

## Elgin O'Hare – West Bypass Study: Build Alternatives Transit Improvement Cost Analysis

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### Introduction

A conceptual transit improvement plan has been developed as a complementary element to the proposed roadway improvements included with Build Alternatives 203 and 402 for the Elgin O'Hare – West Bypass Study. Proposed transit improvements consist of new or enhanced transit service (light rail, heavy or commuter rail, bus rapid transit, arterial rapid transit, express bus, local bus, or local circulator) along fifteen corridors, upgrades to two existing intermodal facilities, and three new intermodal facilities. These include transit improvements both within and outside the limits of proposed roadway improvement limits.

Transit improvements along roadway corridors proposed for improvement have been incorporated into the overall conceptual layout and footprint requirements for the build alternatives so as to ensure that proposed roadway improvements are developed in a manner that would accommodate potential transit service. Individual transit agencies (Metra, Pace, CTA) will be responsible for conducting detailed studies and implementing transit improvements within and outside the proposed roadway improvement limits. Future studies will need to include appropriate consideration of transit alternatives, including potential transit modes (e.g. bus rapid transit, light rail, commuter rail).

The purpose of this memorandum is to describe the procedures used in the development of conceptual level cost estimates for transit improvements reflected in the layout of the Build Alternatives. The conceptual level estimates were prepared based on information currently available for each improvement corridor at this early stage of the project, and are stated in year 2009 dollars.

The transit cost summary accounts only for construction and engineering activities related to two proposed transit corridor improvements as follows (see Exhibit 1), as well as bus shelter costs where proposed bus service overlaps with proposed arterial roadway improvement areas:

- Approximately 10 miles of Bus Rapid Transit (BRT) service within the Elgin O'Hare corridor extending from the existing Elgin-O'Hare Expressway near the Schaumburg Metra MD-W station to the proposed O'Hare West Terminal. This improvement is included in Finalist System Build Alternatives 203 and 402.
- Approximately 3 miles of a new commuter rail connection spur within the proposed West Bypass corridor extending from the planned STAR Line service along the median of I-90 to the O'Hare West Terminal. STAR Line improvements included in the conceptual layout of the Build Alternatives begin at the I-90 and West Bypass system

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interchange complex and extend to the south along the West Bypass corridor. This improvement is included in Finalist System Build Alternative 203.

Additional costs associated with implementation and operation of transit service along these two corridors is not included in this estimate (see “Transit Costs not Included in Current Estimate” section). It is assumed that these additional costs would be identified by the transit service operator as part of future studies.

## **Construction, Engineering, and Contingency Cost Estimates**

Estimated costs for the proposed Elgin O’Hare BRT service and for the West Bypass STAR Line Spur Cost are presented in Tables 1, 2 and 3 (attached). Because of slight layout variations for Alternatives 203 and 402, a separate estimate has been prepared for each of these alternatives. Cost estimates for the STAR Line service have been prepared only for Alternative 203.

Individual cost items have been organized into three categories: pavement and roadway costs, structural costs, and contingency costs. Costs were calculated based on an estimated per-unit cost multiplied by the anticipated number of units. A breakdown of these cost categories for the BRT service and the STAR Line Extension provided below.

### **Bus Rapid Transit Cost**

#### ***Roadway Elements***

Pavement costs associated with the BRT have been calculated based on pavement area measurements from the conceptual plan view information in Microstation. The unit cost of new pavement includes base and subbase materials. Shoulders are paid for as mainline pavement. Costs for specific items related to roadway construction, such as drainage and erosion control have been estimated based on a percentage of the total cost of new pavement and earthwork.

There are three locations where bus stops for the proposed EO-WB transit corridors are located within the arterial roadway improvement areas. Specifically:

- Proposed Roselle Road local bus service is planned near the intersection of Nerge Road and Roselle Road.
- Proposed York Road local bus service would stop within the roadway improvement area at Devon Avenue intersection.
- Proposed York Road local bus service would stop within the roadway improvement area at Irving Park Road intersection.

The cost of providing shelters at these locations is included in the roadway incidental costs of the transit improvement cost estimate. This cost, based on the purchase and installation of six bus shelters (one in each direction at the three intersections discussed above) including the concrete pad under the shelter, is estimated as \$10,000 per shelter for a total cost of \$60,000.

Roadway cost items associated with BRT service plus the noted bus shelters are listed in Table 4.

**TABLE 4**  
Bus Rapid Transit Roadway Costs

<b>Cost Item</b>	<b>Description</b>
Pavement Removal	Not Applicable; this item is included in the Finalist Roadway System Build Alternatives cost estimate
New Pavement	Based on square yards of pavement (including shoulders) needed for BRT construction
Earthwork	
Traffic Control During Construction	
Lighting	Calculated by taking a percentage of new pavement costs
Signing and Markings	
Drainage	
Erosion Control	Calculated by taking a percentage of new pavement and earthwork costs
Utilities	
Roadway Incidentals	

**Structures**

Structure costs include BRT bridges, BRT tunnel access to the West Terminal, temporary relocation of the existing freight rail line near the West Terminal, five BRT stations and platforms, and retaining walls associated with BRT construction. Items included in the structural costs and a description of the calculation procedure is described in Table 5.

**TABLE 5**  
Bus Rapid Transit Structure Costs

<b>Cost Item</b>	<b>Description</b>
Bridge Removal	Not applicable; all bridge removal costs are included separately in the Build Alternatives roadway improvement cost estimate
New Bridges	Based on square footage of bridge and unit cost estimated depending on the bridge height
Retaining Wall	Calculated based on linear feet of retaining walls required for BRT construction
Temporary Railroad Relocation	Costs associated with relocating freight rail activities (UPRR and CPRR) during construction
Stations and Platforms	Costs estimated for each proposed station depending on its unique elements. Could include: stairs/elevator, platform, shelter/furniture, lighting, ticketing, signage, security, public address system, and parking.

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### ***Engineering Costs and Contingency***

Engineering costs associated with preliminary design (Tier Two), final design and construction inspection services are estimated as a percentage of the total construction costs. This cost is estimated to be 20% of total construction cost.

In addition, a contingency cost equal to 25% of total construction cost is included to account for additional costs that are unknown at this point in the project. Note that the contingency is not intended to cover anticipated inflation.

### ***Right of Way***

The estimated construction footprint for the Build Alternatives includes area required to accommodate transit service along proposed roadway improvement corridors. The overall estimated ROW acquisition costs are included separately in the Build Alternative roadway improvement cost estimates. Therefore, no additional ROW acquisition costs are noted in the transit improvement estimates.

### **STAR Line Extension Cost**

#### ***Track infrastructure Costs***

The proposed STAR Line spur would connect the mainline STAR Line located in the median of I-90 to a new STAR Line station near the O'Hare West Terminal. The spur would consist of two tracks, one for each direction, and would be positioned within the median of the West Bypass roadway. More information about specific items included in the cost estimate is described in Table 6 below.

**TABLE 6**  
STAR Line Extension Track Costs

<b>Cost Item</b>	<b>Description</b>
Ballasted Track	Per unit cost based on track feet
Special Trackwork	Additional trackwork beyond mainline needed for turnouts and switches; based on per unit costs
Earthwork Lighting	Calculated by taking a percentage of ballasted track and special trackwork costs
Drainage Erosion Control Utilities	Calculated by taking a percentage of ballasted track, special trackwork, and earthwork costs
Railroad Incidentals	
Train Controls and Signaling	Signal system; cost based on industry average per track feet
Pumping Station	Pump station needed to address drainage issues within the rail corridor; based on per unit cost estimate

### ***Structures***

Structure costs being included for the STAR Line spur pertain to major bridge structures needed to connect the spur to the STAR Line mainline along I-90, retaining walls required as part of the rail corridor, the relocation of freight railroad activities during construction, and

the cost of a new median station located near the entrance to the O'Hare West Terminal. See Table 7 for a description of structural item calculations.

**TABLE 7**  
STAR Line Extension Structure Costs

<b>Cost Item</b>	<b>Description</b>
Bridge Removal	Not applicable; all bridge removal costs are included in the Build Alternatives roadway improvement cost estimate
Aerial Guideway and Bridges	Based on a square foot unit cost estimate; largely refers to bridges needed to connect STAR Line mainline to the spur line from West Terminal
Retaining Wall	Calculated based on linear feet of retaining walls needed for Star Line Spur
Temporary Railroad Relocation	Costs associated with relocating freight rail activities (UPRR and CPRR) during construction
Stations and Platforms	Costs estimated for the West Terminal STAR Line station which includes: stairs/elevator, platform, shelter/furniture, lighting, ticketing, signage, security, and public address system.

***Engineering Costs and Contingency***

Engineering costs associated with preliminary design (Tier Two), final design and construction inspection services are estimated as a percentage of the total construction costs. This cost is estimated to be 20% of total construction cost.

In addition, a contingency cost equal to 25% of total construction cost is included to account for additional costs that are unknown at this point in the project. Note that the contingency is not intended to cover anticipated inflation.

***Right of Way***

The estimated construction footprint for the Build Alternatives includes area required to accommodate transit service along proposed roadway improvement corridors. The overall estimated ROW acquisition costs are included separately in the Build Alternatives roadway improvement estimates. Therefore, no additional ROW acquisition costs are noted in the transit improvement estimates.

**Transit Costs not Included in Current Estimate**

Due to the preliminary nature of this cost estimate, there are a number of potential costs that could not be identified at this time. These costs are summarized below:

- Any infrastructure costs associated with managing the transit services, operational control, or maintaining the vehicles (e.g. administrative office buildings or maintenance facilities and major equipment) were not included in the current estimate. It is assumed that these activities would be undertaken by one of the existing service boards using existing facilities.

- The cost of BRT vehicles were not included in the estimate. Vehicle procurement would be necessary to implement the service. The current average cost of a standard 60-foot BRT vehicle is estimated as \$700,000. Based on route length, running speed, peak headway, and the need for 2 spares, it is assumed that a total of 10 vehicles would be needed to operate the West O’Hare to Schaumburg Metra BRT service. Estimated total cost of \$7,000,000 would be anticipated for BRT vehicle procurement.
- The estimated costs for the proposed STAR Line service along the I-90 corridor were not included in the estimated transit improvement costs as this improvement was previously identified as a baseline project with the 2030 No-Action Alternative. It should be noted that I-90 would need to be reconstructed to accommodate the STAR Line within its median. This cost was also not included in the estimate.
- Estimated costs for proposed transit improvements beyond the proposed Build Alternative roadway improvement limits are not included. These improvements would need to be evaluated and implemented by service operators independently of the roadway improvements proposed with the Elgin O’Hare – West Bypass project.
- The cost of BRT vehicle procurement were not included since these costs are associated with service implementation and, therefore, would be the responsibility of the future service operator.
- Rolling stock costs for the STAR Line Extension are not included in this project since STAR Line is considered as a baseline project with the 2030 No-Action Alternative. The alignment change to access the West Terminal would not result in any additional fleet requirements.
- The feasibility of and costs of potential high speed rail has not been evaluated as part of this study. The UP/CP Railroad corridors represent the potential north/south corridor for high speed rail within the study area.
- The CTA extension of the Blue Line from the East Terminal to the West Terminal was not included in this estimate.
- Station cost items do not include required infrastructure linking to the O’Hare West Terminal transit station and the transit elements described in this memo.

## Cost Summary

The estimated transit improvement costs (construction and engineering only) for Build Alternatives 203 and 402 are presented in Table 8.

**TABLE 8**  
Build Alternative Transit Improvement Cost Summary

<b>Transit Improvements</b>	<b>Cost Estimate</b>
Build Alternative 203	<b>\$427 M</b>
Build Alternative 402	<b>\$246 M</b>

<b>TABLE 1</b>						
Bus Rapid Transit - Finalist System Build Alternatives 203						
Comparative Level Cost Estimate Summary						
ITEM	ITEM DESCRIPTION	UNIT	QUANTITY		UNIT PRICE	TOTAL
1	PAVEMENT REMOVAL	yd <sup>2</sup>	N/A		\$15	N/A
2	NEW PAVEMENT					
	Bus Rapid Transit Pavement	yd <sup>2</sup>	281,327		\$110	\$30,945,970
<b>PAVEMENT COSTS</b>						\$30,945,970
3	EARTHWORK	L.S.	35	% of Items 1-2	N/A	\$10,831,090
4	DRAINAGE	L.S.	16	% of Items 1-3	N/A	\$6,684,330
5	EROSION CONTROL	L.S.	3	% of Items 1-3	N/A	\$1,253,312
6	TRAFFIC CONTROL DURING CONSTRUCTION	L.S.	7	% of Items 1-2	N/A	\$2,166,218
7	LIGHTING	L.S.	5	% of Items 1-2	N/A	\$1,547,299
8	SIGNING/MARKINGS	L.S.	6	% of Items 1-2	N/A	\$1,856,758
9	UTILITIES	L.S.	7	% of Items 1-3	N/A	\$2,924,394
10	SIGNALIZED INTERSECTIONS	each	1		\$200,000	\$200,000
11	PUMPING STATIONS	each	1		\$5,000,000	\$5,000,000
12	ROADWAY INCIDENTALS	L.S.	20	% of Items 1-3	N/A	\$8,355,412
13	SPECIAL WASTE SITE REMEDIATION	L.S.	N/A		N/A	N/A
<b>TOTAL ROADWAY COSTS (Items 1-13)</b>						\$71,764,782
14	STRUCTURES					
	Bridge Removal	ft <sup>2</sup>	N/A		\$35	N/A
15	Proposed Bridges - Bus Rapid Transit					
	2 <sup>nd</sup> level Bus Rapid Transit	ft <sup>2</sup>	235,279		\$160	\$37,644,640
	3 <sup>rd</sup> level Bus Rapid Transit	ft <sup>2</sup>	0		\$230	\$0
	4 <sup>th</sup> level Bus Rapid Transit	ft <sup>2</sup>	0		\$280	\$0
16	Tunnel - West Terminal Approach	ft <sup>2</sup>	45,426		\$750	\$34,069,500
17	Retaining Walls					
	Standard Wall Type	lin. ft.	5,436		\$1,000	\$5,436,000
18	Structural Incidentals (Includes Mob.)	L.S.	15 % of 14-17		N/A	\$11,572,521
<b>TOTAL STRUCTURE COSTS (Items 14-19)</b>						\$88,722,661
19	RAILROAD RELOCATION AND COORDINATION -West Terminal	L.S.	N/A		N/A	\$700,000
20	BUS RAPID TRANSIT STATIONS/PLATFORMS					
	Schaumburg Station/Parking Deck	L.S.	N/A		N/A	\$15,000,000
	Roselle Rd. Station	L.S.	N/A		N/A	\$2,400,000
	Rohlwing Rd./IL Rte. 53 Station	L.S.	N/A		N/A	\$5,100,000
	Arlington Heights Rd. Station	L.S.	N/A		N/A	\$2,800,000
	Lively Blvd. Station	L.S.	N/A		N/A	\$900,000
<b>TOTAL CONSTRUCTION COSTS (Items 1-20)</b>						\$187,387,443
21	CONSTRUCTION CONTINGENCY	L.S.	25	% of items 1-20	N/A	\$46,846,861
22	DESIGN AND CONSTRUCTION ENGINEERING	L.S.	20	% of items 1-20	N/A	\$37,477,489
23	ROW ACQUISITION	L.S.	N/A		N/A	N/A
24	ROW CONTINGENCY	L.S.	50	% of Item 23		N/A
<b>TOTAL ROW COSTS</b>						N/A
<b>TOTAL PROJECT COST</b>						<b>\$272,000,000</b>

Note: Cost in 2009 dollars

**TABLE 2**  
 Bus Rapid Transit - Finalist System Build Alternatives 402  
 Comparative Level Cost Estimate Summary

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY		UNIT PRICE	TOTAL
1	PAVEMENT REMOVAL	yd <sup>2</sup>	N/A		\$15	N/A
2	NEW PAVEMENT					
	Bus Rapid Transit Pavement	yd <sup>2</sup>	285,416		\$110	\$31,395,736
<b>PAVEMENT COSTS</b>						\$31,395,736
3	EARTHWORK	L.S.	35	% of Items 1-2	N/A	\$10,988,508
4	DRAINAGE	L.S.	16	% of Items 1-3	N/A	\$6,781,479
5	EROSION CONTROL	L.S.	3	% of Items 1-3	N/A	\$1,271,527
6	TRAFFIC CONTROL DURING CONSTRUCTION	L.S.	7	% of Items 1-2	N/A	\$2,197,701
7	LIGHTING	L.S.	5	% of Items 1-2	N/A	\$1,569,787
8	SIGNING/MARKINGS	L.S.	6	% of Items 1-2	N/A	\$1,883,744
9	UTILITIES	L.S.	7	% of Items 1-3	N/A	\$2,966,897
10	SIGNALIZED INTERSECTIONS	each	1		\$200,000	\$200,000
11	PUMPING STATIONS	each	1		\$5,000,000	\$5,000,000
12	ROADWAY INCIDENTALS	L.S.	20	% of Items 1-3	N/A	\$8,476,849
13	SPECIAL WASTE SITE REMEDIATION	L.S.	N/A		N/A	N/A
<b>TOTAL ROADWAY COSTS (Items 1-13)</b>						\$72,732,227
14	STRUCTURES Bridge Removal					
		ft <sup>2</sup>	N/A		\$35	N/A
15	Proposed Bridges - Bus Rapid Transit 2 <sup>nd</sup> level Bus Rapid Transit					
		ft <sup>2</sup>	237,307		\$160	\$37,969,120
		ft <sup>2</sup>	0		\$230	\$0
		ft <sup>2</sup>	0		\$280	\$0
16	Tunnel - West Terminal Approach					
		ft <sup>2</sup>	24,424		\$750	\$18,318,000
17	Retaining Walls Standard Wall Type					
		lin. ft.	4,574		\$1,000	\$4,574,000
18	Structural Incidentals (Includes Mob.)	L.S.	15 % of 14-17		N/A	\$9,129,168
<b>TOTAL STRUCTURE COSTS (Items 14-19)</b>						\$69,990,288
19	RAILROAD RELOCATION AND COORDINATION -West Terminal	L.S.	N/A		N/A	\$700,000
20	BUS RAPID TRANSIT STATIONS/PLATFORMS					
	Schaumburg Station/Parking Deck	L.S.	N/A		N/A	\$15,000,000
	Roselle Rd. Station	L.S.	N/A		N/A	\$2,400,000
	Rohlfing Rd./IL Rte. 53 Station	L.S.	N/A		N/A	\$5,100,000
	Arlington Heights Rd. Station	L.S.	N/A		N/A	\$2,800,000
	Lively Blvd. Station	L.S.	N/A		N/A	\$900,000
<b>TOTAL CONSTRUCTION COSTS (Items 1-20)</b>						\$169,622,515
21	CONSTRUCTION CONTINGENCY	L.S.	25	% of items 1-20	N/A	\$42,405,629
22	DESIGN AND CONSTRUCTION ENGINEERING	L.S.	20	% of items 1-20	N/A	\$33,924,503
23	ROW ACQUISITION	L.S.	N/A		N/A	N/A
24	ROW CONTINGENCY	L.S.	50	% of Item 23		N/A
<b>TOTAL ROW COSTS</b>						N/A
<b>TOTAL PROJECT COST</b>				<b>\$246,000,000</b>		

Note: Cost in 2009 dollars



**TABLE 3**

STAR Line Extension - Finalist System Build Alternatives 203  
 Comparative Level Cost Estimate Summary

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY		PRICE	TOTAL
1	<b>BALLASTED TRACK</b>	tf	32,636		\$215	\$7,016,740
2	<b>SPECIAL TRACKWORK</b>					
	No. 10 BALLASTED TURNOUT	each	2		\$90,000	\$180,000
	No. 15 BALLASTED TURNOUT	each	4		\$140,000	\$560,000
<b>TRACK COSTS</b>						\$7,756,740
3	<b>EARTHWORK</b>	L.S.	35	% of Items 1-2	N/A	\$2,714,859
4	<b>DRAINAGE</b>	L.S.	16	% of Items 1-3	N/A	\$1,675,456
5	<b>EROSION CONTROL</b>	L.S.	3	% of Items 1-3	N/A	\$314,148
6	<b>LIGHTING</b>	L.S.	5	% of Items 1-2	N/A	\$387,837
7	<b>UTILITIES</b>	L.S.	7	% of Items 1-3	N/A	\$733,012
8	<b>TRAIN CONTROL/SIGNALING</b>					
	CTC	tf	32636		\$50	\$1,631,800
	Interlocking	each	1		\$2,300,000	\$2,300,000
9	<b>PUMPING STATIONS</b>	each	1		\$5,000,000	\$5,000,000
10	<b>RAILROAD INCIDENTALS</b>	L.S.	20	% of Items 1-3	N/A	\$2,094,320
<b>TOTAL TRACK COSTS (Items 1-13)</b>						\$24,608,172
14	<b>STRUCTURES</b>					
	Bridge Removal	ft <sup>2</sup>	N/A		\$35	N/A
	Proposed Bridges - Star Line					
	2 <sup>nd</sup> level Star line Structure/Aerial	ft <sup>2</sup>	89,144		\$550	\$49,029,200
	3 <sup>rd</sup> level Star Line Structure/Aerial	ft <sup>2</sup>	0		\$650	\$0
	PCC Deck Bridge - Under UPRR	ft <sup>2</sup>	23,120		\$700	\$16,184,000
	Tunnels	ft <sup>2</sup>	0		\$1,000	\$0
	Retaining Walls					
	Standard Wall Type	lin. ft.	3,079		\$1,000	\$3,079,000
18	Structural Incidentals (Includes Mob.)	L.S.	15 % of 14-17		N/A	\$10,243,830
<b>TOTAL STRUCTURE COSTS (Items 14-19)</b>						\$78,536,030
19	<b>COORDINATION -West Terminal</b>	L.S.	N/A		N/A	N/A
20	<b>STATIONS/PLATFORMS</b>					
	West O'Hare Star Line Station	L.S.	N/A		N/A	\$4,000,000
<b>TOTAL CONSTRUCTION COSTS (Items 1-20)</b>						\$107,144,202
21	<b>CONSTRUCTION CONTINGENCY</b>	L.S.	25	% of items 1-20	N/A	\$26,786,050
22	<b>ENGINEERING</b>	L.S.	20	% of items 1-20	N/A	\$21,428,840
23	<b>ROW ACQUISITION</b>	L.S.	N/A		N/A	N/A
24	<b>ROW CONTINGENCY</b>	L.S.	50	% of Item 23		N/A
<b>TOTAL ROW COSTS</b>						N/A
<b>TOTAL PROJECT COST</b>						<b>\$155,000,000</b>

Note: Cost in 2009 dollars