SECTION 4 - ANALYSIS OF PRIMARY CORRIDOR TRANSPORTATION IMPROVEMENT OPTIONS

CONCEPTUAL LAYOUTS

Conceptual engineering layouts of the four Primary Options were prepared to illustrate each option and identify potential elements and impacts. For each option, base improvement elements and applicable optional enhancement opportunities (as outlined in Section 3) were included in the layout.

For Options that included widening or constructing new sidewalk/curb improvements, current and applicable Spokane County design standards were applied. Right-of-way takes for each parcel are not tabularized as part of this conceptual study. Rather, the total area of anticipated right-of-way needed has been computed for the purposes of developing comparative cost estimates as discussed further herein.

The following layout/traffic operations elements are common to all of the Primary Options as shown in **Appendix A.** Visual examples for elements noted with an (*) are included in **Appendix B.**

- **Gateway Features*. Included to help identify Millwood as an established community to through traffic.
- **Transit Amenities.* Amenities such as widened concrete pads, bus shelter structures, and benches are included to enhance transit use along Argonne.
- **Radar Speed Limit Signs.* Radar enhanced speed limit signs are suggested as a way to actively influence driver behavior and manage speeds. The signs clearly depict the speed limit and indicate the actual speeds of approaching vehicles.
- **Landscaping Opportunities*. In response to SAC and public requests to include more trees and landscaping, opportunities for additional or enhanced landscaping are indicated.
- **Patterned/Pigmented and/or Lighted Crosswalks*. Crosswalk enhancements have been identified in the layouts for each option in order to visually highlight the crosswalk locations to drivers, and impress the potential presence of pedestrians within the Millwood community.
- **Pedestrian Lighting*. Pedestrian lighting increases walkability and safety. Opportunities to include pedestrian lighting have been included with each Primary Option layout.
- *ADA Compliant Curb Ramps*. Any reconstruction or paving project will require upgrading all curb ramps to current ADA standard.
- *Elimination of the existing drop lane on Argonne between Trent and Buckeye*. SAC members identified a way to eliminate this problematic drop lane and ease an existing problem with the Northbound to Westbound movements at the intersection of Argonne and Trent. A landscaped median is shown on Argonne between Trent and Buckeye, but an additional Southbound to Eastbound turn lane may be desirable as well.
- *Elimination of Left-Hand turns on to Argonne from Buckeye*. This revision was mandated as part of the traffic mitigation work for the new Walgreen's Drug Store, and has recently been constructed.
- *Completion of Sidewalks on Argonne*. Each option includes addition of sidewalk where no formal sidewalk currently exists.
- *Optional Undergrounding of Pole-Mounted Utilities*. This enhancement item is included due to the number of existing utility poles located within the sidewalks, limiting the available clear width

to two feet at some locations. It is assumed as an optional item for Option 1 and 3, but would most likely be required for Options 2 and 4 which include widening.

- *Change Signal Operation at Empire/Euclid*. Implement split-phased signal operation for east and west legs of Empire and Euclid Avenues at Argonne Road. This improvement is necessary due to the geometry and offset at the intersection and will help ease the truck access to Inland Empire Paper.
- *Signal Controller Upgrade and Signal Interconnect*. Each option would include an upgrade to the signal controller equipment to facilitate the interconnecting of the signals throughout the corridor.
- *Emergency Signal Controller at Frederick*. Install a signal with flashing beacons that change to full signal display (red, yellow and flashing yellow, top to bottom) when actuated by the Fire Department (at the firehouse).
- *Restrict left turning traffic during peak periods*. Post "NO LEFT TURNS, 3-6 PM" signs at the stop-controlled intersections north of Liberty Street.
- *Update Traffic Signs*. Update all regulatory signs with high-intensity sheeting, with high reflectivity, including speed limit signs, no parking signs, stop signs, etc. Replace all warning signs and street name signs with high-intensity sheeting and larger lettering to adhere to current MUTCD.
- *Optional Sidewalk Project on E. Grace Avenue*. As a response to the SAC and public desire to connect City schools and parks, this optional sidewalk project along the north side of E. Grace extends from West Valley High School to Argonne Road. It is assumed that this project could be constructed within the existing right-of-way on Grace.
- *Optional Multi-Use Path*. Each Primary Option includes an optional multi-use pathway along the Spokane County sanitary sewer right-of-way corridor, from West Valley High School to Millwood Park. An initial feasibility discussion with County right-of-way services staff yielded no red flags to the idea of the Town creating a paved trail throughout this corridor. Due to the proximity of the path to the UPRR tracks, a chain link fence will be required along the Northern path edge.

Unique features and key assumptions identified for each Primary Option are identified and summarized as follows.

Option 1 – Optimize Existing 4-Lane Roadway

- *Optional Multi-Use Path along IEP*. SAC members identified this potential corridor, and representatives from IEP indicated that they were open to discussing this type of possibility. A 10-foot wide path directly behind the curb would provide a direct connection from the Historic District of Millwood to the Spokane River Bridge, where pedestrians and/or bicyclists could continue north along Argonne on designated sidewalks or bike lanes to the Centennial Trail, at Argonne and Upriver Drive.
- *Curb/Sidewalk Bulb-Outs along Historic District*. Bulb-outs provide protection for parallel parked cars, provide for shorter crosswalks lengths, calm traffic on Argonne by creating a sense of constriction at these locations, and provide for landscaping opportunities.

Option 2 – 4-Lane with Turn Pockets

- *Widening Methodology*. Widening for turn pockets at the signalized intersections was distributed evenly on each side of the centerline, except north of Frederick, where widening for the turn pockets at Euclid/Empire and Liberty occurs along the east side of the road, such that the historic storefronts are not impacted. Continuous two-way left turn lanes are indicated

between Buckeye and Grace, and between Euclid/Empire and Liberty, as there is limited distance between blocks to taper back to the existing 4-lane roadway.

- *Truck Friendly Right Turn*. A right-hand turn radius is provided at the Argonne/Empire intersection to accommodate the regular movements of large IEP trucks. The radius was designed to Washington State DOT standards for a WB-67 truck, which is typical for IEP deliveries. No feasibility discussions have occurred with UPRR to date.
- *Curb/Sidewalk Bulb-Outs along Historic District*. Bulb-outs provide protection for parallel parked cars, provide for shorter crosswalks lengths, calm traffic on Argonne by creating a sense of constriction at these locations, and provide for landscaping opportunities.

Option 3 – 3-Lane Conversion

- *Bicycle Lanes*. Continuous bicycle lanes are included in the re-striping of Argonne road to a 3-lane facility. SAC members indicated that bicycle lanes are preferred to other options such as on-street parking. Bike lanes are a minimum of 5-feet in width per Spokane County design standards. Bicycle lanes are disrupted only along the southbound side of Argonne adjacent to the Historic District, where existing parallel parking is favored. Bicyclists would be required to merge with traffic along this portion of southbound Argonne road.
- *Curb/Sidewalk Bulb-Outs along Historic District*. Bulb-outs provide protection for parallel parked cars, provide for shorter crosswalks lengths, calm traffic on Argonne by creating a sense of constriction at these locations, and provide for landscaping opportunities.

Option 4 – 5-Lanes

- *Widening Methodology*. Widening for the additional continuous two-way left turn lane and bicycle lanes was distributed evenly on each side of the centerline, except north of Frederick, where widening for the turn pockets at Euclid/Empire and Liberty occurs along the east side of the road, such that the historic storefronts are not impacted.
- *Bicycle Lanes*. Continuous bicycle lanes are included in the widening of Argonne road to a 5-lane facility. Bike lanes are a minimum of 5-feet in width per Spokane County design standards. Bicycle lanes are disrupted only along the southbound side of Argonne adjacent to the Historic District, where existing parallel parking is favored. Bicyclists would be required to merge with traffic along this portion of southbound Argonne road.
- *Truck Friendly Right Turn*. A right-hand turn radius is provided at the Argonne/Empire intersection to accommodate the regular movements of large IEP trucks. The radius was designed to Washington State DOT standards for a WB-67 truck, which is typical for IEP deliveries. No feasibility discussions have occurred with UPRR to date.
- *Operational Impact to IEP*. Widening for the additional continuous two-way left turn lane creates an operational impact to IEP that would likely require additional analysis, and may require mitigation if the impacts are unavoidable. IEP delivery operations require adequate width on the west side of the historic mill building. This width is compromised with the 5-lane layout as shown.

TRAFFIC OPERATIONS ANALYSIS

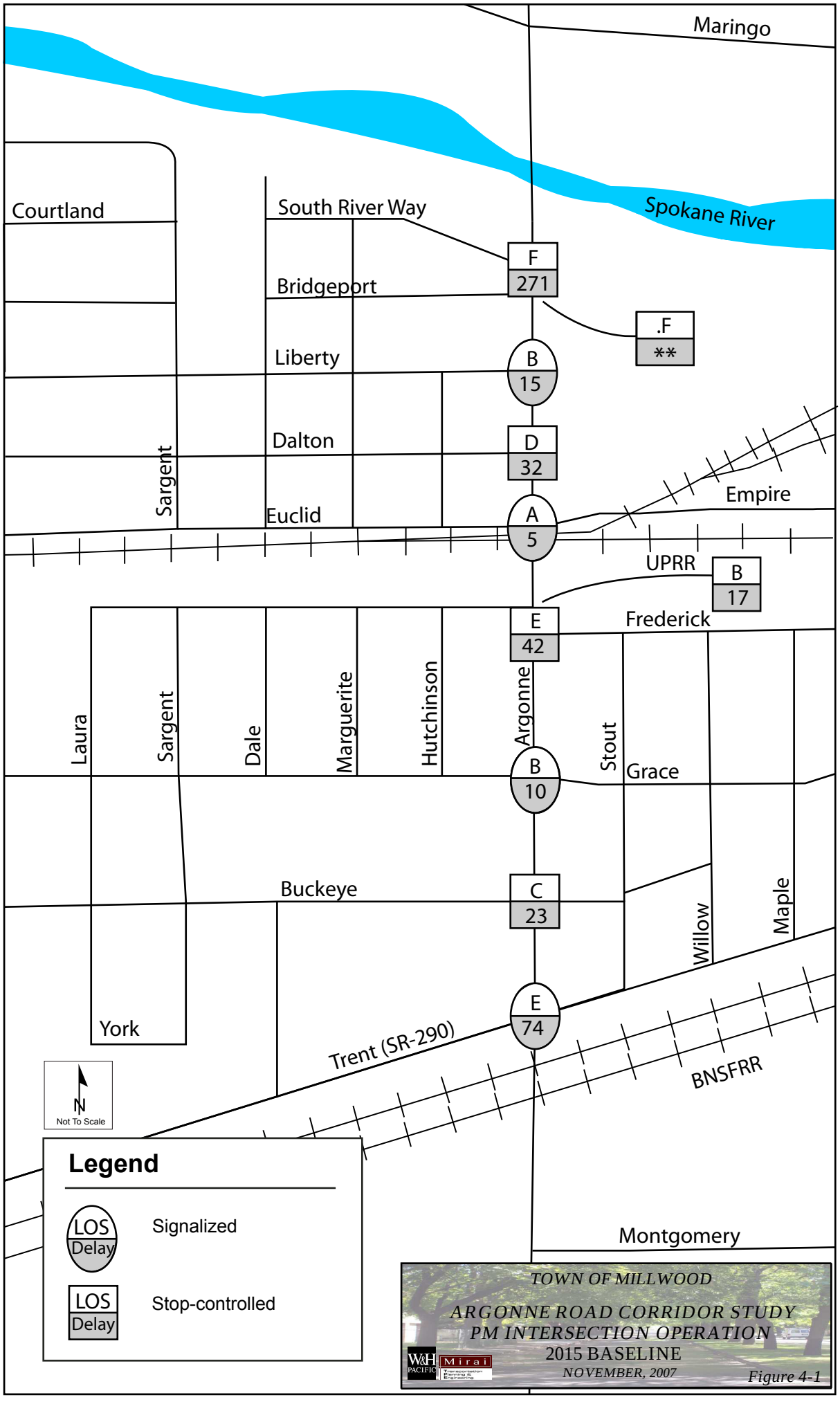
The consultant team examined traffic operations for the four Primary Corridor Transportation Improvement Options under future predicted (2015) traffic conditions to assess how they'll perform, and provide for a basis for comparison between the options. The traffic operations elements that the team evaluated are:

- Intersection Level of Service (LOS) – A measure by which transportation planners determine the quality of service at an intersection. The Highway Capacity Manual and AASHTO - Geometric Design of Highways and Streets ("Green Book") list the following levels of service:

A= Free flow	C=Stable flow	E=Unstable flow
B=Reasonably free flow	D=Approaching unstable flow	F=Forced or breakdown flow

- Delay - Average of the vehicle delay entering the intersection at all times. This study looks at delay for both north/south traffic as well as east/west traffic.

A comparison of each Option with the future baseline condition (condition if no improvements are made to Argonne Road at all) helps to illustrate what traffic-related benefits can be achieved under each option. **Figure 4-1** illustrates the year 2015 baseline operations for Argonne Road.


Maringo
Spokane River
Courtland
South River Way
Bridgeport
Liberty
Dalton
Sargent
Euclid
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B
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A
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Empire
UPRR
B
17
Frederick
E
42
Laura
Sargent
Dale
Marguerite
Hutchinson
Argonne
Stout
Grace
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Buckeye
C
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Willow
Maple
York
E
74
Trent (SR-290)
BNSFRR
Montgomery
N
Not To Scale
Legend
LOS
Delay
Signalized
LOS
Delay
Stop-controlled
TOWN OF MILLWOOD
ARGONNE ROAD CORRIDOR STUDY
PM INTERSECTION OPERATION
2015 BASELINE
NOVEMBER, 2007
Figure 4-1

Baseline Conditions for Argonne Road

The consultant team obtained a forecast of estimated housing and employment by transportation analysis zone (TAZ) for year 2015. While the travel demand model was not available in time for this analysis of Argonne Road, we have incorporated a growth in both housing and employment into the traffic forecasts for Argonne Road in 2015. An estimated 18 percent growth in PM peak hour traffic is expected for northbound Argonne Road by year 2015. Southbound traffic is also expected to increase, at a lower rate of 10 percent for the PM peak hour. A 10 percent increase in side street traffic is forecasted. Housing and employment are expected to remain stable in Millwood and this slight increase in side-street traffic is more a reflection of some shifting of traffic between access points than it is a growth in Millwood traffic demand. The traffic volumes for PM peak hour analysis thus reflect some growth overall, and are limited in operation by the major intersection at Trent Avenue.

Traffic operations and the roadway network are expected to remain relatively constant between 2007 and 2015, with respect to Argonne Road in Millwood. Spokane County will progress in the development and widening of the Bigelow Gulch corridor, however it is not expected to modify travel behavior along Argonne Road. The Spokane area "Bridging the Valley" program is expected to be underway by 2015, but the program is long term, with completion out beyond 2015. This view of operations for Argonne Road in 2015 is intended to provide a mid-term projection for traffic conditions and to also provide a comparison of the corridor options under conditions that are quite similar to today.

It is expected that completion of the Bigelow Gulch corridor with extension east to another crossing of the Spokane River can provide an alternative to Argonne Road – and with anticipated growth in population and employment, there may be little relief realized on Argonne Road itself. Completion of the Bridging the Valley program to expand railroad capacity along the BNSF corridor will allow the Union Pacific mainline trains to have grade separated operation – and thus reduce the impact on local communities such as Millwood.

Baseline Operations

Traffic operation in the Argonne Road corridor will be congested, running near capacity in the PM peak hour of 2015, with operation metered by the intersection at Trent Avenue. Under current signal operation and 2015 traffic volumes, northbound travel time through the Millwood corridor would be an estimated 5.8 minutes between Trent and the Spokane River bridge. This operation is tuned to prioritize north and south travel. Left-turns from Argonne Road will continue to be difficult – and it's likely that those will be rerouted to other intersections with signal control. Side street traffic will continue to experience delays in access to Argonne Road – since the priority would remain with north-south traffic.

Four Traffic Options

The four traffic options for the Argonne Road corridor reflect the interest of the Stakeholders to explore what can be done with the current configuration (Option 1, Four Lanes), what can be done if we add turn pockets (Option 2), what can we expect with a Road Diet (Option 3 – reconfigure from four lanes to three), and what can we expect if we widen the whole corridor (Option 4 – widen for five lanes). Each of these four options was evaluated using Synchro traffic modeling software. This analysis provides information to compare them based on individual intersection operation, north-south flow, and east-west access.

Although the Town is resistant to widening the roadway, it's important to provide the traffic analysis for comparison. Likewise, the Town is very interested in exploring a three lane configuration – to which there is also resistance from the City of Spokane Valley, WSDOT and

Spokane County. The traffic analyses of the four options and a comparison with the future baseline can provide information for decisions to be made for the corridor, with both local and regional interests in consideration.

The traffic options for the corridor were evaluated with three aspects of operational philosophy for Argonne Road in Millwood:

- Improve side street access for pedestrians and vehicles
- Address truck access and maneuvering challenges at Empire Avenue
- Strike a new balance between north-south through traffic priority and the east-west community access priority

Table 4-1 illustrates the results of the traffic analysis for both baseline and the four options.

Option 1 – Enhanced Operation with Four Lanes. By modifying signal timing and signal phasing at the three Millwood signals, traffic operations can improve substantially for side-street traffic, at small expense to through traffic. **Figure 4-2** shows the expected intersection operation with Option 1. Signal operation would add left-turn phasing for Argonne Road, where the opposing traffic would be stopped to grant the left-turn right of way. Signal timing was modified to provide longer pedestrian crossing times and side street timing at the signals. Split phase operation would be implemented at the Euclid/Empire Avenue intersection – to provide safer and more effective traffic access with the off-set intersection. This also provides for smoother truck operation through the intersection with key access to the Inland Empire Paper mill facility. Left-turn movements from the Stop controlled side streets could be restricted in the peaks where especially challenging, and the traffic would relocate to a nearby signal for full access to the corridor.

Overall, Option 1 changes could result in a 56 percent reduction in side-street delay at Millwood intersections. This would be a huge improvement for Millwood community access – through signal timing and phasing adjustments at the existing signals. This side street benefit would come at the expense of through traffic, with small increases in north-south travel time. Through traffic is already constrained at the intersection with Trent Avenue.

Option 2 – Widen for Left-turn Pockets. Similar results can be achieved for the corridor by adding left-turn pockets at the three signals in Millwood and with slightly increased travel speeds for the through traffic. **Figure 4-3** shows the expected intersection operation with Option 2. Option 2 would include the signal timing changes for side street traffic and pedestrians, as well as the split phasing for Euclid/Empire Avenue intersection. Overall improvement in side street delay would be about 59 percent. Widening for this option would be localized to the Grace Avenue intersection and would extend from the Euclid/Empire Avenue intersection beyond the Liberty Avenue intersection.

Option 3 – Reconfigure from Four to Three Lanes. Traffic operation in the corridor would fail with only one through lane in each direction, even with left-turn lanes. **Figure 4-4** shows the expected intersection operation with Option 3. Intersection operation would fail throughout the corridor because there would be no gaps in traffic for turns or side street traffic. The current and forecasted corridor traffic on Argonne Road would exceed the possible capacity of a three-lane roadway. Even with signal timing adjustments for increased side street access, the operation would fail in the corridor for both side streets and through traffic. Although it could be designed to be attractive, the three lane configuration would be highly congested throughout the extended peak periods, limiting both vehicle and pedestrian travel in Millwood. A steady stream of traffic through the corridor would limit access to businesses, residential areas and also constrain pedestrians crossing Argonne Road. This option would result in degradation of traffic operation for both through and local traffic.

Table 4-1: Traffic Operations Analysis Results

TOWN OF MILLWOOD

ARGONNE ROAD CORRIDOR STUDY

Table 4-1: Traffic Operations Analysis Results

	2015 Conditions									
Street Name	Baseline - Optimize Signals		Option 1 Optimize Existing 4-Lane		Option 2 4-Lane with Turn Pockets		Option 3 3-Lane Conversion		Option 4 5-Lanes	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
E Trent Ave & N Argonne Rd	74	E	71	E	72	E	107	F	74	E
E Buckeye Ave & N Argonne Rd	23	C	3	A	6	A	23	C	8	A
E Grace Ave & N Argonne Rd	10	B	13	B	7	A	129	F	7	A
E Frederick Ave & N Argonne Rd (S)	42	E	15	D	28	D	#	F	22	C
E Frederick Ave & N Argonne Rd (N)	17	B	12	B	14	B	#	F	13	B
E Euclid Ave & N Argonne Rd	5	A	20	C	10	B	189	F	10	B
E Dalton Ave & N Argonne Rd	32	D	13	B	16	C	#	F	16	C
E Liberty Ave & N Argonne Rd	15	B	13	B	11	B	159	F	11	B
E Bridgeport Ave & N Argonne Rd	#	F	14	B	14	B	#	F	21	C
E South Riverway Ave & N Argonne Rd	271	F	14	B	14	B	#	F	17	C
Travel Time Northbound	5.8	minutes	7.2	minutes	6.3	minutes	8.6	minutes	5.9	minutes
Travel Time Southbound	3.3	minutes	4.6	minutes	4.3	minutes	7.5	minutes	3.9	minutes
Average Speed, Northbound	6 mph		5 mph		5 mph		4 mph		6 mph	
Average Speed, Southbound	10 mph		7 mph		8 mph		5 mph		9 mph	
Total Sidestreet Delay Eastbound	13.7	minutes	4.7	minutes	4.1	minutes	36.0	minutes	4.5	minutes
Total Sidestreet Delay Westbound	2.2	minutes	2.2	minutes	2.4	minutes	8.7	minutes	2.4	minutes
Sum of Sidestreet delay	15.9	minutes	7.0	minutes	6.5	minutes	44.7	minutes	6.9	minutes
Reduction in Sidestreet delay			56%		59%		Large increase		56%	

Legend

LOS A-D

LOS E

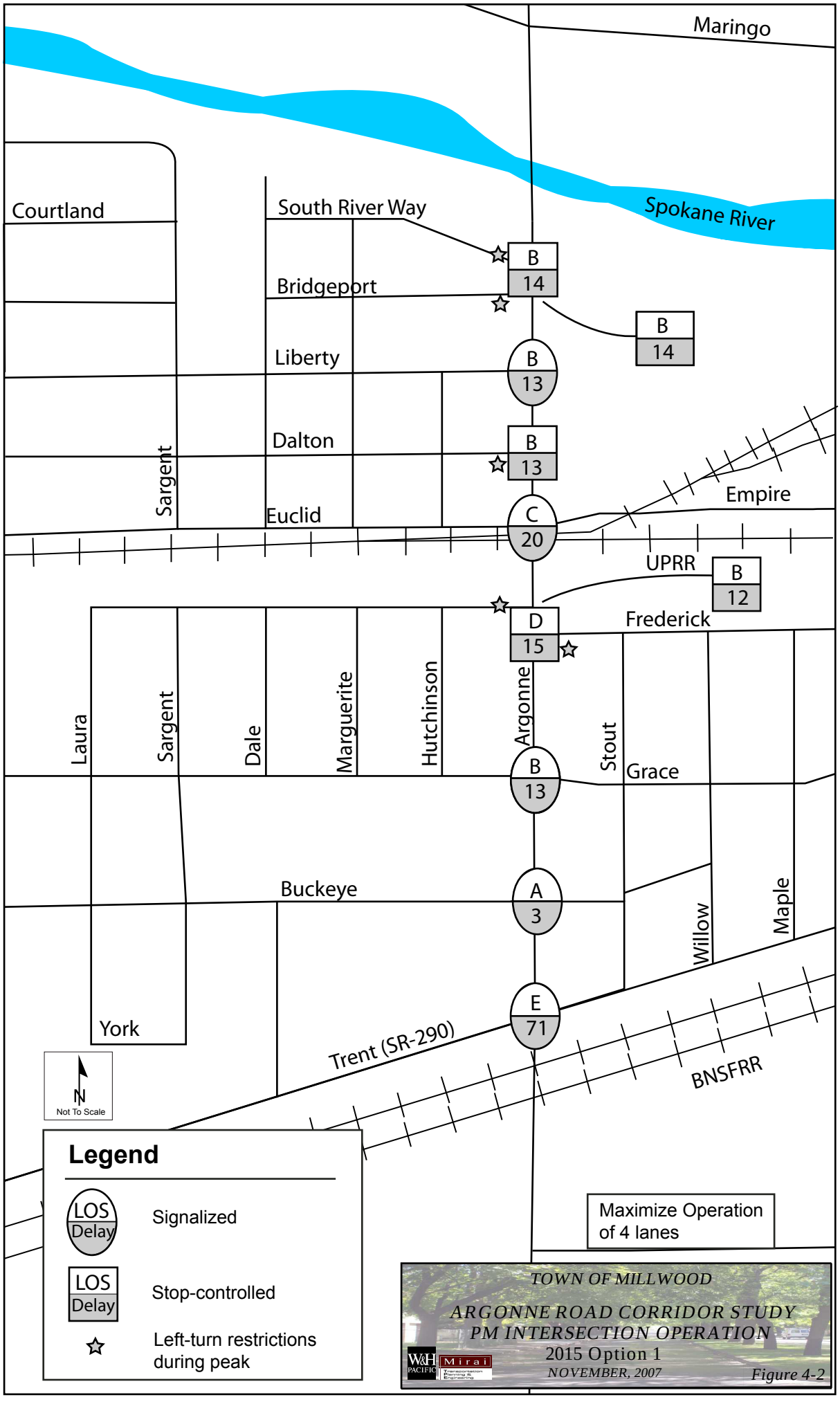
LOS F

Option 4 – Widen for Five Lanes. Widening Argonne Road from four to five lanes would provide for a turn lane at the signalized intersections and provide for a continuous turn lane for mid-block driveway access. **Figure 4-5** shows the expected intersection operation with Option 4. Option 4 would include signal timing changes for the side street traffic and pedestrian movements – for the longer crossing distance. Split phasing is proposed for the intersection of Euclid/Empire Avenue for safety and truck access as well as traffic operations from the side streets. East-west delays would be reduced by 56 percent compared with the baseline conditions operation.

Findings from the Traffic Analysis

1. Striking a new balance between through traffic and side street traffic could be accomplished without widening and could result in over 50 percent reduction in side street delays. This would come at the expense of through traffic speed and delays, however, the corridor is constrained and metered by operation at the Trent Avenue intersection, and free-flow is not a realistic goal for the peak period.
2. Widening for left-turn pockets can generate some benefits in additional side street accessibility and restore some through traffic benefit on Argonne. It would also provide for easier left-turns at signals and driveways mid-block.
3. The Road Diet is not an option for Argonne Road under current traffic and the near term traffic volumes anticipated for the corridor. It would result in added delays for both through and Millwood traffic – a losing proposition for all. Although it could provide bike lanes, the high volume of traffic would reduce the attractiveness for cycling.
4. A Five Lane cross section for Argonne Road would provide for both the left-turns and add bike lanes. This would improve side street access and reduce delays and restore much of the through traffic travel speed, as for the baseline condition. However, the widening would require right of way through the length of the corridor and would widen about two lanes worth for the turn lane and the two bike lanes.
5. Side street access at stop signs will continue to be a challenge during the peak period – and it's suggested that these intersections be signed for "No Left Turn 4-6pm" and that traffic would reroute to nearest signal – Liberty, Euclid/Empire and Grace. Analysis reflects that shift in traffic to the signalized access.
6. Trent continues to operate as a meter for traffic into and out from the Argonne Road corridor in Millwood – as such, there are limitations to what changes at the Millwood signals can accomplish for north or south flow. Also, this means that modifications to side-street signal timing may have little impact on overall corridor performance during the peak while providing improved service to the community.
7. Conversion to a three lane roadway is a big loser – for north/south flow, and also for side street and community access. While the crossing distance is shorter for pedestrians, there would be no break in traffic stream for pedestrians to cross – both north/south and east/west delays would amplify with this option.
8. Widening for five lanes would have no big benefit over the widening for left turn pockets at the signals.

Results of the traffic analysis were presented to the Stakeholder Advisory Committee for review on October 15, 2007. The Stakeholders concurred with the analysis.


Maringo
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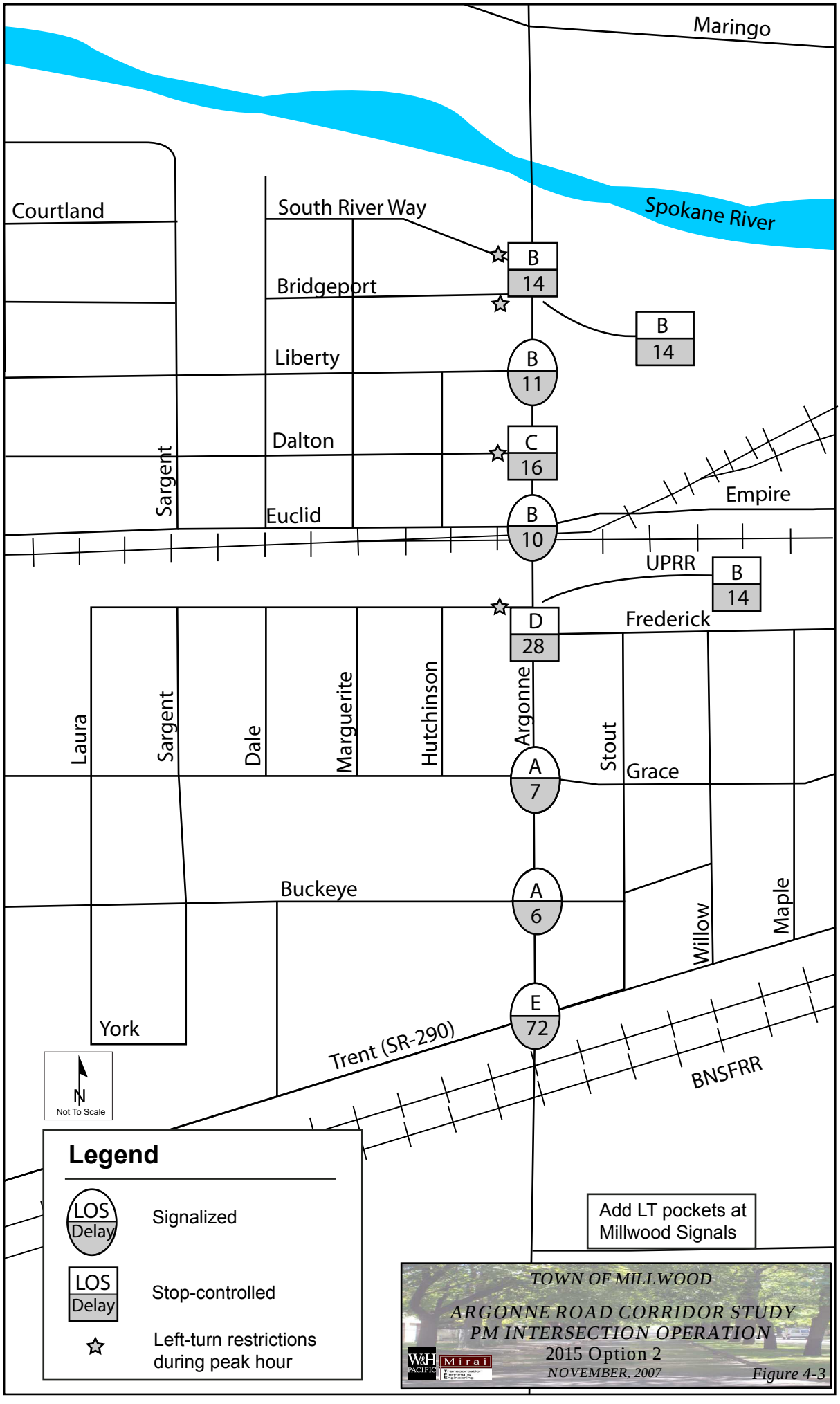
Legend
LOS Delay
Signalized
LOS Delay
Stop-controlled
Left-turn restrictions during peak
Maximize Operation of 4 lanes
TOWN OF MILLWOOD
ARGONNE ROAD CORRIDOR STUDY
PM INTERSECTION OPERATION
2015 Option 1
NOVEMBER, 2007
Figure 4-2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D 28
A 7
A 6
E 72
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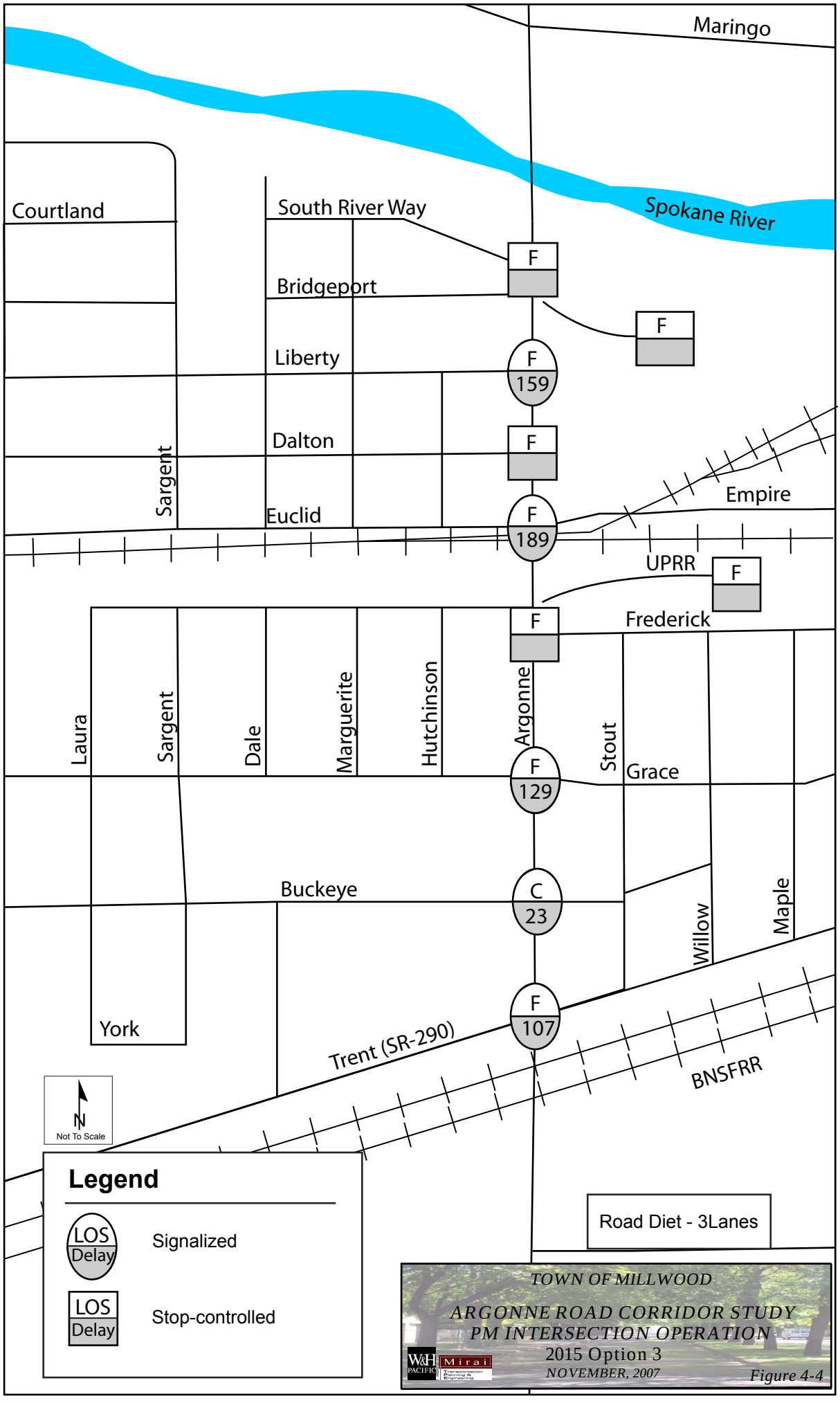
Not To Scale
Legend
LOS Delay
Signalized
LOS Delay
Stop-controlled
Left-turn restrictions during peak hour
Add LT pockets at Millwood Signals
TOWN OF MILLWOOD
ARGONNE ROAD CORRIDOR STUDY
PM INTERSECTION OPERATION
2015 Option 2
NOVEMBER, 2007
Figure 4-3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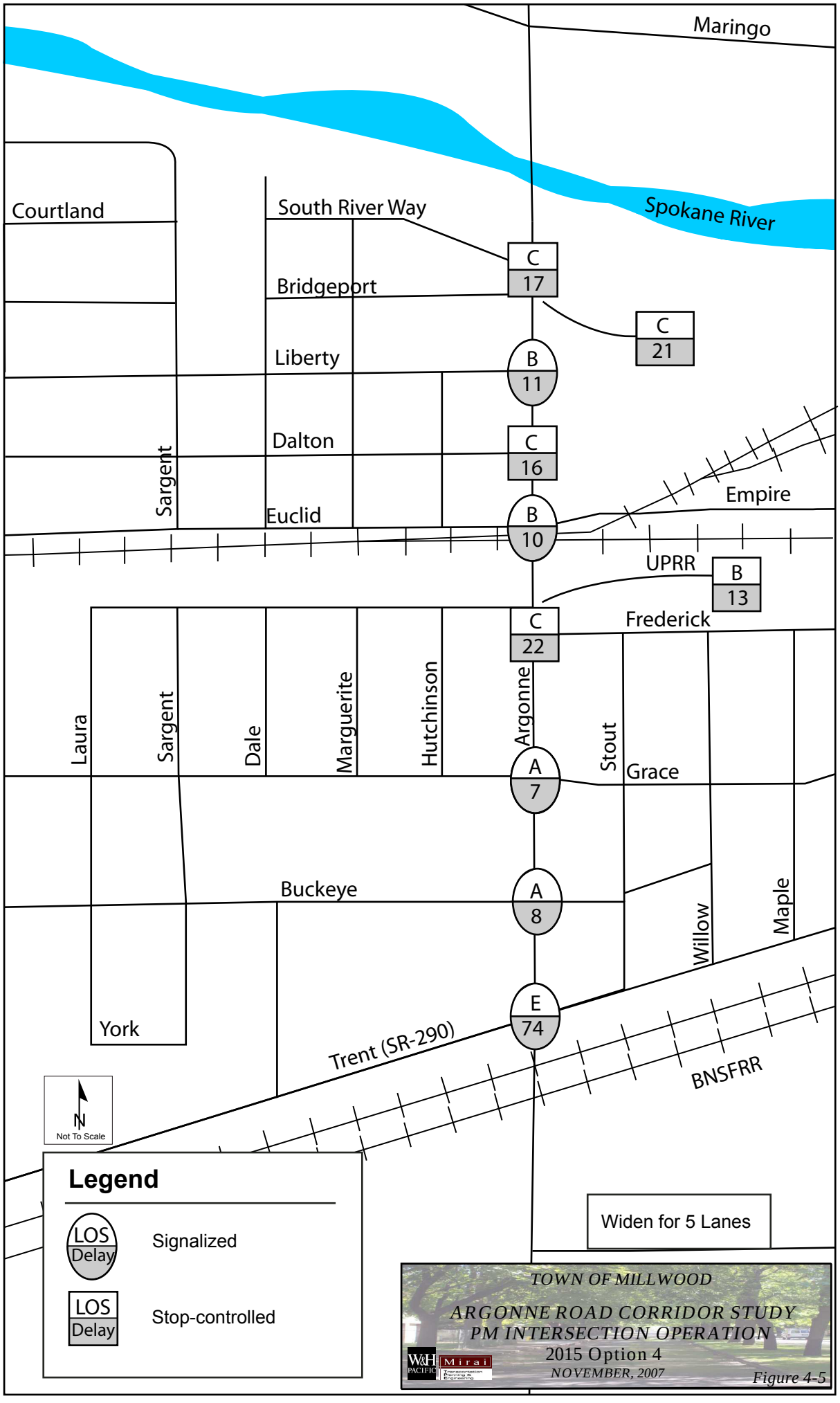
Legend
LOS
Delay
Signalized
LOS
Delay
Stop-controlled
Road Diet - 3Lanes
TOWN OF MILLWOOD
ARGONNE ROAD CORRIDOR STUDY
PM INTERSECTION OPERATION
2015 Option 3
NOVEMBER, 2007
Figure 4-4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Legend
LOS Delay
Signalized
LOS Delay
Stop-controlled
Widen for 5 Lanes
TOWN OF MILLWOOD
ARGONNE ROAD CORRIDOR STUDY
PM INTERSECTION OPERATION
2015 Option 4
NOVEMBER, 2007
Figure 4-5

Traffic Operations Recommendations

Option 1 – Enhanced Operation with Four Lanes. Signal timing and modifications to traffic signals in Millwood will continue to be coordinated in cycle length and overall operation with the traffic signal at Argonne Road and Trent Avenue. Traffic signal modifications for Option 1 include the following items:

- Upgrade traffic signal controllers to be compatible with equipment at the Trent Avenue intersection. Install interconnect cable from Trent intersection across the Spokane River Bridge for future connection to Spokane County signals north of the River.
- Modify signal phasing at Grace and Euclid/Empire intersections for leading or lagging left-turn phasing for north and south traffic on Argonne Road. This will likely require additional time in the cycle length for the intersection, with some added delay to through traffic. This will require detection to initiate the left-turn phase when delays are long for left-turning traffic.
- Modify signal phasing at Euclid/Empire intersection for separate side-street phases, eastbound only from Euclid and westbound only from Empire. This split phasing configuration is needed due to the offset between the approaches and can provide better access for trucks to and from the IEP plant.
- Install vehicle detection for north-south traffic on Argonne Road and upgrade side-street detection. This could use either pavement detector loops or video detection (as is in use at the Trent intersection). Detection on the side streets should be sensitive to detect bicycles.
- Install pedestrian count-down signal heads at the three Millwood signals to provide positive information and guidance to pedestrians using the crosswalks. Make sure that signal timing for the intersection provides sufficient crossing time for pedestrians.
- Eliminate northbound merge between Trent and Buckeye. Modify lane configuration at the Trent Avenue intersection to result in two northbound through lanes exiting the intersection toward Buckeye. This lane revision can help streamline operation for the northbound dual-left-turn movement from Argonne Road to Trent Avenue.
- Install short left-turn pocket at the Liberty intersection.

Option 2 – Widen for Left-turn Pockets. Signal timing and modifications to traffic signals in Millwood will continue to be coordinated in cycle length and overall operation with the traffic signal at Argonne Road and Trent Avenue. Traffic signal modifications for Option 2 include the following items:

- Upgrade traffic signal controllers to be compatible with equipment at the Trent Avenue intersection. Install interconnect cable from Trent intersection across the Spokane River bridge for future connection to Spokane County signals north of the River.
- Provide for future traffic signal phasing at Grace and Euclid/Empire intersections to allow for permitted left-turn phasing for north and south traffic on Argonne Road. There may be a future need to change from permitted left-turns to protected, then permitted left-turn phasing. This will require detection to initiate the left-turn phase when delays are long for left-turning traffic. Operation should be monitored yearly to confirm if permitted left-turn phasing is enough for these intersections.
- Modify signal phasing at Euclid/Empire intersection for separate side-street phases, eastbound only from Euclid and westbound only from Empire. This split phasing

configuration is needed due to the offset between the approaches and can provide better access for trucks to and from the IEP plant.

- Install vehicle detection for north-south traffic on Argonne Road and upgrade side-street detection. This could use either pavement detector loops or video detection (as is in use at the Trent intersection). Detection on the side streets should be sensitive to detect bicycles.
- Install pedestrian count-down signal heads at the three Millwood signals to provide positive information and guidance to pedestrians using the crosswalks. Make sure that signal timing for the intersection provides sufficient crossing time for pedestrians.
- Eliminate northbound merge between Trent and Buckeye. Modify lane configuration at the Trent Avenue intersection to result in two northbound through lanes exiting the intersection toward Buckeye. This lane revision can help streamline operation for the northbound dual-left-turn movement from Argonne Road to Trent Avenue.

Option 3 – Reconfigure from Four to Three Lanes. Signal timing and modifications to traffic signals in Millwood will continue to be coordinated in cycle length and overall operation with the traffic signal at Argonne Road and Trent Avenue. Traffic signal modifications for Option 3 include the following items:

- Upgrade traffic signal controllers to be compatible with equipment at the Trent Avenue intersection. Install interconnect cable from Trent intersection across the Spokane River bridge for future connection to Spokane County signals north of the River.
- Provide for traffic signal phasing at Grace and Euclid/Empire intersections to allow for protected left-turn phasing for north and south traffic on Argonne Road. This will require detection in the left-turn pockets.
- Modify signal phasing at Euclid/Empire intersection for separate side-street phases, eastbound only from Euclid and westbound only from Empire. This split phasing configuration is needed due to the offset between the approaches and can provide better access for trucks to and from the IEP plant.
- Install vehicle detection for north-south traffic on Argonne Road and upgrade side-street detection. This could use either pavement detector loops or video detection (as is in use at the Trent intersection). Detection on the side streets should be sensitive to detect bicycles.
- Install pedestrian count-down signal heads at the three Millwood signals to provide positive information and guidance to pedestrians using the crosswalks. Make sure that signal timing for the intersection provides sufficient crossing time for pedestrians.

Note that there would need to be some modifications to the lane configuration at the Trent Avenue intersection to transition to the three-lane configuration of Argonne Road north of Trent Avenue.

Option 4 – Widen for Five Lanes. Signal timing and modifications to traffic signals in Millwood will continue to be coordinated in cycle length and overall operation with the traffic signal at Argonne Road and Trent Avenue. Traffic signal modifications for Option 5 include the following items:

- Upgrade traffic signal controllers to be compatible with equipment at the Trent Avenue intersection. Install interconnect cable from Trent intersection across the Spokane River bridge for future connection to Spokane County signals north of the River.
- Provide for future traffic signal phasing at Grace and Euclid/Empire intersections to allow for permitted left-turn phasing for north and south traffic on Argonne Road. There may be a future need to change from permitted left-turns to protected, then permitted left-turn phasing. This will require detection to initiate the left-turn phase when delays are long for left-turning traffic. Operation should be monitored yearly to confirm if permitted left-turn phasing is enough for these intersections.
- Modify signal phasing at Euclid/Empire intersection for separate side-street phases, eastbound only from Euclid and westbound only from Empire. This split phasing configuration is needed due to the offset between the approaches and can provide better access for trucks to and from the IEP plant.
- Install vehicle detection for north-south traffic on Argonne Road and upgrade side-street detection. This could use either pavement detector loops or video detection (as is in use at the Trent intersection). Detection on the side streets should be sensitive to detect bicycles.
- Install pedestrian count-down signal heads at the three Millwood signals to provide positive information and guidance to pedestrians using the crosswalks. Make sure that signal timing for the intersection provides sufficient crossing time for pedestrians.
- Eliminate northbound merge between Trent and Buckeye. Modify lane configuration at the Trent Avenue intersection to result in two northbound through lanes exiting the intersection toward Buckeye. This lane revision can help streamline operation for the northbound dual-left-turn movement from Argonne Road to Trent Avenue.

Concept-Level Costs

Concept-level cost estimates were prepared for each of the Primary Options, including estimates of enhancements, right-of-way costs, and engineering & construction management costs. Unit prices were derived from a combination of recent construction cost unit bid prices, recent historical averages, and discussions with appropriate vendors and/or purveyors.

The detailed cost estimates are provided in **Appendix C**. A summary of the concept-level cost estimates is provided below in **Table 4-2**.

Table 4-2: Summary of Concept-Level Cost Estimates

Cost Component		Option 1 Optimize Existing 4-Lanes	Option 2 4-Lane with Turn Pockets	Option 3 3-Lane Conversion	Option 4 5-Lanes
Construction Costs	Base Improvement Items	$2,359,903	$3,955,490	$1,721,315	$4,292,465
	Enhancement Items	$1,597,500	$1,076,500	$1,488,500	$1,076,500
	Subtotal	$3,957,403	$5,031,990	$3,209,815	$5,368,965
Design & Construction Contingencies	(30% of Subtotal)	$1,187,200	$1,509,600	$962,900	$1,610,700
TOTAL CONSTRUCTION		**$5,144,603**	**$6,541,590**	**$4,172,715**	**$6,979,665**
Design Engineering	(15% of Construction Total)	$771,690	$981,239	$625,907	$1,046,950
Construction Management	(12% of Construction Total)	$617,352	$784,991	$500,726	$837,560
TOTAL ENGINEERING & CONSTRUCTION MANAGEMENT		**$1,389,043**	**$1,766,229**	**$1,126,633**	**$1,884,510**
***TOTAL PROJECT ESTIMATE**		**$6,534,000**	**$8,308,000**	**$5,299,000**	**$8,864,000**

*All costs are shown in 2008 dollars.

Funding Strategy Comparison

For evaluation purposes, the consultant team reviewed each option for applicability to a number of Local, State and Federal funding opportunities. Depending on the nature of the funding source, and funding source requirements, an initial assessment of 'fundability' for each option was performed. The complete Funding Strategy Comparison is provided in **Figure 4-6.** The net result is:

- There are a variety of ways to fund potential future projects;
- Some options are more fundable than other options, depending on funding source requirements; and
- A number of funding options should be pursued for the preferred option as identified in Section 5 in the next available funding cycle.

TOWN OF MILLWOOD
ARGONNE ROAD CORRIDOR STUDY
Figure 4-6: Funding Strategy Comparison

2008 Argonne Rebuild/Inlay Project

Federal STP(U) - Regionally Selected

Included in Project (Funded):
- Updated Curb Ramps
- Concrete Intersections at Grace, Euclid, Empire
- Rebuild Roadway Pavements (Frederick - North)
- Grind & Inlay Pavements (Frederick - South)

Consider Including, at a Minimum (Local Funding):
- Completing Sidewalks on Argonne
- Conduit for Signal Coordination/Interconnect
- Curb/Sidewalk Revisions in Historic District to Protect Parking/Shorten Ped Crossings
- Utility Undergrounding

LEGEND
"Thumbs-Up" - Project Fits Funding Source Requirements and Should be Pursued
"Thumbs Sideways" - Project May or May Not be Successful Utilizing this Funding Source
"Thumbs Down" - Project is Not Fundable Utilizing this Funding Source

	Option 1 Optimize Existing 4-Lane	Option 2 4-Lane with Turn Pockets	Option 3 3-Lane Conversion	Option 4 5-Lanes	Comments & Notes
LOCAL					
Argonne Corridor Roadway Improvement District (RID)					*Funding via local funding district, assessments to benefiting properties.*
Town of Millwood General Funds					
Town of Millwood Special Taxing District					
STATE					
WASHINGTON STATE DEPT OF COMMUNITY, TRADE & ECONOMIC DEVELOPMENT (CTED)					
PWTF - Public Works Trust Fund					*In the past, reserved for Water & Sewer Infrastructure* *Applications due in May* *$10M Loans for Construction (20-yr), $1M for Pre-Construction (5-yr)* *0.5%-2% Interest Rate, linked to Local Match* *Local Match 5%-15%, linked to Interest Rate*
WASHINGTON STATE FREIGHT MOBILITY STRATEGIC INVESTMENT BOARD (FMSIB)					
FMSIB - Freight Mobility Strategic Investment Board	Limited Improvements for freight		Delay would negatively impact freight.		*Argonne Road is Designated T-2 Strategic Freight Corridor* *Criteria based on reducing delay, improving safety for freight movement.* *Local Match (Public & Private) adds points*
WASHINGTON STATE TRANSPORTATION IMPROVEMENT BOARD (TIB)					
UAP - Urban Arterial Program			Environmental Studies will reveal traffic flow weakness.	Public/Private support is crucial	*Target Program Size (Statewide): $30-40M* *NE WA - (12%)* *10-20% Local Match Required*
UCP - Urban Corridor Program			Environmental Studies will reveal traffic flow weakness.	Public/Private support is crucial	*Target Program Size (Statewide): $35-40M* *East WA - (18%)* *10-20% Local Match Required*
SP - Sidewalk Program	Partial Funding for Sidewalk Portions	Partial Funding for Sidewalk Portions	Partial Funding for Sidewalk Portions	Partial Funding for Sidewalk Portions	*Target Program Size (Statewide): $1-2M* *East WA - (18%)* *20% Local Match Required*
SCAP - Small City Arterial Program			Environmental Studies will reveal traffic flow weakness.	Public/Private support is crucial	*Target Program Size (Statewide): $5-8M* *Towns w/ Less than 5,000 population may compete* *5% Local Match Required*
SC-SP - Small City Sidewalk Program	Partial Funding for Sidewalk Portions	Partial Funding for Sidewalk Portions	Partial Funding for Sidewalk Portions	Partial Funding for Sidewalk Portions	*Target Program Size (Statewide): $1-1.5M* *Towns w/ Less than 5,000 population may compete* *5% Local Match Required*
WASHINGTON STATE DEPT OF TRANSPORTATION (WSDOT)					
Safe Routes to School Program	May fund Sidewalk Projects, Multi-Use Path Projects	May fund Sidewalk Projects, Multi-Use Path Projects	May fund Sidewalk Projects, Multi-Use Path Projects	May fund Sidewalk Projects, Multi-Use Path Projects	*The purpose of the Safe Routes to Schools program is to provide children a safe, healthy alternative to riding the bus or being driven to school.* *Focus on ped/bicycle projects within two-miles of primary and middle schools.* *No Local Match Required*
FEDERAL					
Federal Highway Administration					
CMAQ - Congestion Mitigation Air Quality	Limited congestion improvement		Environmental Studies will reveal traffic flow weakness.		*Administered by SRTC, Project must be on STIP* *Funding for Projects that result in less congestion, air quality issues* *Local Match Required*
STP(E) - Surface Transportation Program - Enhancements	Fund gateways, landscaping, ped & bike enhancements.	Fund gateways, landscaping, ped & bike enhancements.	Environmental Studies will reveal traffic flow weakness.	Fund gateways, landscaping, ped & bike enhancements.	*Administered by SRTC/STA, Project must be on STIP* *Funding for transportation-related activities that are designed to strengthen the cultural, aesthetic, and environmental aspects* *Local Match Required*
STP(U) - Urban Surface Transportation Program - Regionally Selected			Environmental Studies will reveal traffic flow weakness.		*Administered by SRTC/STA, Project must be on STIP* *Funding for Improvements to Urban Streets* *Local Match Required*
Federal Transit Administration					
5307 - FTA Flexible Funding for Transit and Highway Improvements	Fund sidewalks, crosswalks, conrete intersections, bus stop improvements.	Fund sidewalks, crosswalks, conrete intersections, bus stop improvements.	Fund sidewalks, crosswalks, conrete intersections, bus stop improvements.	Fund sidewalks, crosswalks, conrete intersections, bus stop improvements.	*Administered by SRTC/STA, Project must be on STIP* *Funding for Street Improvements on Transit Routes* *Local Match Required*