout intersections at Westpark Drive and Sand Lake Road (West Dimond Boulevard). Facilities on both sides of the roadway will limit the need for additional mid-block crossings. Curb ramps along the corridor would be provided at all curb intersections

and will conform to current Americans with Disabilities Act (ADA) standards. MOA's People Mover does not serve areas within the project area.

The MOA's adopted 1997 Areawide Trails Plan (ATP) and the 2010 Anchorage Bicycle Plan (ABP) identify a separated multi-use pathway or trail along West Dimond Boulevard to accommodate a variety of non-motorized users including in-line skaters, bicyclists, joggers and pedestrians. The adopted 2012 Metropolitan Transportation Plan (MTP), the 2007 Pedestrian Plan and the 2012 West Anchorage District Plan support completing and connecting non-motorized facilities such as trails and pathways. The Draft update of the ATP (2006-2007) lists this as a priority project. Standards for multi-use paved trails recommend an 8 to 10-foot wide trail with a 7-foot setback from the back of curb. According to the ATP, a multi-use paved trail will follow both West Dimond Boulevard and Jodhpur Street. The plan also indicates a proposed grade separated crossing close to the Jodhpur Street entry.

The proposed improvements will provide pedestrian access, consistent with the ATP, Bicycle Plan and Pedestrian Plan through the project area to the entry of Kincaid Park, a 1,500 acre regional park with high community usage both in winter and summer. The eastern Park boundary begins at the curve and generally follows Jodhpur Street. The eastern entrance into Kincaid Park is from Jodhpur Street.

The ABP identifies the need for both on-street shared use and off street multi-purpose facilities along the project corridor. A Shared Roadway is also identified in the ABP for West Dimond Boulevard and Jodhpur Street. Shared Roadway designations include signage for routes that provide continuity to other bicycle infrastructure such as bike lanes or bike shoulders and separated pathways or the route extends along local streets and collectors that lead to an internal neighborhood destination such as a park, school or commercial district. The proposed typical sections are consistent with the recommendations of the ABP by providing paved shoulder bike lanes and multi-use pathways on both sides of the roadway. Furthermore, the roundabouts will be equipped with ramps to accommodate bicyclists who prefer not to use the circulatory roadway.

10.0 DRAINAGE

10.1 Evaluations and Recommendations

According to the DCM, Table 2-1, the project can be classified as a minor drainageway due to its contributing area of less than 40 acres. Therefore, the storm drain must accommodate the 24 hour, 10 year design storm. Drainage guidelines set forth in the DCM mandate that at least one lane in each direction is kept free of water and that no curb overtopping occurs. All proposed recommendations are to maintain existing patterns on or around the project area. The preferred alternative states that all roadway will have curb and gutter with all low points having curb inlets which then collect and transport storm water through a network of buried pipes and ditches into existing drainage low areas. All existing driveway and approach culverts within proposed road

improvement area will need to be replaced as shown on the attached plans. Specific recommendations per each basin are as follows:

10.1.1 North Basins

BOP to Skyhills Drive: The pathway along Jodhpur Street will sheet flow into existing low spots along the roadway. The proposed ditch between Sta 42+00 and 52+00, along the north of the pathway, will route storm water to the existing low area located in Lot 1, Block 3, Barnhill Subdivision. A relocation and extension of the existing culvert crossing Cramer Place will be necessary to continue the ditch east. Also, an additional culvert will be needed to cross the driveway at Sta 51+85. Approximately 1,300 feet of roadway drainage will be directed into the infiltration basin located within the drainage easement at approximately Sta 54+00. A percolation test will need to be performed on this site to determine the absorption capacity.

Skyhills Drive to Sommers Place: The proposed ditch or swale along the north of the pathway, will maintain the existing drainage pattern. Approximately 400 feet of roadway drainage will be directed into the low lying area at Sta 67+00. It may be desirable to place a new culvert crossing the project area at Sta 67+50 to drain the south side low area to match existing historical patterns.

Sommers Place to Sta. 70+50: Roadway construction is mostly in a fill zone so no ditch is needed. Maintain existing drainage away from roadway. Two catch basins will be constructed at the sag vertical curve low spot near Sta. 68+00 to limit water spread on low gradient approaches to the sag vertical curve and provide a measure of safety should clogging occur.

Sta 70+50 to Westpark Drive: The proposed ditches or swales between Sta 73+50 to 75+00, and 81+00 to 82+00, along the north of the pathway, will maintain the existing drainage pattern. Install storm drain piping system (centered on Sta 79+90) which moves flow from the north ditch plus any roadway drainage and discharges to the south low area at Sta 78+25. Two driveways (Sta 75+00 and 82+25) will need new culvert crossings at proposed ditch line.

Westpark Drive to Sand Lake Road: The proposed vertical road alignment will slightly alter the existing drainage pattern by channeling the flow towards the low spot at Sta 93+75. The storm water will then cross West Dimond Boulevard via pipe, combine with the south catch basin and then outlet to the south. A ditch will be constructed on the north side directing water to the sag vertical curve low spot at Sta 93+75. At this point, the water will be routed to the south side.

Sand Lake Road to EOP: No changes to existing drainage pattern are expected.

10.1.2 South Basins

BOP to Bluffwood Circle: The proposed ditch or swale along the south of the pathway will maintain the existing drainage pattern. Approximately 300 feet of roadway drainage will be directed into this basin at Sta 56+80. There are two existing culverts that must be removed and three new pipes placed at driveway crossings and approaches (Sta 39+80, 46+50, 49+00 and 56+50).

Bluffwood Circle to 70+25: The proposed ditch or swale along the south of the pathway, will maintain the existing drainage pattern. It may be desirable to place a new culvert crossing the project area at Sta 67+50 to drain the south side low area to match existing historical patterns. Approximately 1,100 feet of roadway drainage (half width) will be discharged into the natural low areas at Sta 62+00 and 67+00.

Sta 70+25 to Westpark Drive: The proposed ditch or swale between Sta 71+00 and 75+00, along the south of the pathway, will maintain the existing drainage pattern. Two culverts will need to be removed and replaced at their new locations (Sta 73+50 and 75+00). Approximately 1,600 feet of roadway drainage from the two adjacent high points will be directed into this basin at Sta 78+50. This system will transfer overflow from the ditch north of West Dimond Boulevard, as well as drainage from both gutters along the roadway, to the low area to the south.

Westpark Drive to Sand Lake Road: Two catch basins will be installed in the south curb at the sag vertical curve low spot near Sta 93+75. A ditch will be constructed on the south side directing water to the sag vertical curve low spot at Sta 93+75.

Previous plans called for an outfall towards the north into the Westpark Subdivision. However, changes to the DCM have effectively shown the storm drain infrastructure within the Westpark Subdivision to be undersized (*Westpark Subdivision Drainage Impact Analysis, page 1*). Therefore, it is considered that utilizing any portion of that storm drain system is no longer feasible.

In light of this, the following alternatives were evaluated:

- Piped storm drain system outfalling into Turnagain Arm south of Sand Lake Road
- Pipe storm drain system outfalling into Turnagain Arm south of Westpark Drive
- Low Impact Development (LID)

The two remaining options are illustrated in the figures below.

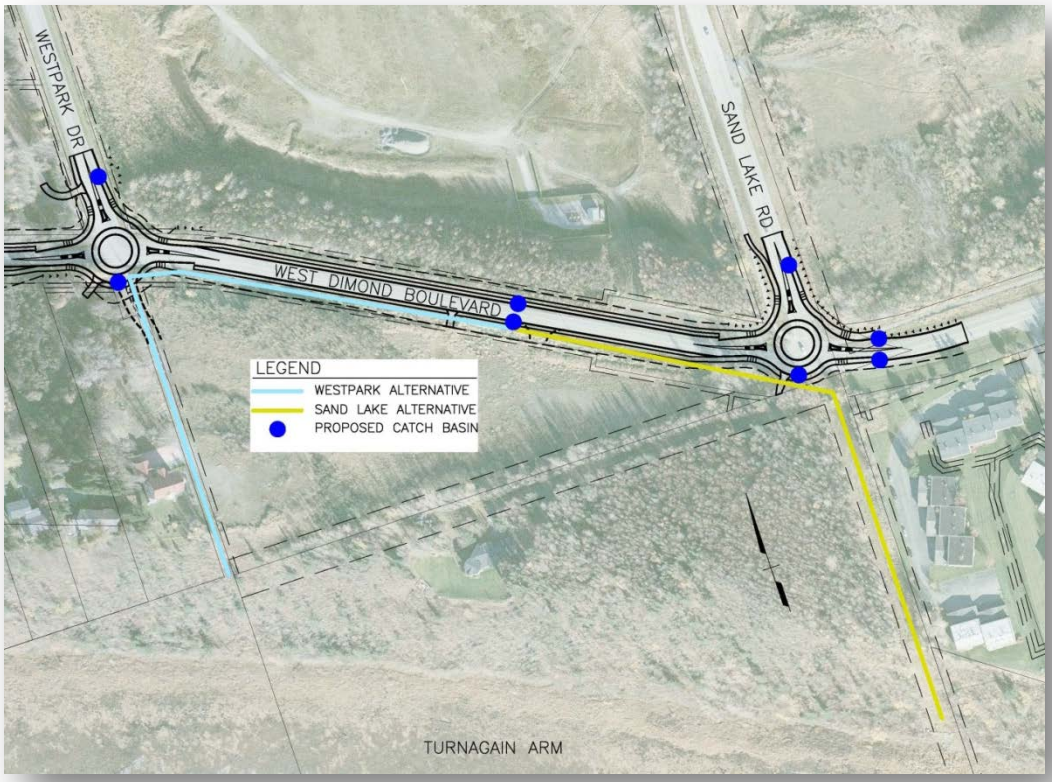


Figure 10.1 Storm Drain Alternatives – plan view

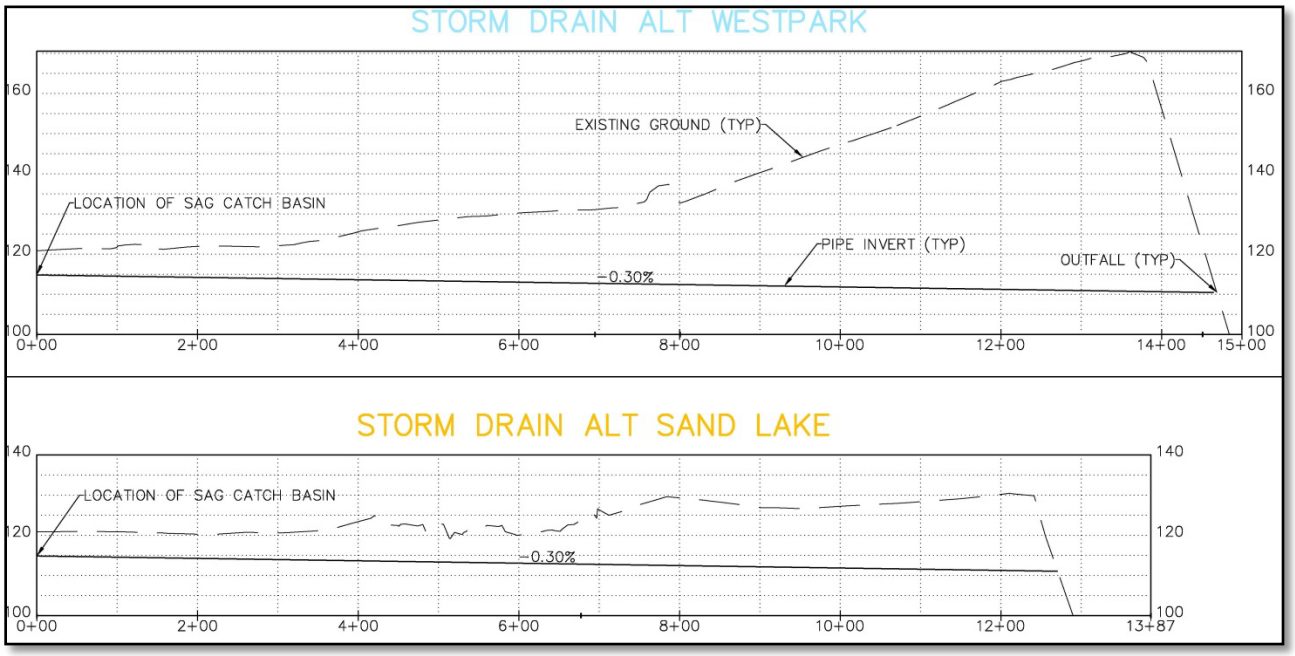


Figure 10.2 Storm Drain Alternatives – profile view

Table 10.1 Storm Drain Alternative

ITEM	OUTFALL ALTERNATIVE	
	WESTPARK DRIVE	SAND LAKE ROAD
Open trench	750 ft	1,000 ft
Trenchless	750 ft	300 ft
Minimum pipe cover	4 ft	4 ft
Maximum pipe cover	60 ft	20 ft
Construction cost estimate	$1,000,000	$750,000

The Sand Lake Road alternative is recommended due to its lower cost. However, potential conflicts with the existing Westpark Subdivision outfall may require the implementation of the Westpark Drive alternative. The system will be centered within the existing, 50 foot wide section line easement. To reduce erosion, the bluff between the outfall and the marsh below will be lined with riprap.

11.0 UTILITY IMPACTS

11.1 General

Utility companies with facilities located within the proposed West Dimond Boulevard Upgrade project area have been contacted to coordinate utility conflicts and identify any facility relocations that may be necessary. Presented below are summary descriptions of the utility companies contacted, and issues related to the proposed project.

A more detailed analysis of the need for relocations or extension will be made during the design process. The locations of utilities within the project corridor were recorded during field surveys and record drawing research. Additional surveys will be performed during the design process to supplement current information as necessary.

Plan views showing existing utility locations are shown in Appendix C, Plan Sheets.

11.2 AWWU

Coordination with AWWU regarding the 12-inch DIP water main at the Sand Lake and West Dimond Boulevard intersection will need to be resolved as well as any future extensions to serve the Dimond Sands Subdivision. Approximately two sanitary sewer manholes will be impacted during this project. These impacts range from adjusting manhole rings to replacing cone sections. Further coordination will be required during the design process to identify the best solution for adjusting these manholes. The conflicts are shown on the summary tables below.

Table 11.1 Water Conflicts

LOCATION	DESCRIPTION
Skyhills Drive	Water line runs perpendicular to West Dimond Boulevard and ends near intersection.
Sta. 65+70 LT	Well located within proposed cut slope
Westpark Drive	Water line runs parallel to Westpark Drive and terminates within proposed roundabout. Planned water line crossing for Dimond Sands. Consider installing preemptively.
Sta. 95+00	Planned water line crossing for Dimond Sands. Consider installing preemptively.
Sta. 99+20 LT	Water line valve box located in proposed roundabout area.
Sta. 100+25 LT	Water line valve box located north of proposed roundabout area.
Sta. 100+75 LT	Fire hydrant and valve box located within work zone

Table 11.2 Sanitary Sewer Conflicts

LOCATION	DESCRIPTION
96+15	Sewer line crosses roadway.
96+25 RT	Sewer manhole located within work area.
96+25	Planned sewer connection for Dimond Sands. Consider installing preemptively.
96+25 to 103+50 RT	Sewer line runs parallel along West Dimond Boulevard
99+65 RT	Sewer manhole located within work area.

11.3 Natural Gas Conflicts

There are approximately 16 ENSTAR separate service crossings of West Dimond Boulevard and two valves that may need relocation or protection in the vicinity of the proposed Sand Lake roundabout. Some of the gas mains and services will require relocation due to excavation limits and depth of fill. Also, any widening of the road structural section will also require any exposed pipe to be protected.

The summary table of gas conflicts is below:

Table 11.3 ENSTAR Gas Conflicts

LOCATION	DESCRIPTION
35+00 to 38+00LT	Service line parallels roadway.
35+00LT	Service line perpendicular to Jodhpur Street.
37+00LT	Service line perpendicular to Jodhpur Street.
48+15LT	Service line perpendicular to road.

LOCATION	DESCRIPTION
48+15 to 99+50LT	Gas line parallels roadway.
49+15	Gas line crosses road to service lots to south.
51+60LT	Service line perpendicular to road.
51+70	Gas line crosses road to service lots to south.
52+00LT	Service line perpendicular to road.
53+85LT	Service lines perpendicular to road. Located in 15-foot access easement.
56+15	Gas line crosses road to service lots to south.
57+80LT	Service line perpendicular to road.
58+55	Gas line crosses road to service lots to south.
60+10	Gas line crosses road to service lots to south.
61+10LT	Service line perpendicular to road.
64+30	Gas line crosses road to service lots to south.
65+50LT	Service lines perpendicular to road.
67+90LT	Service line perpendicular to road.
68+65	Gas line crosses road to service lots to south.
69+00LT	Service line perpendicular to road.
70+10LT	Service line perpendicular to road.
71+35	Gas line crosses road to service lots to south.
71+90LT	Service line perpendicular to road.
74+10 and 74+45	Two gas lines cross road to service lots to south
77+15	Gas line crosses road to service lots to south.
79+00	Gas line crosses road to service lots to south.
82+50	Gas line crosses road to service lots to south.
83+75Lt	Service line perpendicular to road.
84+90LT	Service line perpendicular to road.
85+00	Gas line crosses road to service lots to south.
85+40	Gas line crosses road to service lots to south.
95+00LT	Service line perpendicular to road.
99+35LT	Gas valve located in proposed roundabout area.
99+45	Gas line crosses West Dimond Boulevard as well as running north along Sand Lake Road.
99+60RT	Gas valve located in proposed roundabout area.
99+60 to 102+50RT	Gas line runs parallel to West Dimond Boulevard.

11.4 Telephone and Fiber Optics Conflicts

The telephone and F/O pedestals and cable may not require relocation but further study will take place during the design phase.

The summary table of telephone conflicts is below:

Table 11.4 Telephone/Fiber Optic Conflicts

LOCATION	DESCRIPTION
65+60 to 68+60 LT	Telephone cable parallels roadway within work area.
96+60 LT	J-boxes for underground F/O line.
95+60 to 100+50 LT	Underground F/O telephone line parallels roadway on left within work area.

11.5 Electric Utility Conflicts

It is anticipated that 13 existing poles that provide roadway-only illumination will need to be removed and replaced. 11 poles with service conductors will also need to be replaced. Four existing overhead crossings do not meet the minimum vertical clearances (20.5' per PCM Table 1130-1) and need to be raised or relocated. Underground electric (UGE) distribution lines may require relocations due to changes in depth of bury and the location of pad mounted electrical cabinets. Relocation work will be coordinated with lighting improvements included in project construction work. Furthermore, the utility has indicated that conflicting overhead lines will likely be undergrounded in conjunction with the roadway construction. The summary table of electrical conflicts is below:

Table 11.5 Electric Conflicts

LOCATION	DESCRIPTION
32+20	Overhead electric wire crossing. Vertical clearance = 21.8'
37+90	Overhead electric wire crossing. Vertical clearance = 19.5'
39+50 to 44+50 LT	Overhead electric line parallels West Dimond Boulevard.
40+00 LT	Guy wire within proposed cut area.
42+15 LT	Power pole and guy wires within proposed cut area. UGE also impacted.
45+75 RT	Illumination pole within proposed cut area.
46+50 RT	Two electrical junction boxes close to limits of proposed cut area.
48+65 RT	Illumination pole within proposed cut area.
45+75 to 59+50 RT	Overhead electric line parallels West Dimond Boulevard.
51+30 RT	Illumination pole within proposed cut area.
54+10 RT	Illumination pole within proposed cut area.
54+50 LT	Driveway light in cut area.
55+65 RT	Power pole located in cut area.
57+20	Overhead electric wire crossing. Vertical clearance = 17.9'

LOCATION	DESCRIPTION
57+25 RT	Power pole with meter and guy wires at toe of fill area.
57+85 RT	Power pole at toe of fill area.
59+50 RT	Power pole with two electrical meters and guy wires at toe of fill area.
59+50	Overhead electric wire crossing. Vertical clearance = 15.7’
65+60 LT	Power pole located in pathway area.
65+80	Overhead electric wire crossing. Vertical clearance = 22.8’
65+60 to 68+60 LT	Underground electrical line parallels roadway within work area.
71+80	Overhead electric wire crossing. Vertical clearance = 22.8’
72+40 RT	Power pole located in cut area.
73+40	Overhead electric wire crossing. Vertical clearance = 29.5’
74+35	Power pole located in cut area.
79+05 RT	Illumination pole and guy wire within proposed pathway buffer.
82+50 RT	Power pole and guy wire located in cut area.
82+60	Overhead electric wire crossing. Vertical clearance = 32.6’
85+60 LT	Illumination pole in roundabout area.
85+75 RT	Illumination pole in roundabout area.
88+90 RT	Illumination pole in work area.
92+00 RT	Illumination pole in work area.
95+00 RT	Illumination pole in work area.
95+60 LT	J-Boxes for underground electric line.
95+60 to 100+50 LT	UG electrical line parallels roadway on left within work area.
98+00RT	Illumination Pole near work area.
99+20 LT	Light pole in roundabout area.
99+20	UG electric line road crossing.
99+20 to 100+60RT	UG electric line runs parallel to W. Dimond Blvd.
100+60 LT	Power pole located in work area.
100+80	Overhead electric wire crossing. Vertical clearance = 19.0’

11.6 Cable Conflicts

Some overhead cables within the project area will require relocation in coordination with CEA relocations as noted above. Relocation of the F/O cable will require installing new cable from existing splice points to provide continuous service and any disturbed vaults will require adjustment to final grade.

11.7 Storm Drain

The pipe is approximately 75 feet below existing ground at the crossing location and therefore not considered to be in conflict

11.8 Relocation Costs

Planning level cost estimates for the utility conflict mitigations are shown in the following table:

Table 11.6 Estimated Utility Relocation Costs

UTILITY	ESTIMATED COST
AWWU Water	included in construction cost estimate
AWWU Sanitary Sewer	included in construction cost estimate
ENSTAR	$ 280,000
ACS	$ 20,000
CEA	$ 330,000
GCI	$ 20,000
Utilities Total:	**$ 650,000**

12.0 ACCESS AND RIGHT-OF-WAY CONSIDERATIONS

12.1 Access Control

The intersections of Westpark Drive and Sand Lake Road feature yield control of all entering traffic (roundabout). All other cross-streets and driveways are stop controlled. In many cases along the roadway, residential driveways access West Dimond Boulevard directly, especially along the south side. The preferred alternative does not propose changes to the existing access control.

12.2 Right-of-Way

The proposed improvements extend beyond the existing ROW and will require slope, public use, and/or drainage easements in the affected areas. The roundabouts at Westpark Drive and Sand Lake Road will also require additional ROW. Temporary construction permits and temporary construction easements will be required to complete tie-ins on private property and provide access for the contractor.

The horizontal and vertical geometry, along with the fill and cut slopes, have been optimized to minimize ROW impacts. Several areas will require further investigation and refinement during the detailed design phase due to the proximity of structures or access concerns. They are:

- 90 degree horizontal curve at the western terminus of West Dimond Boulevard
- West Dimond Boulevard between Skyhills Drive and Bluffwood Circle
- Intersection of Sommers Place and West Dimond Boulevard
- West Dimond Boulevard near Station 71+00

As shown on Figures 12.1 and 12.2, two buildings with minimal setback are located at the intersection of Sommers Place and West Dimond Boulevard. Furthermore, an existing well is located within the public ROW. This intersection has undergone a preliminary analysis to reduce ROW impacts and maintain feasible access to the residences. Further alternatives, such as the use of cast-in-place retaining walls, will be analyzed during the design process.

There are driveways that need to be realigned due to the proposed improvements. The preliminary driveway improvements have been identified on the Plan sheets in Appendix C. Table 12.1 identifies and describes all permanent easements that are required for the proposed improvements.

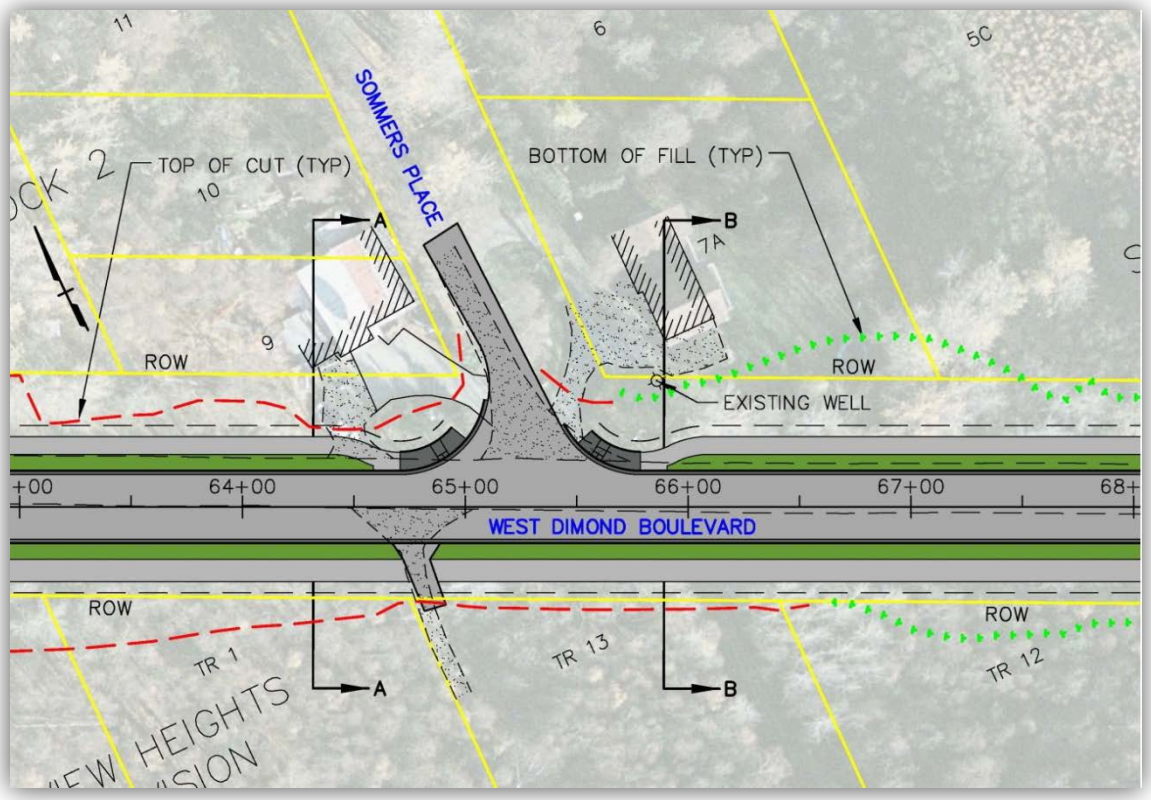


Figure 12.1 Plan View of Sommers Place Intersection

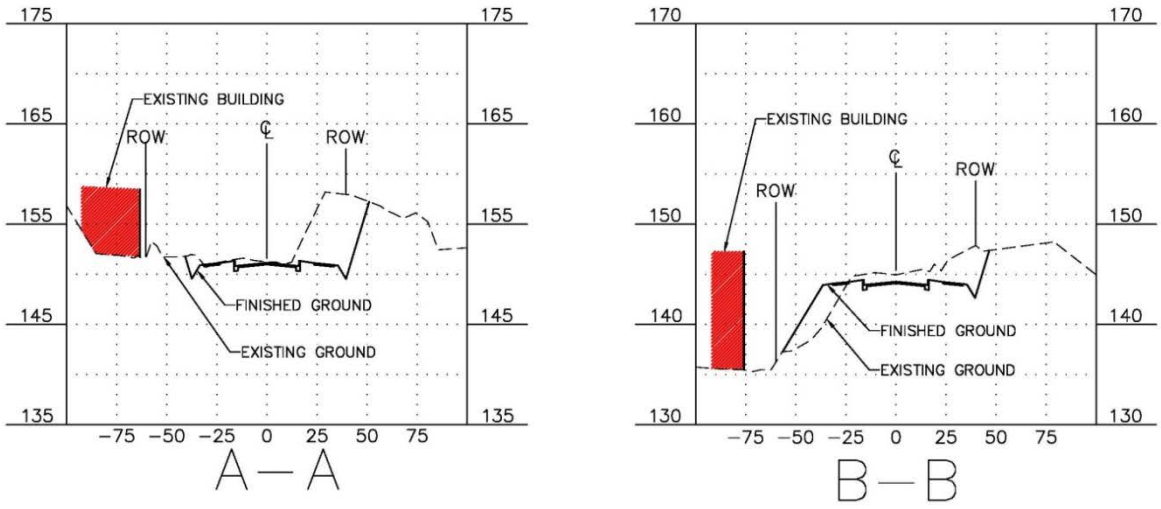


Figure 12.2 Section View of Sommers Place Intersection

Table 12.1 Easements and Right-of-Way Requirements

Parcel No.	EASEMENT		
	SLOPE (SF)	PUBLIC USE (SF)	DRAINAGE (SF)
1	2,371		
2	1,845		
3	121		
4	2,398		
5	1,873		
6	1,871		
7	292		
8	1,587		
9	552		
10	240		
11	4,140		
12	907		
13	1,137		
14	295		
15	5,980		
16	446		
17	841		
18	4,750		
19		1,241	
20		67	
21	4,304		
22	5,294		
23	3,289		
24	1,328		
25	1,774		
26			167
27			166
28	1,418		
29	3,309		
30			300
31	2,643		
32	3,471		
33	4,135		
34	3,970		
35	881		
36	3,071		

Parcel No.	EASEMENT		
	SLOPE (SF)	PUBLIC USE (SF)	DRAINAGE (SF)
37	5,640		
38	4,569		
39	155		
40	82		
41	3,622		
42	1,703		
43	1,639		
44	6,284		
45	1,780		
46	2,033		
47		333	
48		147	
49		1,525	
50	10,346		
51	833		
52	3,981		
53	158		
Total	**113,358**	**3,313**	**633**

12.3 Parking

No dedicated or on-street parking facilities are proposed within the project perimeter.

13.0 MAINTENANCE CONSIDERATIONS

The MOA owns and maintains West Dimond Boulevard within the project limits. Maintenance costs associated with sealing cracks and filling potholes will be reduced as a result of a new asphalt surface.

Storm Drain manholes will be spaced no more than 300 feet and located outside of the traveled way for ease of access and reduced failure. A minimum of 18-inch pipe will be used for the storm drain system and driveway culverts. The need for thaw pipe will be analyzed during the detailed design.

DOT&PF owns Jodhpur Street and Sand Lake Road including the right-of-way for the West Dimond and Sand Lake Road intersections. Further clarification is needed regarding possible maintenance agreements for the proposed improvements, including the roadway illumination at these locations.

14.0 STREET ILLUMINATION

14.1 Street Lighting

The existing illumination system does not meet the current standards within the Design Criteria Manual for a continuous lighting system. The existing road is classified as a collector and has medium pedestrian conflict. Requirements for continuous lighting systems using the luminance criteria are laid out in Table 5.2 of the DCM:

Table 14.1 Lighting Requirements

CLASSIFICATION	PEDESTRIAN CONFLICT	AVE LUMINANCE	UNIFORMITY (AVE/MIN)	UNIFORMITY (MAX/MIN)	VEILING LUMINANCE
Collector	Medium	0.6 cd/m²	3.5	6.0	0.4

Additionally, the proposed separated pedestrian pathways are required by Section 5.4C to be illuminated in conformance with Table 5.4 of the DCM:

Table 14.2 Pathway Illumination

PEDESTRIAN CONFLICT	LAND USE	AVE ILLUMINANCE (HORIZONTAL)	VERTICAL ILLUMINANCE	UNIFORMITY (AVE/MIN)
Low	Low Density Residential	0.3 fc	0.08 fc	6.0

Existing luminaires are recommended to be demolished and a new continuous illumination system be installed per Tables 13-1 and 13-2. Due to utility conflicts and lack of right-of-way, poles will be placed inside the pathway buffer on the south side of the roadway. Breakaway bases will be specified per DCM Section 5.7.

Section 5.4D in the DCM, requires the use of white lighting for new construction and current practice on Municipal roads is to use LED luminaires to accomplish this requirement.

The table below summarizes the continuous lighting system:

Figure 14.1 Proposed Illumination Poles

Table 14.3 LED Lighting System

SPECIFICATION	ROADWAY	PATHWAY ONLY
Nominal wattage	271W (120 LEDs)	90W (49 LEDs)
Mounting Height	35ft	14ft
Approximate Spacing	195ft	90ft
Total Poles*	37	17
Color	White	White
Estimated life	11 years**	11 years**
Estimate construction cost	$606,000	

*Includes 4 poles at each of the two proposed roundabouts.
**BetaLED suggests a 22 year life based on L_{70} (70% of initial lumen output), however this is a calculated value. Testing labs have not actually tested these luminaires to failure. This calculation also does not appear to take into account driver failure, so the designer recommends assuming a shorter life until more data is available.

Pathway lighting will be provided along Jodhpur Street.

14.2 Intersection Lighting

Two roundabouts are currently proposed, one at Sand Lake Road and the second at Westpark Drive. Illumination at these roundabouts will be accomplished using a single pole at each quadrant. Poles will be placed on the far right of each approach in accordance with Section 5.4H.

Sand Lake is currently a DOT&PF maintained intersection. However, MOA is interested in taking over the lighting maintenance of that intersection and as such would specify LED luminaires.

14.3 Load Centers

It is anticipated that three load centers will be required: one near Sand Lake Road, another near Westpark Drive, and the third near Skyhills Drive. The Sand Lake Road load center will only provide power to the DOT&PF loads at that intersection. Each load center will be a Type 1A pedestal-mount, 100A, 480/240V.

The existing 240/120V load center located at the intersection of Jodhpur Street and West Kendale Circle cannot be used due to voltage drop considerations.

15.0 LANDSCAPING

15.1 Viewshed

Views from the road driving eastward can be spectacular and include the Chugach Mountains framed by natural vegetation. Views driving north and along Jodhpur are

typically of native forest with some views of adjacent houses. Views to the road from adjacent properties vary. Many houses are set back from the road and separated by native forest, so the road is barely visible. Several homes overlook the road; these tend to be along the north side of West Dimond Boulevard and the east side of Jodhpur Street.

15.2 Climatic Zone

The climatic zone of the roadway corridor is generally Zone 3, as determined by the United States Department of Agriculture Plant Hardiness Classification System. Temperature maps for Anchorage show the area to include some of Anchorage's warmer pockets. At the coldest extreme, Zone 3 temperature ranges are from -30 degrees to -40 degrees Fahrenheit, with a typical growing season from mid-May to the end of September (120 to 140 days). Climates within the corridor are likely influenced by proximity to the bluff.

15.3 Landscaping Recommendations

Two documents describe how Anchorage roads should be landscaped including the Street and Highway Landscape Plan (MOA, 1981) and the DCM. The Street and Highway Landscape Plan creates the basis for the landscape design for the roadways in this project. Under the plan the proposed project falls within the "Rural" character design category. It is also identified as a Level III Planning Priority. In terms of design, the plan provides broad guidelines that include:

- Develop a sense of visual cohesiveness along the road;
- Reduce visual clutter to improve safety;
- Maintain property values for owners adjacent to the road; and
- Enhance scenic and recreation opportunities.

The plan states the need to preserve existing vegetation and to provide supplemental plantings where possible, use of landforms and grading and the provision of hardscape elements (paving, benches, lights, etc.). Use of naturalized plantings with native vegetation is suggested.

The DCM focuses more on proper placement and planting techniques for trees and shrubs for their health and future maintenance rather than as design ideas and aesthetic considerations. It also describes the need for landscaping and as with the Street and Highway Landscape Plan describes the desire to save existing vegetation.

Based on these documents, the goal of the landscape effort will be to maintain the natural, rural character of the roadway. This will be accomplished by limiting the amount of existing vegetation that will be disturbed as possible and replacing lost vegetation with native vegetation as appropriate to reduce long-term maintenance.

As with many Anchorage roads, ROW width limits available land for landscaping. Typically, the width of the ROW is almost fully used for roadway facilities, including traffic lanes, curb and gutter for drainage conveyance, lighting, snow storage zones and non-motorized facilities. In terms of improving the road's appearance with landscaping, the largest constraint is the limited ROW width. As the project progresses, pockets for landscaping will be explored where both grading and plant placement will reduce the "straight-edge" effect. Massing tree and shrub beds to reduce the long straight lines that road projects oftentimes result in can be obtained through more creative and intentional grading. Again, limits to the amount of ROW available can make this a challenge.

The proposed roundabout at Westpark Drive intersection provides an opportunity for a gateway into the neighborhood and can set the tone for the drive further west. Connecting the natural vegetation in the area to the roundabout will be explored as an option during future design phases. Roadway visibility through the roundabouts and maintenance ease and costs will also help inform the type of gateway feature within the roundabouts.

Appropriate plant materials include primarily native plants that will be used where the ROW is large enough. Keeping long-term maintenance concerns in mind, concepts such as the use of continuous planting beds, permanent edging and adequate depth of topsoil will be utilized where possible. Minimizing moose browsing of planted vegetation will also be a consideration to the extent possible.

Between the edge of road and pathway the landscape treatment will include a low maintenance grass mix, placed in the form of seed that will allow snow storage with the least amount of damage. All disturbed areas will be seeded. Initial seeding may include flower seed as a temporary amenity.

Trees require space to grow properly. They have a larger root system requiring more moisture and nutrients. While some trees will perform adequately within limited space, even as narrow as four feet, a more ideal width of eight feet is recommended for long-term plant viability. In a natural setting, placement of groups of trees and shrubs that are fairly closely spaced will more closely match adjacent native forest. Evergreen species including spruce, pine and larch need a minimum of 10 feet in width, however 20 feet is closer to ideal to allow full branching of evergreens. Width here refers to the space the tree needs to maintain a natural form. The other width consideration is the area needed to support the growth of a plant. The MOA identifies 200 cubic feet as the minimum volume of soil needed for one tree to survive. This amount varies depending on tree species and should be considered a general guideline.

16.0 WORK ZONE TRAFFIC CONTROL

It is anticipated that construction will take place under traffic conditions whenever possible. Furthermore, access to all residences will be maintained during construction to reduce the inconvenience to the residents as much as possible. Fortunately, several

detour opportunities exist that could be utilized during construction for potential full width roadway closures. The key to a successful construction phase is early coordination with stakeholders. Refinement of the traffic control plan will continue through final design.

17.0 PERMITTING AND APPROVALS

17.1 Planning and Zoning Commission

Planning and Zoning Commission (PZC) review and approval of the recommended alternative is required at the 35% design phase. Concurrent technical review from MOA Departments and state agencies is also required at the 35% design study phase. The Planning and Zoning Commission typically is concerned with the impacts to neighbors, pedestrians and related land use issues.

17.2 Urban Design Commission

Review of the project by PZC and the Urban Design Commission (UDC) is required for public roadway projects. Plans for the road, including 65% complete landscape plans, will be submitted to the Commissions approximately eight weeks prior to their regularly scheduled meetings. Plans are reviewed by affected Municipal departments who make comments that are summarized by MOA staff for the Commission. MOA staff makes recommendations to the Commissions based on department comments and neighborhood concerns. The project is reviewed and approved before each Commission in a public meeting. The Commissions may make design recommendations to improve the landscape elements of the project, as well as the function of the project including overall design (roadway width, pedestrian facilities, drainage and run-off and other design elements) as they see fit. The UDC reviews plans for landscape concerns in addition to neighborhood impacts. Lighting and transit are also included in project reviews.

A pre-application meeting, prior to the preliminary submittal, with UDC staff is recommended to discuss general project concepts including roadway widths, pedestrian enhancements, and neighborhood issues.

18.0 STAKEHOLDER/PUBLIC INVOLVEMENT

18.1 General

This section describes the public involvement initiated from the start of the project and the activities that will continue throughout the project phases.

18.2 Public Involvement Completed

The public involvement and public discussion about the improvements to West Dimond Boulevard began early in the project. It started with an agency scoping meeting, where MOA Department staff were asked to provide feedback about the project to the design

team. An initial public scoping meeting was held to solicit input from the community for improving the roadway corridor. In addition, a CAC was formed to assist the project team in developing the design criteria for the project.

A public involvement plan was developed and the completed items are shown in the following table. Italics are used to indicate items that will be ongoing throughout the project.

Table 18.1 Public Involvement Activity Summary

DATE	PUBLIC INVOLVEMENT TOOL (GROUP/ACTIVITY)	PROJECT PHASE/PURPOSE	TIME & LOCATION
NTP through end of project	Establish and update project mail list	Project Mailings	N/A
Web Site	Develop and update project web site	All Phases – updated at four key points in project.	N/A
May 10, 2006	Workshop	Introduce project, seek technical input from department staff.	2:30 pm MOA Development Services Department Training Room
May 8, 2006	Post Card Mailing	Announce project and upcoming public meeting.	N/A
May 8, 2006	Sand Lake Community Council	Announce project; invite community to public meeting.	2nd Monday, 7 pm Calvary Church, Spuhler Hall W 80th/Jewel Lake Rd.
May13, 2006	Newsletter #1	Announce project and upcoming public meeting.	Door hanger along project corridor; distributed to Community Council
May 15, 2006 May 21, 2006	*Anchorage Daily News* display advertising	To advertise the public meeting on May 22, 2006.	N/A

DATE	PUBLIC INVOLVEMENT TOOL (GROUP/ACTIVITY)	PROJECT PHASE/PURPOSE	TIME & LOCATION
May 22, 2006	Public Meeting #1	Introduce the project, seek public input on project scope and alternative evaluation criteria.	7-9 pm Dimond H.S. Library
July 12, 2006	Citizens' Advisory Committee Meeting #1	Meet the project team; sign Charter; define steps to be taken to recommend a solution for project..	5:30-7:30 pm Jewel Lake Plaza Multipurpose Room 8300 Jewel Lake Road
August 21, 2006	Citizens' Advisory Committee Meeting #2	Who are we designing the road for? Discussion of Pedestrian Facility Requirements; Planning and Zoning and Urban Design Commission; Street & Pedestrian Facility Maintenance.	5:30-7:30 pm Jewel Lake Plaza Multipurpose Room 8300 Jewel Lake Road
January 4, 2007	Citizens' Advisory Committee Meeting #3	Summary of CAC input; discuss typical sections; roadway impacts/design challenges; intersection alternatives.	5:30-7:30 pm Jewel Lake Plaza Multipurpose Room 8300 Jewel Lake Road

Public input, in the form of telephone call records, comment sheets from the public meetings and other written correspondence to the project team are presented in Appendix F, Public Involvement.

18.3 Citizen's Advisory Committee

A CAC consisting of seven members was formed. Three meetings were held to discuss the project in more depth and to gain feedback and suggestions from committee members. Some of the topics discussed included:

- Context Sensitive Solutions Design Process
- Context of West Dimond Boulevard
- Identifying the "interdisciplinary" team
- Identification of project stakeholders

- Identifying existing street characteristics (classification, right-of-way width, landscaping, etc.)
- Defining the problems to be solved with this project
- Develop criteria for evaluating West Dimond Boulevard alternatives
- Stakeholders the road will be designed for
- Pedestrian Facility Requirements and Opportunities
- Planning and Zoning requirements
- Street and Pedestrian Facility Maintenance
- Design Alternatives – typical sections; roadway impacts/design challenges; intersection alternatives

Meeting agendas, presentation materials, handouts and meeting notes for the CAC are included in Appendix E, Public Involvement.

18.4 Public Agency Coordination

The project team met with staff from various MOA departments, the ASD, AWWU, DOT&PF and utility companies to:

- Introduce the project;
- Discuss MOA and DOT&PF goals for the project;
- Understand what each department would like to see included in this project;
- Determine what changes the public can effect and yet meet department standards or guidelines.

Another goal of this meeting was to make contact with staff and encourage project coordination internally with other ongoing municipal, state or utility projects in the area that may impact the West Dimond Boulevard project.

For a complete list of invitees and meeting notes, please refer to Appendix G, Public Involvement.

18.5 Future Public Involvement

Additional public involvement is planned for the design study phase, preliminary and final design phases and pre-construction. A public involvement plan which provides in detail the methods and timeline for engaging the community and agencies as the project moves forward can be found in the Public Involvement Plan in Appendix F.

19.0 COST ESTIMATE

The estimated costs for the preferred alternative are summarized as follows:

Table 19.1 Cost Estimate

DESCRIPTION	ITEM	CALCULATION	ESTIMATED COST
Construction	A		$8,400,000
Utility Relocation	B		$650,000
Right-of-Way Acquisition	C		$500,000
Subtotal	D	A+B+C	$9,550,000
Construction Engineering	E	20% of D	$1,910,000
Contingency	F	30% of D	$2,865,000
Total (rounded)	**G**	**D+E+F**	**$14,400,000**

20.0 DESIGN VARIANCES

The table below summarizes the proposed design variances that will be sought based on the recommended alternatives for the West Dimond Boulevard upgrade:

Table 20.1 Design Variances

ITEM	REFERENCED STANDARD	CRITERIA	REQUESTED VARIANCE	REASON
Pavement Section	DCM 1.10 D	Limited frost penetration method	Reduced subgrade strength method	Adequate for proposed roadway
Longitudinal roadway grade	DCM 1.9 D	≤ 6%	Follow existing terrain (up to 7.9%)	Cost associated with reducing grade is disproportionately high
Tangent between vertical curves	DCM 1.9 D	≥ 25 ft.	< 25 ft.	Undulating terrain west of Westpark Intersection
Curve radius	DCM 1.9 E	≥ 600 ft.	200 ft. Jodhpur Street	To stay within existing right-of-way

Municipality of Anchorage

WEST DIMOND BOULEVARD UPGRADE
JODHPUR STREET to SAND LAKE ROAD
DRAFT Design Study Report
July 2013

MOA Project No. 05-05