Air Quality and Greenhouse Gases Analysis, Methodology, and Results Technical Memorandum

May 2016

Southwest LRT Project Technical Memorandum

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1 Introduction

The purpose of these supporting documents is to summarize the technical information that was used to evaluate air quality and greenhouse gases (GHG) in the Southwest Light Rail Transit (LRT) Project's Final Environmental Impact Statement (EIS).

2 List of Supporting Documentation

All technical reports and memoranda produced to inform the analysis contained in Section 3.11 of the Project's Final EIS are summarized in the sections below. Full copies of each report are attached for reference, in the attachment specified in each summary.

Attachment A – Southwest LRT Final EIS – Air Quality and Greenhouse Gases Analysis Methodology and Results

This memorandum discusses the methodologies used to evaluate the air quality and GHG impacts of the Project.

Attachment B – TPP and TIP Documentation

This memorandum provides letters from the federal government approving the Metropolitan Council's Transportation Policy Plan and Minnesota Department of Transportation's State Transportation Improvement Program.

Attachment C – Intersection AADT

This memorandum provides annual average daily traffic (AADT) information for Project intersections.

Attachment D – Greenhouse Gas Emissions

This memorandum provides GHG calculations for 2013, 2040 No Build, and 2040 Build conditions.

Attachment E – National Ambient Air Quality Standards

This memorandum provides a summary of the federal air quality standards, known as the National Ambient Air Quality Standards (NAAQS).

Attachment F – Summary of the Project's MSAT Assessment

This memorandum provides a basic analysis of the likely Mobile Source Air Toxics (MSAT) impacts and a discussion regarding incomplete or unavailable information.

Attachment G – FHWA Infrastructure Carbon Estimator (ICE) Model

This memorandum provides the input data for the Federal Highway Administration (FHWA) Infrastructure Carbon Estimator (ICE) model to predict GHG emissions from construction activities.

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Attachment A
Southwest LRT Final EIS – Air Quality and Greenhouse Gases Analysis Methodology and Results

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Southwest LRT Final EIS - Air Quality and Greenhouse Gases Analysis Methodology and Results

Date: July 22 2015

This memorandum discusses the methodologies used to evaluate the air quality and greenhouse gas (GHG) impacts of the Project. It also presents the calculations and results. Specifically, transportation conformity, mobile source air toxics, and GHG analyses were performed.

Transportation Conformity

The Project is located in an area designated as being in maintenance for carbon monoxide (CO) national air quality standards and, therefore, the Project is subject to the transportation conformity requirements for CO emissions. According to the conformity rule (40 CFR Part 93), approval of a project that is built with federal funds is subject to demonstrating conformity with the state implementation plan (SIP) at both regional and project levels.

Regional Conformity

At the regional level, Regional Transportation Plans (RTPs) are developed that include transportation projects planned for a region over a period of years, usually at least 20 years. If a proposed project is included in a conforming and financially constrained RTP, and the design and scope of the project is the same as that described in the RTP, the proposed project is deemed to meet regional conformity.

The RTP and the Transportation Improvement Program (TIP) of the Twin Cities metropolitan area was reviewed to evaluate if the project meets the regional conformity requirements. The relevant RTP and TIP documentations are listed in Attachment B. The Project is included in a conforming RTP and the Project's design and scope are consistent with the Project described in the RTP. Therefore, the Project meets the regional conformity requirements.

Project-Level Conformity

In addition to regional conformity, a project-level conformity determination is also required for CO emissions. The following criteria were used to demonstrate project-level conformity of the Project:

- The Project is listed in a conforming RTP and TIP.
- The design concept and scope that were in place at the time of the conformity finding are maintained through project implementation.
- The project design concept and scope must be defined sufficiently to determine emissions at the time of the conformity determination.
- The project must not cause a new local violation of the federal standards or exacerbate an existing violation of the federal standards for CO.

Because the Project is located in a CO maintenance area, project-level conformity for the final criterion listed above was demonstrated by performing a CO "hot spot" analysis. The project-level hot spot analyses for PM_{10} and $PM_{2.5}$ are not required for this project because the area where the Project is located is in attainment for these two pollutants.

Procedures for determining hot-spot CO concentrations are set forth in 40 CFR 93.123; however, EPA approved a screening method for the Twin Cities area to determine if a detailed hot spot analysis is necessary (MnDOT, 2009a).

- The first criterion in this screening method is to determine if a project's annual average daily traffic (AADT[1]) is greater than the benchmark AADT. The benchmark AADT for the Twin Cities is 79,400, as identified in MnDOT's Intersection Benchmark Criteria of Twin Cities CO Maintenance Area (MnDOT, 2009). This value is equal to the Twin Cities intersection with the highest AADT based on 2007 data.
- The second criterion is to determine whether the Project involves one of the "top 10" intersections listed in the Intersection Benchmark Criteria of Twin Cities CO Maintenance Area (MnDOT, 2009).[2]

Following this EPA-approved approach, a screening analysis was performed for the affected intersections in the Project area by comparing the AADT at the affected intersections to the Twin Cities benchmark values. If the affected intersections have AADT less than the benchmark values and none of the intersections are within the top 10 intersections of the Twin Cities maintenance area, the Project demonstrates project-level conformity and a detailed CO hot spot modeling analysis is not required.

A list of the intersections that will be affected by the Project and the corresponding AADT at each intersection are shown in Attachment C. None of the intersections will have AADT greater than the Twin Cities benchmark value of 79,400, and the Project does not involve any of the "top 10" intersections in the Twin Cities CO Maintenance Area. Therefore, following the EPA-approved screening method, the Project demonstrates project-level conformity of CO. A detailed CO hot spot modeling is not needed.

Mobile Source Air Toxic Analysis

Currently, Federal Transit Administration (FTA) has not adopted guidance on evaluating mobile source air toxics (MSAT) impacts from transit projects. Therefore, MSAT impacts of the Project are evaluated following the Federal Highway Administration's (FHWA's) *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA* (FHWA, 2012) in accordance with the *Highway Project Development Process (HPDP) Subject Guidance: Air Quality* (MnDOT, 2009). The FHWA developed a tiered approach with three categories for analyzing MSAT in NEPA documents, depending on specific project circumstances:

- No analysis for projects with no potential meaningful MSAT effects;
- Qualitative analysis for projects with low potential MSAT effects; or
- Quantitative analysis to differentiate alternatives for projects with high potential MSAT effects.

Because the Project is expected to improve the regional and local traffic conditions and it does not involve adding diesel vehicle travel into the region, MSAT impacts because of the Project are highly unlikely; however, the Project will change localized vehicle traffic patterns, especially near the stations and parking facilities. Therefore, the Project will have low potential MSAT effects, and a qualitative MSAT analysis was performed following the FHWA guidance (FHWA, 2012).

The Project in the design year is expected to be associated with lower levels of MSAT emissions relative to the No Build Alternative, along with benefit from improvements in speeds and reductions in region-wide vehicle traffic. There could be slightly higher MSAT levels in localized areas where Project-related activities (e.g., automobile trips to park-and-ride lots) will occur closer to homes, schools, and businesses. Under all alternatives, MSAT levels are likely to decrease over time due to nationally mandated cleaner vehicles and fuels.

[1] Annual Average Daily Traffic (AADT) represents the total volume of vehicle traffic over the course of an average 24-hour day. AADT is a theoretical value based on traffic volumes collected in the field which have then been adjusted to account for seasonal or day-of-the-week fluctuations in traffic.

[2] Top 10 Intersections have the highest vehicle volume and worst level of service in the Twin Cities CO Maintenance Area based on 2007 data. These intersections are: Highway 169 at CSAH 81, Highway 7 at CSAH 101, Highway 252 at 85th Avenue, University Avenue at Snelling Avenue, Highway 252 at Brookdale Drive, Cedar Avenue at County Road 42, Highway 7 at Williston Road, University Avenue at Lexington Avenue, Highway 252 at 66th Avenue, Hennepin Avenue at Lake Street (MnDOT, 2009).

Greenhouse Gas and Climate Change

GHGs, such as carbon dioxide, are deemed to play a role in global climate change. Numerous and varied GHG emissions sources (in terms of both absolute numbers and types) each make a relatively small addition to global atmospheric GHG concentrations. It is difficult to isolate and understand the GHG emissions impact of a particular project. Furthermore, presently there is no scientific methodology for attributing specific climate changes to a particular project's emissions. Therefore, the GHG and climate change analysis for this Final EIS is based on the potential cumulative global effects of the GHG emissions at a regional level instead of the Project level.

GHG emissions associated with the vehicles (i.e., personal automobiles, transit buses, and rail vehicles) were estimated based on the projected changes in vehicle miles traveled (VMT) for the Project. GHG emissions were calculated by multiplying the VMT of each type of vehicle by the carbon dioxide emission factors listed in the *New and Small Starts Evaluation and Rating Process Final Policy Guidance* (FTA, 2013). The emission factors, VMT data used for the GHG operational emission calculations, and the GHG emissions used for the GHG and climate change impact analysis are shown in Attachment D. The Project Greenhouse Gas Emissions in Attachment D show an estimated reduction of existing GHG emissions from approximately 16 million metric tons per year to approximately 15 million metric tons per year in 2040.

References

FHWA. 2012. *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA.*

FTA. 2013. *New and Small Starts Evaluation and Rating Process Final Policy Guidance.*

MnDOT. 2009. *Highway Project Development Process (HPDP) Subject Guidance: Air Quality.*

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Attachment B
TPP and TIP Documentation

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U.S. Department
of Transportation

Federal Highway Administration

Federal Transit Administration

FHWA, Minnesota Division
380 Jackson Street
Cray Plaza, Suite 500
St. Paul, MN 55101-4802

FTA, Region V
200 West Adams Street
Suite 320
Chicago, IL 60606-5253

March 13, 2015

Charles A. Zelle
Commissioner of Transportation
Department of Transportation
MS 100, Transportation Building
St. Paul, Minnesota 55155

Re: Twin Cities Metropolitan Council Transportation Policy Plan (TPP) Air Quality Conformity

Dear Mr. Zelle:

The Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) have reviewed the documentation supporting the transportation conformity determination for the 2040 Transportation Policy Plan (TPP) adopted by the Twin Cities Metropolitan Council on January 14th, 2015.

Based on our review and consultation with the U.S. Environmental Protection Agency (EPA), the Minnesota Pollution Control Agency (MPCA), and the Minnesota Department of Transportation (MnDOT), there are no unresolved issues regarding this conformity determination. Therefore, we hereby find that the 2040 TPP meets all conformity determination requirements under the Clean Air Act Amendments of 1990.

Additionally, we find the 2040 TPP to satisfactorily comply with the requirements of 23 CFR 450.322 regarding the review and update of metropolitan transportation plans in air quality non-attainment and maintenance areas at least every four years. As such, this action restarts the four-year update cycle for the Metropolitan Council TPP and corresponding conformity determination.

Should you have questions concerning this action, please contact Kris Riesenberg, FHWA Minnesota Division at (651) 291- 6114, or Bill Wheeler, FTA Region V at (312) 353-2639.

Sincerely,

KRIS D RIESENBERG
2015.03.12 15:50:17
-05'00'

David Scott
Acting Division Administrator
FHWA – MN

Marisol R. Simón
Regional Administrator
FTA – Region V

Cc: Michael Leslie, EPA

U.S. DEPARTMENT OF TRANSPORTATION

Federal Highway Administration
Minnesota Division
380 Jackson Street, Suite 500
St. Paul, MN 55101-4802

Federal Transit Administration
200 West Adams Street, Suite 320
Chicago, IL 60606

November 5, 2014

Mr. Charles Zelle
Commissioner
Minnesota Department of Transportation
395 John Ireland Boulevard
St. Paul, MN 55155

Subject: 2015-2018 Statewide Transportation Improvement Plan (STIP)

Dear Commissioner Zelle:

The following is in response to MnDOT's transmittal of the Minnesota Fiscal Year (FY) 2015-2018 Statewide Transportation Improvement Program (STIP) requesting approval.

Based on the State DOT and MPO self-certifications of their statewide and metropolitan planning processes, in addition to our involvement in the State and MPO transportation planning processes, the FHWA and FTA hereby find that the 2015-2018 STIP is based on a transportation planning process that substantially meetings the requirements of 23 U.S.C. Sections 134 and 135, U.S.C. Sections 5303-5304, 23 CFR 450 (Subparts B and C), and 49 CFR Part 613 (Subparts B and C). Minnesota's 2015-2018 STIP is therefore approved. This approval also includes the corresponding individual MPO Transportation Improvement Programs (TIPs) that comprise the STIP, as well as a joint FHWA/FTA air quality conformity determination for the Metropolitan Council's TIP pursuant to 40 CFR 93 (transportation conformity regulations).

It should be noted that approval of the 2015-2018 STIP is not to be construed as a Federal-aid eligibility determination. Each project must satisfy the specific requirements of the program from which Federal funds are requested, as well as other Federal requirements as appropriate before Federal funds are authorized.

Thank you for your continued effort to improve the STIP process and ensure a cooperative, continuous, and comprehensive transportation process. We recognize the complexity of assembling the STIP and appreciate the hard work and effort expended by staff involved. We look forward to working together to advance the projects and programs in the STIP, and to continuing to provide the traveling public with a transportation system of the highest caliber.

If you have any questions regarding our joint action and the 2015-2018 STIP approval, please contact Mr. Kris Riesenberg, FHWA Technical Services Team Leader at (651) 291-6114, or Mr. Bill Wheeler, FTA Community Planner at (312) 353-2639.

Sincerely,

Brenda L Red Wing

Brenda Red Wing
Division Administrator (Acting)
Federal Highway Administration

Marisol Simón

Marisol R. Simón
Regional Administrator
Federal Transit Administration

Cc: Mark Gieseke
Brian Gage
Mark Nelson

Appendix C: Long-Range Highway and Transit Capital Project List

Appendix C was developed at the request of the U.S. Department of Transportation Federal Highway and Federal Transit Administrations and consists of a list of potential major capital highway and transit projects. The projects included in this list will be planned and implemented by either the Minnesota Department of Transportation (highways) or the Metropolitan Council/Metro Transit (transit). This list does not include projects on the local highway or transit systems; those projects are identified through the local comprehensive planning process for county- and city-owned highways, and through specific facility plans for transit including the Park-and-Ride Plan and the *Regional Service Improvement Plan*. All known regionally significant local projects are included in Appendix B, Transportation Improvement Program, and Appendix E, Additional Air Quality Information (*insert link*).

The *2040 Transportation Policy Plan* marks the first time Appendix C is being provided. This list is intended to be changed through updates and amendments to the Transportation Policy Plan. Appendix C is not a project programming document and cannot be interpreted as a programming document. Appendix C summarizes known projects in the current revenue scenario; this is the long-range transportation planning scenario where known project costs are equal to anticipated revenues (also called the fiscally constrained plan in federal regulations). Appendix C summarizes the project's primary investment category (*link to" Highway Investment Direction and Plan" and "Transit Investment Direction and Plan"*), project location (called "Route"), project description, estimated cost in year of expenditure dollars, and approximate implementation timeframe.

This list is intended to be exhaustive for Highway MnPASS, Strategic Capacity Enhancements, Regional Highway Access, and Transitways only. When new projects are identified for funding in these four categories, they must be amended into the Transportation Policy Plan, this appendix, and any other applicable sections of the plan. The projects listed in the other categories are examples of the types of projects to be funded in these categories and in the timeframes identified. Some projects in these other categories may be regionally significant for air quality analysis and thus require plan amendments prior to funding and construction. For more information contact Metropolitan Council long-range transportation planning staff.

Long-Range Transit Capital Projects 2015-2024

The Metropolitan Council (including Metro Transit), Counties Transit Improvement Board, and the suburban transit providers worked together to develop the list of transit projects included in the current revenue scenario. The list of projects includes only those projects for which potential funding sources, transit mode, and route alignment are identified in the plan. The plan anticipates funding that exceeds anticipated project costs identified in the Transitway System Investments category. Transitway projects will be added to this list through future plan updates and amendments. For multi-year projects with expenditures outside the 2015-2024 timeframe, this appendix lists the total estimated project cost, including already spent funds.

Bus and Support System capital preservation and Transitway System capital preservation costs are included as broad project categories. Specific project estimates will be developed through Capital Improvement Programs for regional transit providers.

Transit Investment Category	Route	Project Description	Estimated Cost (Year of Expenditure)	Timeframe
Bus and Support System	System-wide	Bus and Support System capital maintenance and preservation estimates including fleet replacement and overhauls, facility capital preservation, and other capital preservation.	$964,000,000	2015-2024
Bus and Support System	System-wide	Bus and Support System modernization and expansion projects to be determined through competitive regional process approximately every two years. Transitway improvements are also eligible through this process.	$214,000,000	2015-2024
Transitway System	System-wide	Transitway System capital maintenance and preservation estimates including fleet replacement and overhauls, facility capital preservation, rail system preservation, and other capital preservation.	$107,000,000	2015-2024
Transitway Improvements	System-wide	Transitway System improvements include expanded existing facilities or interim improvements to future transitways that are incremental and identified on an as-needed basis.	$144,000,000	2015-2024
Transitway System	METRO Orange Line	16-mile highway bus rapid transit improvement (six new stations planned, buses, technology) on I-35W south from Minneapolis to Burnsville.	$150,000,000	2015-2024
Transitway System	METRO Green Line Extension	16-mile light rail extension of the Green Line with plans to include 16 new stations from Minneapolis to Eden Prairie.	$1,653,000,000	2015-2024
Transitway System	METRO Blue Line Extension	13-mile light rail extension of the Blue Line with plans to include 11 new stations from Minneapolis to Brooklyn Park.	$999,000,000	2015-2024
Transitway System	METRO Gold Line	12-mile dedicated bus rapid transit line with plans to include 11 new stations from Saint Paul to Woodbury.	$469,000,000	2015-2024

Attachment C
Intersection AADT

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Project Intersections AADT - West Section

Intersection	AADT
Mitchell Rd and Martin Dr	20,125
Mitchell Rd and WB TH 5/TH 212 Ramp	35,100
Mitchell Rd and EB TH 5 / TH 212 Ramp	22,175
Mitchell Rd and Lone Oak Rd	29,900
Mitchell Rd and Technology Dr	36,175
Mitchell Rd and Anderson Lakes Parkway	25,800
Technology Dr and PnR Access	13,000
Technology Dr and Optum Dr W.	18,950
Technology Dr and Optum Dr E.	18,000
Technology Dr and MTS Dr E / St Andrews E	-
Technology Dr and St Andrews E.	14,375
Technology Dr and Apartments W.	14,500
Technology Dr and Apartments E.	15,150
Technology Dr and Sothwest Station / LRT Crossing	14,250
Technology Dr and Southwest Station W.	14,850
Technology Dr and Southwest Station	19,500
Prairie Center Dr and TH 5 WB Ramps/Plaza Dr	53,175
Prairie Center Dr and TH 5 EB Ramps/Technology Dr	61,350
Prairie Center Dr and Technology Dr/Tech Driveway	51,625
Singletree Lane and Main Street	20,400
Eden Rd and Main St	8,000
Eden Rd and Eden Rd Ext	6,500
Eden Rd and Glen Rd	9,500
Flying Cloud Dr and Valley View	56,325
Flying Cloud Dr and Viking Dr	35,400
Flying Cloud Dr and N 494 Ramps	45,225
Flying Cloud Dr and S 494 Ramps-Technology Dr	52,350
Flying Cloud Drive and Eden Rd-Leona Ln	46,400
Flying Cloud Dr and Singletree Lane	44,775
Shady Oak and Valley View	17,900
Shady Oak and W 70th St	16,375
70th St LRT Crossing	-
Shady Oak Rd and TH 62 North Ramps	34,000
Shady Oak Rd and TH 62 South Off Ramp/W 62nd St	43,500
Shady Oak Rd and City West Pkwy	33,000
Bren Rd E. and Red Circle Dr	7,100
Yellow Circle Dr and Red Circle Dr	-
Bren Rd E and Yellow Circle / LRT Crossing	-
Yellow Circle Dr and Yellow Circle Dr	-
Bren Rd W. and Bren Rd E.	3,800
Bren Rd W and LRT Crossing	-
K-Tel LRT Crossing	-
Excelsior Blvd and Shady Oak Rd	32,625
Excelsior Blvd and 17th Ave S.	26,425
17th Ave and 5th St / K-Tel Dr	3,500
Excelsior Blvd and 11th Ave S.	35,525
11th Ave S. LRT Crossing	-
11th Ave S. and 5th St S.	17,450

Data Source: SWLRT Traffic Study (2015)

Project Intersections AADT - East Section

Intersection	AADT
Excelsior Blvd (CSAH 3)/ 8th Ave	29,200
Excelsior Blvd (CSAH 3)/ 5th Ave	29,950
Excelsior Blvd (CSAH 3)/ TH 169 SB Ramps	31,850
Excelsior Blvd (CSAH 3)/ TH 169 NB Ramps	30,750
Excelsior Blvd (CSAH 3)/ Jackson Ave/ Milwaukee St	29,600
Excelsior Blvd (CSAH 3)/ Pierce Ave	26,150
Blake Rd (CSAH 20)/ TH 7	63,300
Blake Rd (CSAH 20)/ Cambridge St	24,100
Blake Rd (CSAH 20)/ 2nd St NE	25,150
Excelsior Blvd (CSAH 3)/ Blake Rd (CSAH 20)	40,050
Louisiana Ave/ Oxford St	19,800
Louisiana Ave/ Louisiana Cir	14,550
Louisiana Ave/ Excelsior Blvd (CSAH 20)	34,000
Wooddale Ave/ TH 7 EB Ramps	21,250
Wooddale Ave/ TH 7 WB RampS	17,200
Wooddale Ave/ South Frontage Rd	19,850
Wooddale Ave/ W 36th St	29,100
CSAH 25/ Lynn Ave	32,750
Beltline Blvd/ CSAH 25	39,250
Beltline Blvd/ South Frontage Rd	18,600
Beltline Blvd/ Park Glen Rd	20,550
W Lake St/ Drew Ave	29,900
W Lake St/ Market Plaza	35,800
Cedar Lake Pkwy/ Sunset Blvd	9,100
Cedar Lake Pkwy/ Rail Crossing/ Burnham Rd	9,850
Cedar Lake Pkwy/ Xerxes Ave	10,050
Cedar Lake Pkwy/ SB Dean Blvd	9,700
Cedar Lake Pkwy/ NB Dean Blvd	13,700
Cedar Lake Pkwy/ Benton Blvd	10,100
21st St W/ Rail Crossing	450
Penn Ave/ I-394 WB Ramps	14,200
Penn Ave/ I-394 EB Ramps	17,150
Glenwood Ave/ E Lyndale Ave	14,500
Glenwood Ave/ Royalston Ave/ 12th St N/ Twins Way	13,100
Royalston Ave/ Holden St	5,200
Royalston Ave/ 5th Ave N	3,950
7th St N/ 5th Ave N	16,400

Data Source: SWLRT Traffic Study (2015)

Attachment D
Greenhouse Gas Emissions

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GHG Emission Calculations - Project Operations

Average Weekday VMT

	2013	2040	2040
	Existing	No build	Build
Autos	79,205,393	99,435,381	99,317,589
Trucks	2,454,774	3,192,153	3,191,577
Bus (Metro Transit)	98,430	107,478	112,942
Diesel Bus	90,950	99,310	104,358
Hybrid Bus	7,481	8,168	8,584
Bus (other Agencies, Diesel)	48,539	85,099	83,924
LRT	14,480	23,997	33,013
Commuter Rail	1601	1601	1601
Total VMT	81,823,217	102,845,709	102,740,646

Note:

Data Source: AECOM Travel Demand Model, August 2015

LRT VMT based on an average consist size of 2.71 vehicles (from Aug 2014 Rail Fleet Management Plan Rev 22.00)

Commuter rail VMT based on an average consist size of 3.4 vehicles

FTA New Starts GHG Emission Factors (g CO2e/VMT)

Mode	Current Year	10-year Horizon	20-year Horizon
	g/CO2e/VMT)	g/CO2e/VMT)	g/CO2e/VMT)
Automobile	532	434	397
Bus – Diesel	3319	2854	2721
Bus – Hybrid	2655	2283	2177
Bus – CNG	2935	2524	2406
Bus - Electric	2934	2441	2303
Light Rail and Streetcar	4779	4623	4574
Commuter Rail - Diesel (used)	7970	7970	7970

Note:

Emission factors are from the New and Small Starts Evaluation and Rating Process Final Policy Guidance (FTA, 2013).

Project Greenhouse Gas Emissions as CO2e

	2013	2040	2040
	Existing	No build	Build
	metric ton/year	metric ton/year	metric ton/year
Autos	15,380,103	14,408,684	14,391,615
Trucks	476,668	462,559	462,475
Bus (Metro Transit)	117,430	105,122	110,466
Diesel Bus	110,180	98,631	103,645
Hybrid Bus	7,250	6,490	6,821
Bus (other Agencies, Diesel)	58,802	84,517	83,350
LRT	25,258	40,063	55,116
Commuter Rail	4,657	4,657	4,657
Total Emissions	16,062,918	15,105,602	15,107,680

Note:

Emissions for 2040 were based on the 20-year horizon emission factors.

Autos and trucks used emission factors of automobiles

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Attachment E
National Ambient Air Quality Standards

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National Ambient Air Quality Standards

Federal air quality policies are regulated through the federal Clean Air Act (CAA). The EPA adopted the CAA in 1970 and its amendments in 1977 and 1990. Pursuant to the CAA, EPA has established nationwide air quality standards to protect public health and welfare with an adequate margin of safety. These federal standards, known as the National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50), represent the maximum allowable atmospheric concentrations and were developed for six criteria pollutants: ozone, nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter less than 10 microns in aerodynamic diameter (PM_{10}) and particulate matter less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$), sulfur dioxide (SO_2), and lead. The NAAQS represent safe levels of each pollutant to avoid specific adverse effects to human health and the environment. A summary of the NAAQS is provided in Table A.

TABLE A
National Ambient Air Quality Standards[a]

Pollutant	Averaging Time	NAAQS[b]	
		Primary[c]	Secondary[d]
Ozone	8 hours	0.075 ppm	0.075 ppm
PM_{10}[e]	24 hours	150 μg/m^3	150 μg/m^3
$PM_{2.5}$[e]	Annual Arithmetic Mean	12 μg/m^3	15 μg/m^3
	24 hours	35 μg/m^3	35 μg/m^3
CO	8 hours	9 ppm	Not Available[d]
	1 hour	35 ppm	Not Available[d]
NO_2	Annual Arithmetic Mean	0.053 ppm	0.053 ppm
	1 hour	100 ppb [f]	Not Available[d]
SO_2	Annual	0.03 ppm (certain areas)[g]	Not Available[g]
	24 hours	0.14 ppm (certain areas)[g]	Not Available[g]
	3 hours	Not Available[g]	0.5 ppm
	1 hour	75 ppb[g]	Not Available[g]
Lead[h]	Calendar Quarter	1.5 μg/m^3	1.5 μg/m^3
	Rolling 3-month Average	0.15 μg/m^3	0.15 μg/m^3

[a] Data Source: EPA, 2015, http://www.epa.gov/air/criteria.html, Accessed July 2015.

[b] National standards other than ozone, PM, and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, is equal to or less than the standard.

[c] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[d] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. There are no secondary standards for CO and No_2 1-hour.

[e] On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 μg/m^3 to 12.0 μg/m^3. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 μg/m^3, as was the annual secondary standard of 15 μg/m^3. The existing 24-hour PM_{10} standards (primary and secondary) of 150 μg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over three years.

[f] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb.

[g] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

[h] Final rule signed October 15, 2008. The 1978 lead standard (1.5 μg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

Acronyms: μg/m^3 = micrograms per cubic meter; ppm = parts per million (by volume); ppb = parts per billion (by volume)

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Attachment F
Summary of the Project's MSAT Assessment

Summary of the Project's MSAT Assessment

This attachment summarizes the Project's assessment of mobile source airborne toxic (MSAT) analysis, which includes a qualitative assessment of the Project's anticipated effects on MSATs and a statement of incomplete or unavailable information for the MSAT assessment, in compliance with 40 CFR 1502.22. Currently, FTA has not adopted guidance on evaluating MSAT impacts from transit projects. Therefore, FTA and the Council used FHWA's *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA* (FHWA, 2012a) for the Project's MSAT impact analysis. In summary, the Project will have low potential MSAT effects and, therefore, a qualitative MSAT analysis was performed following the FHWA guidance (FHWA, 2012a).

The regional or local air toxic concentrations of MSAT emissions are affected by changes of vehicle mix types and miles traveled (FHWA, 2012a). Nationwide MSAT emissions are expected to be lower than present levels in the future years as a result of EPA's national control programs that are projected to reduce annual MSAT emissions (FHWA, 2012a). For example, based on an FHWA analysis using EPA's MOVES2010b model, even if VMT increases by 102 percent as assumed from 2010 to 2050, a combined reduction of 83 percent in the total annual emissions for the priority MSAT is projected for the same time period.

Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures; however, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future.

Qualitative MSAT Assessment

The Project will cause changes in VMT for a variety of vehicles such as passenger vehicles, buses, and rail vehicles. These VMT changes will result in changes in the MSAT emissions locally and regionally. Potential MSAT effects from the Project operations were evaluated following the FHWA Interim Guidance. According to the interim guidance, the types of projects considered to have low potential for MSAT effects include those that serve to improve operations of highway, transit, or freight without adding substantial new capacity or without creating a facility that is likely to meaningfully increase MSAT emissions. The proposed Project meets those criteria.

The Project will improve access and mobility to the jobs and activity centers in the Minneapolis central business district, and support regional transportation efficiency. The Project is projected to reduce vehicle travel on roadways of the region when passengers switch from driving or using buses to light rail. Therefore, the Project will not create or add significant capacity to urban highways, or concentrate high levels of diesel vehicles at a single location, and has design year (2040) traffic less than 140,000 AADT.

As shown in Table 3.11-3, the regional VMT for cars and trucks for the Project will be lower than those for the No Build Alternative. The VMT decrease of cars and trucks under the Project is attributed to removal of vehicles from roadways when people switch from driving to using light rail. There will be an increase in bus VMT from Metro Transit buses with the Project, but the bus VMT increase is lower than the VMT reduction by cars and trucks, resulting in a net decrease of VMT. Therefore, the overall MSAT emissions from vehicles on the region's highways and surface streets will decrease compared to the No Build Alternative.

TABLE 1
Average Weekday VMT of the Region [a]

	2013 VMT	2040 VMT	
	Existing	No Build	Project
Cars	79,205,393	99,435,381	99,317,589
Trucks	2,454,774	3,192,153	3,191,577
Bus (Metro Transit)	98,430	107,478	112,942
Diesel Bus	90,950	99,310	104,358
Hybrid Bus	7,481	8,168	8,584
Bus (Other Agencies, Diesel)	48,539	85,099	83,924
LRT	14,480	23,997	33,013
Commuter rail	1601	1601	1601
Total VMT	81,823,217	102,845,709	102,740,646

[a] Regional vehicle miles traveled (VMT) refers to data for the seven-county Twin Cities metropolitan area.
Source: AECOM Travel Demand Model, August 2015.

Project operations will have the potential effect of increasing MSAT emissions in the vicinity of nearby homes, schools, and businesses; therefore, under the Project there may be localized areas where ambient concentrations of MSATs will be higher than under the No Build Alternative. The localized increases in MSAT emissions will likely occur near the proposed light rail stations, the park-and-ride lots, and OMF; however, as discussed in the following section, the magnitude and the duration of these potential effects cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific health impacts. In addition, even if these increases do occur, they will be substantially reduced in the future due to implementation of EPA's vehicle and fuel regulations.

In summary, the Project in the design year is expected to be associated with lower levels of MSAT emissions in the region, relative to the No Build Alternative, along with benefit from improvements in speed and reductions in region-wide vehicle traffic. There could be slightly higher MSAT levels in localized areas where Project-related activities (e.g. automobile trips to park-and-ride lots) will occur closer to homes, schools, and businesses. (MSAT levels are likely to decrease over time due to nationally mandated cleaner vehicles and fuels.)

Incomplete or Unavailable Information for Project-Specific MSAT Analysis

As per 40 CFR 1502.22, when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking. Further, if the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:

1. A statement that such information is incomplete or unavailable;

2. A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;

3. A summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and

4. The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts that have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

As previously noted, the MSAT analysis in Section 3.11 of the Final EIS includes a qualitative analysis of the likely MSAT impacts of the proposed Project. The FHWA Interim Guidance notes that, in addition to a qualitative assessment, a NEPA document for this category of projects must include a discussion of information that is incomplete or unavailable for a project-specific assessment of MSAT impacts, in compliance with CEQ regulations (40 CFR 1502.22).

The following discussion regarding the limitations of the MSAT analysis due to incomplete and unavailable information in compliance with 40 CFR 1502.22 and is based on Appendix C of the FHWA Interim Guidance (FHWA 2012), which provides an example of how to document the discussion concerning incomplete or unavailable information for a project-specific MSAT assessment.

Information is incomplete or unavailable to credibly predict the Project-specific health impacts associated with changes in MSAT emissions associated with a proposed set of highway configurations (e.g., under the No Build Alternative and under the Project), particularly those impacts that could be associated with localize increases of MSAT emissions. The outcome of such an assessment, adverse or not, will be influenced more by the uncertainty introduced into the process through assumption and speculation rather than insight into the actual health impacts directly attributable to exposure to MSATs from the proposed action.

EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. It is the lead authority for administering the CAA and its amendments and has specific statutory obligations with respect to HAPs and MSATs. EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. EPA maintains IRIS, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, 2014b). Each report contains assessments of noncancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures, with uncertainty spanning perhaps an order of magnitude. (FHWA, 2012b).

Other organizations also are active in the research and analysis of the human health effects of exposures to MSATs, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA* (FHWA, 2012a). Adverse health effects linked to MSAT compounds at high exposures include cancer in humans in occupational settings, cancer in animals, and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious are the adverse human health effects of exposures to MSAT compounds at current environmental concentrations (HEI, 2007) or at future concentrations as vehicle emissions substantially decrease (HEI, 2009).

The methodologies for forecasting health impacts include emissions modeling, dispersion modeling, exposure modeling, and final assessment of potential health impacts, with each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete definition or differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70-year) exposure assessments, particularly because unsupportable assumptions will have to be made regarding changes in travel patterns and vehicle technology over that timeframe. Additionally, given that some of the necessary information is unavailable, it is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and human exposures near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI. As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. EPA and the HEI have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There also is a lack of a national consensus on an acceptable level of risk. The current context is the process used by EPA, as provided by the CAA, to determine whether more stringent controls are required to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally set at a value for excess lifetime cancer risk of no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with excess lifetime cancer risks less than one in a million due to exposure to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than one in a million; in some cases, the residual risk determination could indicate maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects will result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts, any predicted difference in health impacts between the Project and the No Build Alternative is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, FTA has determined that the results of such assessments will not be useful to decision-makers, who would need to weigh this information against project benefits, such as increases in transit ridership and mobility and reducing VMT and traffic congestion, that are better suited for quantitative analysis.[1]

[1] Because of the determination that the incomplete or unavailable information would not be useful to decision-makers (statement #2 of 40 CFR 1502.22), the subsequent determinations under 40 CFR 1502.22 (i.e., #3 and #4) are not required to be made.

Attachment G
FHWA Infrastructure Carbon Estimator (ICE) Model

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The Federal Highway Administration (FHWA) Infrastructure Carbon Estimator (ICE) model was used to estimate construction and maintenance Greenhouse Gas (GHG) emissions. The ICE model is used to predict estimated GHG from transportation infrastructure projects.

Construction activities for the Southwest LRT are planned between 2017 and 2019, therefore the majority of construction was conservatively assumed to be over a three-year period. Table 1 provides the construction project types, as input into the ICE model.

Table 1. Rail Construction Inputs

	Light Rail	Heavy Rail
Project Type	**(One-Way Track Miles)**	**(One-Way Track Miles)**
New construction (underground - hard rock)	0	0
New construction (underground - soft soil)	1.2	0
New construction (elevated)	7.0	0
New construction (at grade)	20.8	0
Converted or upgraded existing facility	0.55	0
New rail station (underground)	0	0
New rail station (elevated)	0	0
New rail station (at grade)	15	0
Single-Span Bridge Structure (2-lane)	28	0
Two-Span Bridge Structure (2-lane)	5	0

GHG emissions are categorized as upstream energy materials or direct energy for routine construction activities. Model results are shown in Table 2 as metric tonnes (MT) of carbon dioxide equivalent (CO2e) per year.

Table 2. Annual GHG Emissions

	Bridges	Rail	Total
Energy Use Type	**(MT CO2e/yr)**	**(MT CO2e/yr)**	**(MT CO2e/yr)**
Upstream Energy Materials	680	66,125	66,805
Direct Emissions Construction	150	3,718	3,868
Routine Maintenance			165
Total	830	69,843	70,838

Results Summary

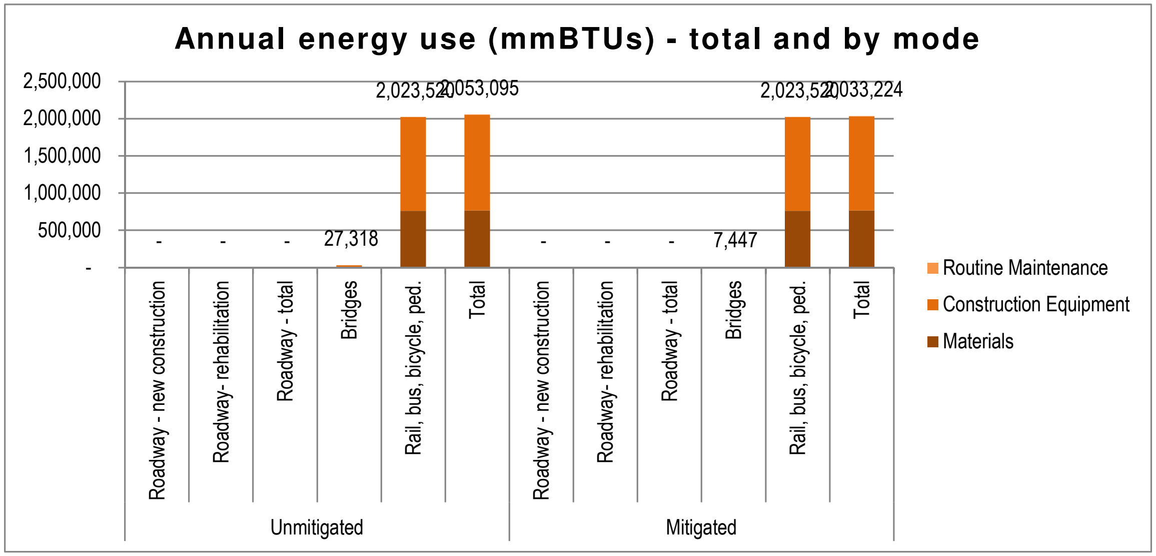
Project Inputs | Mitigation Inputs | Impacts on Vehicle Operation

	Annualized energy use (mmBTUs), per year over 3 years											
	Unmitigated						Mitigated					
	Roadway - new construction	Roadway-rehabilitation	Roadway - total	Bridges	Rail, bus, bicycle, ped.	Total	Roadway - new construction	Roadway-rehabilitation	Roadway - total	Bridges	Rail, bus, bicycle, ped.	Total
Upstream Energy												
Materials	-	-	-	7,447	759,264	**766,711**	-	-	-	7,447	759,264	**766,711**
Direct Energy												
Construction Equipment	-	-	-	19,871	1,264,256	**1,284,127**	-	-	-	-	1,264,256	**1,264,256**
Routine Maintenance						**2,257**						**2,257**
Total	**-**	**-**	**-**	**27,318**	**2,023,520**	**2,053,095**	**-**	**-**	**-**	**7,447**	**2,023,520**	**2,033,224**

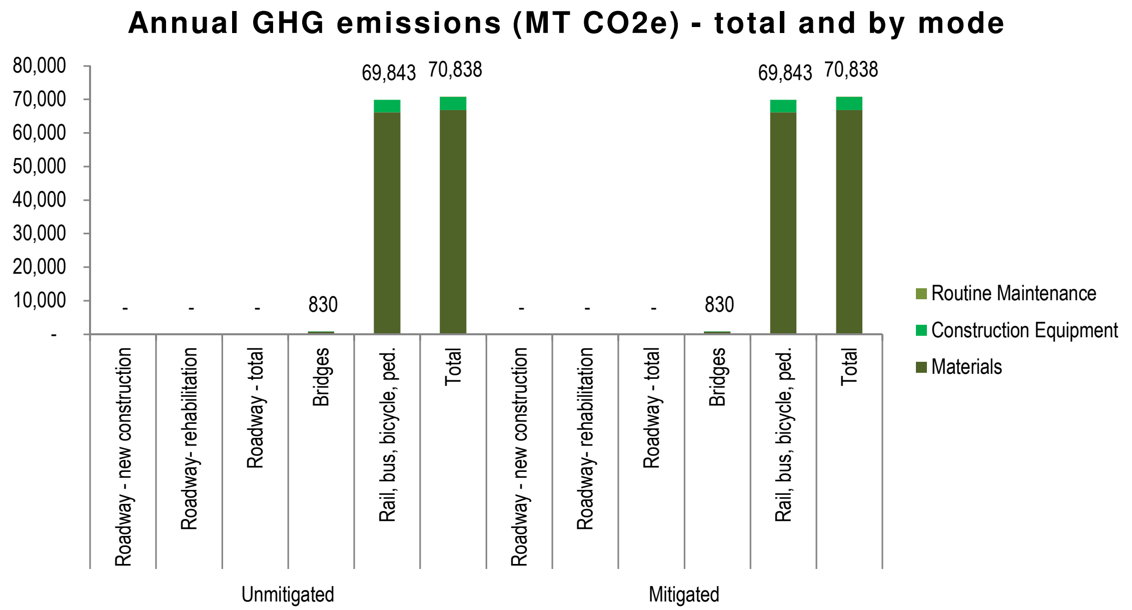
Note: To convert mmBTU to the equivalent gallons of US conventional diesel, use the conversion factor of 7.785 gallons of diesel / mmBTU. Please keep in mind that this conversion represents the equivalent amount of energy required, which can be useful for informational purposes, but it does not necessarily represent actual gallons of diesel required.

	Annual GHG emissions (MT CO2e), per year over 3 years											
	Unmitigated						Mitigated					
	Roadway - new construction	Roadway-rehabilitation	Roadway - total	Bridges	Rail, bus, bicycle, ped.	Total	Roadway - new construction	Roadway-rehabilitation	Roadway - total	Bridges	Rail, bus, bicycle, ped.	Total
Upstream Emissions												
Materials	-	-	-	680	66,125	**66,805**	-	-	-	680	66,125	**66,805**
Direct Emissions												
Construction Equipment	-	-	-	150	3,718	**3,868**	-	-	-	150	3,718	**3,868**
Routine Maintenance						**165**						**165**
Total	**-**	**-**	**-**	**830**	**69,843**	**70,838**	**-**	**-**	**-**	**830**	**69,843**	**70,838**

Annualized over 3 Years



Annualized over 3 Years



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