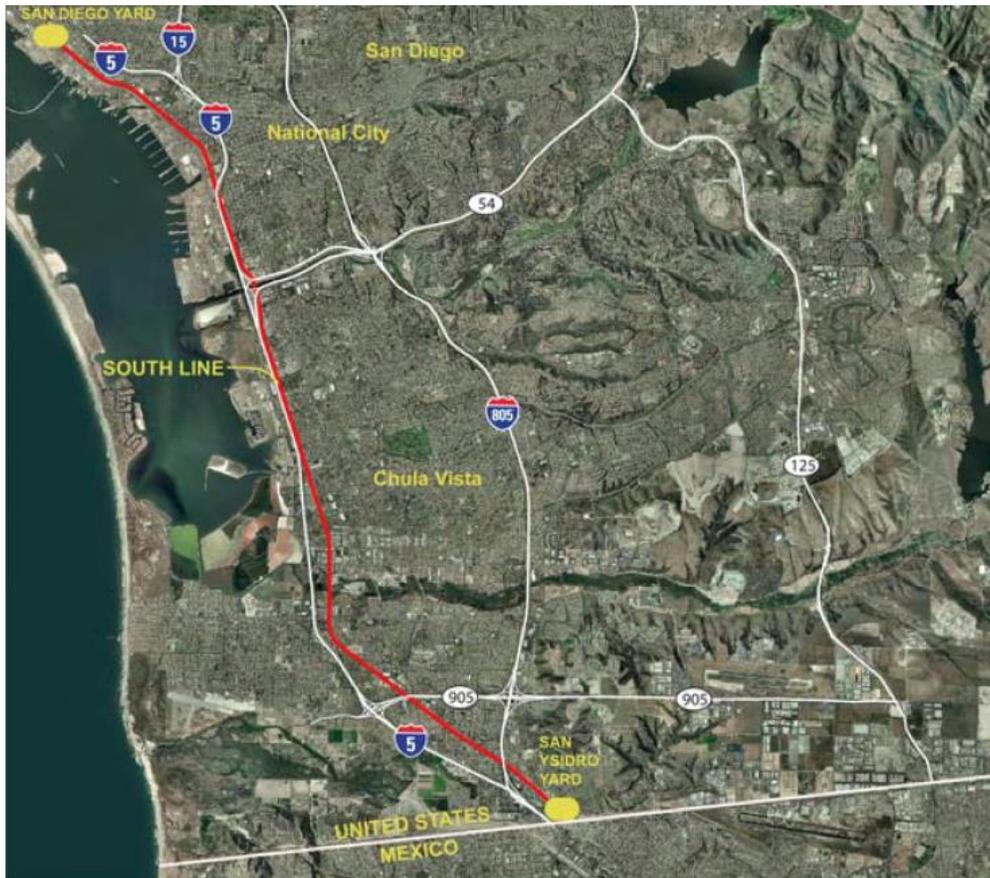


# PROJECT BENEFITS REPORT

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## SOUTH LINE FREIGHT AND SAN YSIDRO YARD IMPROVEMENTS

TCIF Project Numbers: 74 & 75



San Diego Association of Governments - [www.sandag.org](http://www.sandag.org)

December 8, 2020



# SOUTH LINE FREIGHT AND SAN YSIDRO YARD IMPROVEMENTS

SANDAG CIP 1300601 & 1300602

Report Prepared by:



Prepared for:



Revision	Author	Organization	Date	Description
0	D. Berryman	RailPros	12/8/20	Report Finalized

Current Rev.	Approved by:	Organization	Date	Signature
0	B. Smith	SANDAG	12/8/20	

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# South Line Freight and San Ysidro Yard Improvements

## Project Benefits Analysis

### INTRODUCTION

This document is a supplement to the final delivery reports for the San Ysidro Freight Improvement projects, which consisted of two separate projects to increase freight capacity on the San Diego and Arizona Eastern (SD&AE) Railroad short line between the San Diego Yard at 12<sup>th</sup> and Imperial and the San Ysidro Yard at the border of Mexico, also known as the “Blue Line” or “South Line”, as shown in the cover photo and Figure 1. SD&AE is a subsidiary of the Metropolitan Transit System (MTS) and the tracks used for freight transit are shared with the San Diego Trolley, another subsidiary of MTS. The sole Freight Operator along this segment is the San Diego and Imperial Valley (SD&IV) Railroad.

The two projects that comprise the freight improvements are listed below, and when referred to collectively, are called the “Project” throughout this document:

- the SD&AE Mainline Improvement Project (SANDAG CIP 1300602; TCIF Segment 75)
- the San Ysidro Yard Expansion Project (SANDAG CIP 1300601; TCIF Segment 74)



Figure 1 – Location Map

The SD&AE Mainline Improvement Project in southern San Diego, which consists of the entire 14-mile stretch of the South Line, provided Centralized Train Control (CTC) for bi-directional train movements. The work included the installation of powered crossovers, central control switches and routing, remote signal and switch

status, bi-directional grade crossing signaling, and siding improvements. The San Ysidro Freight Yard Expansion Project provided an additional 1000-foot yard lead and additional storage tracks. (See Appendix A for a Before & After aerial view of the project). The work included acquisition of property, development of an access road, new drainage facilities, and large desilting basins to protect the yard from erosion deposits from the easterly hills. The two projects combined provided for increased freight capacity and goods movement. The projects were initiated in 2008, began construction in 2014, and were completed in 2016.

The projects were funded with a combination of Federal, State, and Local Funds. The environmental and design components of the Mainline Freight Capacity Improvements were funded with local TransNet funds. The environmental and design of the Freight Yard Expansion was funded with Federal Highway Administration (FHWA), Statewide Transportation Improvement Program (STIP), and local TransNet funds. The Right of Way for the Freight Yard Expansion was funded through a combination of FHWA and local TransNet funds. The construction for both projects was funded through the California Trade Corridor Improvement Fund (TCIF) via two separate agreements, both dated September 1, 2008, between the California Transportation Commission (CTC), California Department of Transportation (Caltrans), and SANDAG.

The Project Study Report and Project Benefits Forms were included in the TCIF Agreements. Project Benefits were formulated and calculated based on the following six categories: Throughput, Reliability, Safety, Velocity, Congestion Reduction, and Emissions Reduction. All six benefit categories are discussed as part of the analysis below.

## PURPOSE

The purpose of this analysis is to compare the Project or “Planned” Benefits, as stated in the Project’s Project Study Report and the TCIF Agreement, to actual results from post-Project operations (“Benefits Achieved”). For each of the six benefit categories mentioned above, this analysis will state the “Planned Benefit” followed by the actual “Benefit Achieved”.

*It should be noted that many of the benefits stated in the TCIF Agreement are based on projections of benefits achieved by the year 2030 as a result of these projects. Benefits depicted in this report are benefits achieved to date.*

## ANALYSIS

### **Benefit Category 1 – Throughput**

**Planned Benefit 1a (Mainline Improvements):** Implementation of the Mainline Track Improvements Project is expected to provide capacity to double the number of freight train movements from two to four trains per day. In conjunction with the San Ysidro Yard Improvements Project, the Mainline Track Improvements Project will help increase total system capacity from 10,000 to 19,600 carloads transported per year.

**Benefit Achieved 1a:** According to data obtained from SD&IV, the total freight moved on the South Line increased by 28.6% between 2012 and 2016 following implementation of these projects. (See Table 1 below). This freight increase equates to an approximate increase of 1,915 carloads annually from the 2012 baseline to 2016. With the Project opening service in July of 2016, a significant increase in freight tonnage was realized

as a result of the improvements, as demonstrated in Table 1. If freight demand were to continue at this pace, carloads would increase to 15,322 by 2030. With a new capacity of 19,600 stated above, the rail line can meet this demand.

**Table 1 – SD&IV Freight Tonnage Increases since 2012**

Year	Freight Tons Moved*	Equivalent Carloads**	% Increase since 2012	Notes on TCIF Project
2012	536,346	6,704		Project in Design
2013	589,488	7,369	9.9%	Project in Design
2014	426,859	5,336	-25.6%	Project Begin Construction
2015	448,578	5,607	-19.6%	Project in Construction
2016	689,491	8,619	28.6%	Construction Completed
<b>Projected to...</b>				
<b>2030</b>	<b>1,225,760</b>	<b>15,322</b>	<b>128.6%</b>	

\* Data obtained from SD&IV

\*\* A carload is a typical rail car with an average payload of 80 tons.

**Planned Benefit 1b (Yard Expansion):** The Project will nearly double the yard capacity, increasing it by 96% from 10,000 carloads to 19,600 carloads per year. The extended yard lead and additional storage tracks will allow trains to be fully assembled within the yard and not need the use of the mainline for switching. Mainline use during non-freight operations is not allowed by the mainline operator San Diego Trolley. Train assembly within the Yard will increase overall throughput.

**Benefit Achieved 1b:** The yard expansion has increased the storage capacity of the yard from 100 cars to 196 cars. This, along with the 1,000-foot extension of the yard lead, has allowed for increased train assembly during San Diego Trolley operations. (Freight can only move trains on the short line during non-trolley operations from approximately 1:00 AM to 4:00 AM daily). Freight movements can now take full advantage of the narrow freight operating window for actual freight transport and not be limited for the time it takes to assemble trains. This allows for more throughput by effectively increasing the capacity of the yard from 10,000 carloads to 19,600 carloads per year. It must be noted that the actual usage of the line is based on freight demand.

## **Benefit Category 2 – Reliability**

**Planned Benefit 2a (Mainline Improvements):** Reliability of freight delivery is increased with two additional train operations per day. The Project also reduces canceled train movements because of scheduled and unscheduled track maintenance and reduces the variability and unpredictability of train travel times.

**Benefit Achieved 2a:** The Project has increased the daily train operation capacity of the mainline from two to four freight trains. This provides relief to the mainline and increases reliability of freight movements along the line. The Project has also increased reliability with the implementation of Centralized Train Control (CTC), which allows for higher speeds and increased on-time performance during track maintenance. During reverse train running movements, CTC has eliminated the need to stop at all grade crossings, which has reduced trip times in half.

**Planned Benefit 2b (Yard Expansion):** The lengthened yard lead allows freight trains to be fully assembled within the confines of the yard, ready for transportation during the narrow freight operating window. Pre-

assembly of trains without needing the mainline track improves reliability to meet the constrained freight operating window and on-time performance.

**Benefit Achieved 2b:** With the 1,000-foot yard lead extension and the additional yard tracks, freight trains can now be fully assembled within the yard without needing the use of the mainline tracks. This allows the freight operator to take full advantage of the narrow freight operating window (approximately 1:00 AM to 4:00 AM) and effectively increasing the capability to run 4 trains daily on the mainline.

Additionally, the drainage improvements in the yard and the protection against flooding have resulted in zero lost days of service since the Project was completed, increasing the reliability of freight movements. Prior to the project, portions of the yard would be removed from service as a result of flooding as shown in Figure 2.



**Figure 2 – Flooding at San Ysidro Yard prior to construction (2005).**

### **Benefit Category 3 – Safety**

**Planned Benefit 3 (Mainline Improvements and Yard Expansion):** The Project provides for the rail transportation of goods allowing for a reduction of up to 31,800 truck trips annually on the regional highway system, with an estimated reduction of two injury accidents per year.

**Benefit Achieved 3:** With the CTC / signaling improvements on the mainline and the Yard expansion, the Project has provided increased capacity for freight, which has reduced the need to ship goods by truck. Per Table 2 below, in 2016, the Project resulted in a reduction of 6,806 truckloads since 2012. This equates to a reduction of 2,041,800 truck Vehicle Miles Travelled (VMT) when considering a 300-mile shipping distance (6,806 trucks X 300-mile trips = 2,041,800 Truck VMT). The 300-mile shipping distance is the typical minimum distance needed for shipping freight by rail versus shipping freight by truck. Actual truck VMT reduction may be much greater.

As this relates to safety, the National Highway Traffic Safety Administration (NHTSA) data<sup>1</sup> states that in 2016 there were 36.58 (35 injury crashes + 1.58 fatal crashes) truck related injury or fatality crashes nationally per 100 million VMT. (See Appendix B). Since the Project eliminated 2,041,800 VMT in 2016, that equates to 0.75 eliminated crashes for Year 2016 ( $\rightarrow 2M \text{ VMT} \times 36.58 / 100M \text{ VMT} = 0.3$ ). On a straight-line projection, this results in 3.36 eliminated total crashes by Year 2030.

**Table 2 –SD&IV VMT REDUCTION**

YEAR	Actual Trucks* Removed (from 2012)	Actual VMT* Reduction (from 2012)	Actual Crash Reduction per year	Goal to be Met (Crashes per Year)	Benefit Achieved
2013	2,362	708,600	0.26	2.00	NA
2014**	-4,882	-1,464,600	-0.54	2.00	NA
2015**	-3900	-1,170,000	-0.43	2.00	NA
2016	6,806	2,041,800	0.75	2.00	NA
<b>Subtotal</b>	<b>386</b>	<b>115,800</b>	<b>0.04</b>		
<b>Projected to...</b>					
<b>2030</b>	<b>30,627</b>	<b>9,188,100</b>	<b>3.36</b>	<b>2.00</b>	<b>TBD</b>

\*Data received from SANDAG (assumes average 45,000lb truck load capacity); truck roundtrip = San Diego Yard to the San Ysidro Yard via 1-5. This analysis does not consider any dead heading of trucks or additional trips made due to trucks not being fully loaded.

\*\*Project Construction in progress.

## Benefit Category 4 – Velocity

**Planned Benefit 4a (Mainline Improvements):** The Centralized Train Control (CTC) and reverse approach signaling will allow freight trains to move on the South Line at greater operating speeds. During periods of track maintenance, reverse running train speeds will increase from 10mph to 40mph.

**Benefit Achieved 4a:** As a result of the CTC and signal improvements, train speeds have increased to 40 mph while operating on “normal” or right-running rail operations and 30 mph while operating on “reverse rail” or left-running rail operations (during track maintenance). Also, for reverse rail operations, the train no longer has to stop at each grade crossing to manually activate the crossing. As a result, for right running rail, the average trip time decreased from approximately 40 minutes to approximately 25 minutes, and for reverse or left-running rail, the average trip time decreased from more than 60 minutes to approximately 35 minutes. Refer to Appendix C for current operating speeds on the South Line.

**Planned Benefit 4b (Yard Extension):** New mainline turnout and yard layout provides for faster train speeds exiting and entering the yard. New layout and technology improvements also provide for more efficient switching and train assembly.

**Benefit Achieved 4b:** The implementation of power operated switches has reduced the time in entering and exiting the yard as the switch can be changed by the dispatcher and does not have to be manually changed by the train crew. Prior to the Project the crew had to stop the train, manually line the switch, pass through the switch, and then place the switch back into the mainline configuration. As a result of the Project trains can enter and exit the yard without stopping by contacting the dispatcher beforehand to line the switch. This has resulted in an average savings of 20 minutes each time a train enters or exits the yard.

<sup>1</sup> <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812891>

## Benefit Category 5 – Congestion Reduction

**Planned Benefit 5 (South Line Improvements and Yard Expansion):** The increased rail capacity will eliminate up to 31,800 truck trips annually, reducing congestion on the highway network and at the U.S. – Mexico border crossing.

**Benefit Achieved 5:** As of 2016 the projects effectively removed 6,806 truck trips (assuming a 45,000 lb of freight per truck) through increased freight movement by rail. If this trend continues on a straight-line projection, it is anticipated that 30,627 truck trips will be reduced annually by the year 2030. This is slightly less than the anticipated 31,800 trips originally proposed. However, it is forecasted that freight demand will increase at a greater rate by 2030, and with the increased capacity of the rail lines, the 31,800 annual truck trip reduction would be met.

## Benefit Category 6 – Emissions Reduction

**Planned Benefit 6 (South Line Improvements and Yard Expansion):** The reduction of 31,800 trucks by 2030 is projected to result in the following emissions reductions: NOx 320 lbs./day, CO<sub>2</sub> 1.36 million lbs./day, PM10 260 lbs./day, and CO 540 lbs./day. *[It would appear the planned benefit was incorrectly calculated]*

Based off the current SANDAG modeling in Appendix D, the reduction of 31,800 trucks by 2030 is calculated to result in the following reduction of emissions: NOx 9.6 lbs./day, CO<sub>2</sub> 4,872 lbs./day, PM10 0.53 lbs./day, and CO 1.64 lbs./day. The calculation is also shown in Table 3 below:

**Table 3 – Projected Emission Reductions**

	<b>CO<sub>2</sub> Reductions (lbs)</b>	<b>NOx Reductions (lbs)</b>	<b>PM10 Reductions (lbs)</b>	<b>CO Reductions (lbs)</b>
<b>Annual</b>	1,593,302	3,164	172	538
<b>Daily*</b>	4,872	9.6	0.53	1.64

\*327 effective days used, not 365. The 327 effective annual days for commercial activity was researched by USD EPIC for the 2008 San Diego County GHG inventory.

Since the emissions reduction benefits included in the TCIF grant application were estimated to 2030, the current report is progress to date. In addition, current emissions modeling tools have updated calculations compared to the tools used for the 2008 TCIF applications, so there might be inconsistencies in doing direct comparisons. The SANDAG Transportation Analysis & Modeling TCIF GHG Reduction Estimates memo in Appendix D should therefore be considered a standalone analysis based on data provided by the rail operator and should not be directly compared to the original TCIF application or the closeout sheets.

**Benefit Achieved 6:** The operational flexibility and increased capacity, provided by the Project, allows for more freight on rails and reduces highway truck traffic, resulting in lower emissions. This truck traffic reduction has been measured against the 2012 baseline and was determined to be 6,806 truckloads in 2016. Using this data, the four (4) emissions listed in the “Planned Benefit” section were analyzed and the results are described below. If this trend continues on a straight-line projection, it is anticipated that 30,627 truck trips will be reduced annually by the year 2030. This is slightly less than the anticipated 31,800 trips originally proposed. However, it is forecasted that freight demand will increase at a greater rate by 2030, and with the increased capacity of the rail lines, the 31,800 annual truck trip reduction and the associated emissions reduction would be met.

Nitrogen Oxide (NOx):

Per Table 4 below, this truckload reduction equates to a NOx Emission Reduction of approximately 7.1 pounds per day in 2016.

**Table 4 – NOx Emission Reductions**

YEAR	Rail Freight Tons Over Baseline (2012)	Annual Diverted Truckloads from Hwy* (trips)	Annual NOx Emission Reductions**(pounds)	NOx Emission Reductions lbs./day***
2013	53,142	2,362	1,230	3.8
2014	-109,485	-4,882	-2,190	-6.7
2015	-87,750	-3900	-1,521	-4.7
2016	153,135	6,806	2,309	<b>7.1</b>
<b>Subtotal</b>	<b>8,682</b>	<b>386</b>	<b>-172</b>	<b>-0.5</b>
<b>Projected to...</b>				
<b>2030</b>		<b>31,680</b>	<b>3,164</b>	<b>9.6</b>

\* Assumes average 45,000lb truck load capacity; truck roundtrip = BNSF Yard/10<sup>th</sup> Ave Marine terminal to outbound Otay Mesa Commercial POE. Analysis does not consider any dead heading of trucks or additional trips made due to trucks not being fully loaded.

\*\*Used NOx emissions factors from EMFAC2017, specifically limited to the 'TI-Tractor' vehicle type, which is for tractor trailer rigs.

\*\*\*327 effective days used, not 365. The 327 effective annual days for commercial activity was researched by USD EPIC for the 2008 San Diego County GHG inventory.

Carbon Dioxide (CO<sub>2</sub>):

Per Table 5 below, this truckload reduction equates to a CO<sub>2</sub> Emission Reduction of approximately 1,380 pounds per day in 2016.

**Table 5 – CO<sub>2</sub> Emission Reductions**

YEAR	Rail Freight Tons Over Baseline (2012)	Annual Diverted Truckloads from Hwy* (trips)	Annual CO <sub>2</sub> Emission Reductions**(pounds)	CO <sub>2</sub> Emission Reductions lbs./day***
2013	53,142	2,362	165,342	506
2014	-109,485	-4,882	-336,052	-1,028
2015	-87,750	-3900	-263,133	-805
2016	153,135	6,806	451,238	<b>1,380</b>
<b>TOTAL</b>	<b>8,682</b>	<b>386</b>	<b>17,395</b>	<b>53</b>
<b>Projected to...</b>				
<b>2030</b>		<b>31,680</b>	<b>1,593,302</b>	<b>4,872</b>

\* Assumes average 45,000lb truck load capacity; truck roundtrip = BNSF Yard/10<sup>th</sup> Ave Marine terminal to outbound Otay Mesa Commercial POE. Analysis does not consider any dead heading of trucks or additional trips made due to trucks not being fully loaded.

\*\*Used CO<sub>2</sub> emissions factors from EMFAC2017, specifically limited to the 'TI-Tractor' vehicle type, which is for tractor trailer rigs.

\*\*\*327 effective days used, not 365. The 327 effective annual days for commercial activity was researched by USD EPIC for the 2008 San Diego County GHG inventory.

Particulate Matter:

Per Table 6 below, this truckload reduction equates to a PM10 Emission Reduction of approximately 0.28 pounds per day in 2016.

**Table 6 – PM10 Emission Reductions**

YEAR	Rail Freight Tons Over Baseline (2012)	Annual Diverted Truckloads from Hwy* (trips)	Annual PM10 Emission Reductions** (pounds)	PM10 Emission Reductions lbs./day***
2013	53,142	2,362	53	0.16
2014	-109,485	-4,882	-90	-0.27
2015	-87,750	-3900	-62	-0.19
2016	153,135	6,806	93	<b>0.28</b>
<b>Subtotal</b>	<b>8,682</b>	<b>386</b>	<b>-5</b>	<b>-0.02</b>
<b>Projected to...</b>				
<b>2030</b>		<b>31,680</b>	<b>172</b>	<b>0.53</b>

\* Assumes average 45,000lb truck load capacity; truck roundtrip = BNSF Yard/10<sup>th</sup> Ave Marine terminal to outbound Otay Mesa Commercial POE. Analysis does not consider any dead heading of trucks or additional trips made due to trucks not being fully loaded.  
 \*\*Used PM10 emissions factors from EMFAC2017, specifically limited to the 'TI-Tractor' vehicle type, which is for tractor trailer rigs.  
 \*\*\*327 effective days used, not 365. The 327 effective annual days for commercial activity was researched by USD EPIC for the 2008 San Diego County GHG inventory.

Carbon Monoxide:

Per Table 7 below, this truckload reduction equates to a CO Emission Reduction of approximately 1.34 pounds per day in 2016.

**Table 7 – CO Emission Reductions**

YEAR	Rail Freight Tons Over Baseline (2012)	Annual Diverted Truckloads from Hwy* (trips)	Annual CO Emission Reductions**(pounds)	CO Emission Reductions lbs./day***
2013	53,142	2,362	278	0.85
2014	-109,485	-4,882	-452	-1.38
2015	-87,750	-3900	-304	-0.93
2016	153,135	6,806	438	<b>1.34</b>
<b>Subtotal</b>	<b>8,682</b>	<b>386</b>	<b>-40</b>	<b>0.85</b>
<b>Projected to...</b>				
<b>2030</b>		<b>31,680</b>	<b>538</b>	<b>1.64</b>

\* Assumes average 45,000lb truck load capacity; truck roundtrip = BNSF Yard/10<sup>th</sup> Ave Marine terminal to outbound Otay Mesa Commercial POE. Analysis does not consider any dead heading of trucks or additional trips made due to trucks not being fully loaded.  
 \*\*Used CO emissions factors from EMFAC2017, specifically limited to the 'TI-Tractor' vehicle type, which is for tractor trailer rigs.  
 \*\*\*327 effective days used, not 365. The 327 effective annual days for commercial activity was researched by USD EPIC for the 2008 San Diego County GHG inventory.

## CONCLUSION

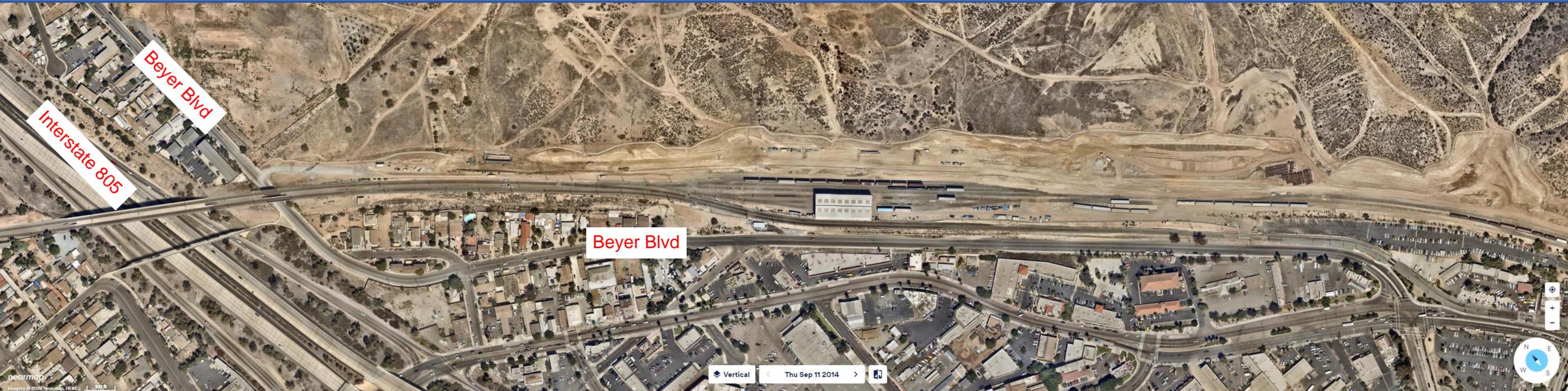
The project benefits are summarized in Table 8 below. It should be noted that the emissions reduction benefits included in the TCIF grant application were estimated to 2030 and the current report is progress to date. In addition, current emissions modeling tools have updated calculations compared to the tools used for the 2008 TCIF applications, so there might be inconsistencies in doing direct comparisons. The SANDAG Transportation Analysis & Modeling TCIF GHG Reduction Estimates memo in Appendix D should therefore be considered a standalone analysis based on data provided by the freight rail operator.

**Table 8 – Project Benefits Summary**

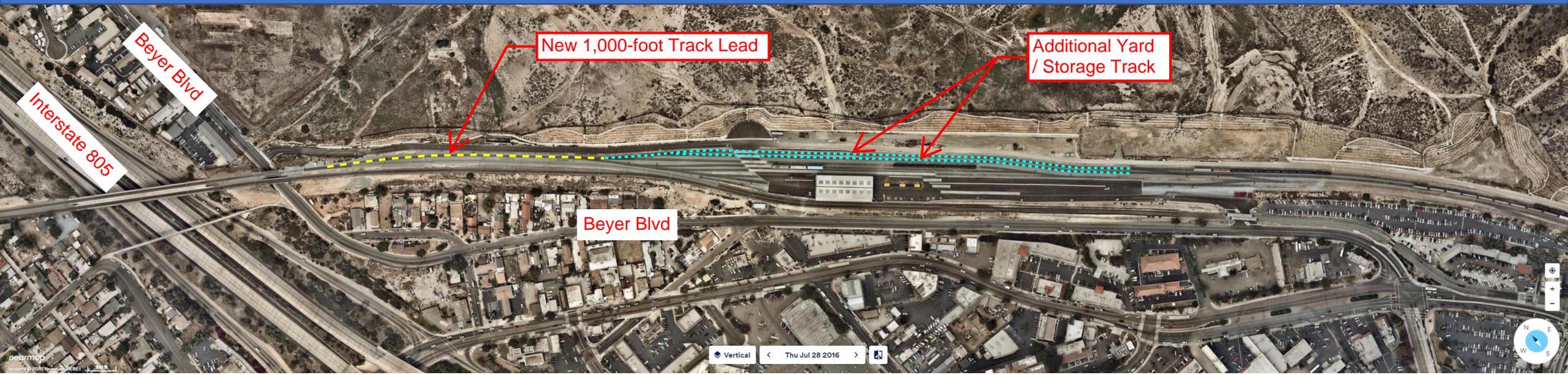
<b>Benefit Category</b>	<b>Category Description</b>	<b>Planned Benefit</b>	<b>Improvements Needed</b>	<b>Achieved</b>	<b>Met</b>
1a	Throughput	Increase Capacity (10,000 carloads to 19,600)	Signal System (CTC)	Doubled the freight capacity	Yes
1b	Throughput	Increase Capacity (10,000 carloads to 19,600)	Yard Expansion	Doubled the freight capacity	Yes
2a	Reliability	Increase number of daily trains from 2 to 4	Signal System (CTC)	Capacity of line has increased to four trains daily	Yes
2b	Reliability	Increase number of daily trains from 2 to 4	Extended Yard Lead	Extended Yard Lead Approx. 1000 ft	Yes
3	Safety	Reduce Truck Crashes by 2/yr.	Increased Capacity	Reduced Truck Crashes estimated at 0.75/yr. (2016)	TBD
4a	Velocity	Increase Reverse Running Speed from 10-40 mph	Signal System (CTC)	Speeds @ 40 mph	Yes
4b	Velocity	Faster train movements in and out of Yard	Extended Yard Lead & More Yard Track	Reduced movements in and out of Yard by +/- 15 minutes	Yes
5	Congestion Reduction	Eliminate 31,800 annual truck trips by 2030	Increased Capacity	Reduced 6,806 trucks (2016)	TBD
6	Emissions Reduction (by 2030)	<u>2030 target</u> Reduction NOx 320 lb./day Reduction CO <sub>2</sub> 1.36M lb./day Reduction PM10 260 lb./day Reduction CO 540 lb./day	Additional Freight Capacity to reduce truck trips	<u>Progress to 2016</u> Reduced NOx 7.1 lb./day Reduced CO <sub>2</sub> 1,380 lb./day Reduced PM10 0.3 lb./day Reduced CO 1.34 lb./day	TBD TBD TBD TBD

## APPENDIX A – San Ysidro Freight Yard BEFORE and AFTER Construction

# San Ysidro Freight Yard – September 2014 – Construction **BEGINS**



# San Ysidro Freight Yard – July 2016 – Construction **COMPLETED**



## APPENDIX B – NHSTA Truck Accident Data

### Large Trucks Involved in Fatal and Injury Crashes, and Involvement Rates, 2009–2018

Year	Number of Large Trucks Involved	Number of Large Trucks Registered	Involvement Rate per 100,000 Registered Large Trucks	Large-Truck Miles Traveled (millions)	Involvement Rate per 100 Million Large-Truck Miles Traveled
<b>Fatal Crashes</b>					
2009	3,211	10,973,214	29.26	288,306	1.11
2010	3,494	10,770,054	32.44	286,527	1.22
2011	3,633	10,270,693	35.37	267,594	1.36
2012	3,825	10,659,380	35.88	269,207	1.42
2013	3,921	10,597,356	37.00	275,017	1.43
2014	3,749	10,905,956	34.38	279,132	1.34
2015	4,075	11,203,184	36.37	279,844	1.46
2016	4,562	11,498,561	39.67	287,895	1.58
2017	4,804	12,229,216	39.28	297,593	1.61
2018	4,862	13,233,910	36.74	304,864	1.59
<b>Injury Crashes</b>					
2009	53,000	10,973,214	487	288,306	19
2010	58,000	10,770,054	541	286,527	20
2011	63,000	10,270,693	609	267,594	23
2012	77,000	10,659,380	719	269,207	28
2013	73,000	10,597,356	690	275,017	27
2014	88,000	10,905,956	811	279,132	32
2015	87,000	11,203,184	779	279,844	31
2016 <sup>†</sup>	102,000	11,498,561	888	287,895	35
2017 <sup>†</sup>	107,000	12,229,216	873	297,593	36
2018 <sup>†</sup>	112,000	13,233,910	848	304,864	37

Sources: FARS 2009–2017 Final File, 2018 FARS ARF; NASS GES 2009–2015 and CRSS 2016–2018; Vehicle miles traveled and registered vehicles – Federal Highway Administration  
<sup>†</sup>CRSS estimates and NASS GES estimates are not comparable due to different sample designs. Refer to end of document for more information about CRSS.

APPENDIX C – Metropolitan Transit System – BULLETIN NO. 20-02 – Speed  
Restrictions



1255 Imperial Avenue, Suite 1000
San Diego, CA 92101-7490
(619) 231-1466

BULLETIN NO. 20-02

DATE: January 21, 2020
TO: All Transportation Department Personnel
SUBJECT: SPEED RESTRICTIONS

Effective immediately, Bulletin 19-02, dated December 12, 2019, is cancelled and the following permanent speed restrictions are in effect.

ON ALL SEGMENTS OF LINE

Table with 3 columns: Description, SDTI, SD&IV. Rows include: Maximum permitted speed on signalized private right-of-way (55/40 MPH), Maximum permitted speed on non-signalized private right-of-way (45/20 MPH), Maximum permitted speed of Vintage Trolley PCC car (25 MPH), Diverging route at all main track crossovers (15 MPH), Except at: No. 20 turnouts (N/A), Crossovers O21A/B & O23A/B (30 MPH), Crossovers S29A/B, M25A/B, M27A/B, M29A/B, M31A/B, M33A/B, M35A/B (10 MPH), Diverging route at main track switches (5 MPH), On SDTI yard storage tracks (5 MPH).

BETWEEN IMPERIAL TERMINAL AND BROADWAY WYE

Table with 3 columns: Description, SDTI, SD&IV. Rows include: Diverging route at switch no. 5 Imperial Terminal station (15 MPH), Trailing switch no. 5 (spring and return) (10 MPH), Between Gaslamp Quarter station and Broadway Wye (30 MPH), Through all curves and switches at Broadway Wye (10 MPH), Except at: Diverging route at switch no. 137 (to Santa Fe Depot) (5 MPH).

BETWEEN BROADWAY WYE AND OLD TOWN

Table with 3 columns: Description, SDTI, SD&IV. Rows include: Between Broadway Wye and Ash Street crossing (15 MPH), Westbound only, between MP .50 and County Center station (35 MPH).



<u>Eastbound only</u> MP 1.00 and Middletown station .....	45 MPH	N/A
<u>Eastbound only</u> , curve between MP 3.20 and the Old Town Transit Center	35 MPH	N/A

**BETWEEN OLD TOWN AND BALTIMORE JUNCTION**

	<b><u>SDTI</u></b>	<b><u>SD&amp;IV</u></b>
Curve between MP 3.75 and Morena/Linda Vista station.....	35 MPH	N/A
Curve at Friars Road grade crossing.....	20 MPH	N/A
Between MP 5.50 and MP 6.50.....	45 MPH	N/A
Between MP 6.50 and Hazard Center Drive #2 grade crossing.....	20 MPH	N/A
<u>Eastbound only</u> , between Hazard Center Drive #2 and MP 6.75.....	35 MPH	N/A
<u>Westbound only</u> , between MP 6.75 and Hazard Center Drive #2.....	25 MPH	N/A
Between MP 6.75 and Rio Vista station.....	40 MPH	N/A
Stadium Pocket Tracks, including over all switches entering and exiting....	10 MPH	N/A
Between MP 9.50 and Mission San Diego station.....	20 MPH	N/A
<u>Westbound only</u> , between MP 10.00 and Mission San Diego station.....	40 MPH	N/A
Curve between MP 10.00 and MP 10.25.....	40 MPH	N/A
Curve between MP 10.25 and MP 10.50.....	35 MPH	N/A
Curve between MP 10.50 and MP 10.75.....	30 MPH	N/A
<u>Westbound only</u> , between MP 11.60 and MP 10.75.....	50 MPH	N/A
Between MP 11.60 and MP 11.80.....	40 MPH	N/A
Between MP 11.80 and MP 12.60 (including SDSU tunnel).....	30 MPH	N/A
Between MP 12.60 and MP 13.25.....	35 MPH	N/A
Between MP 13.80 and MP 14.50.....	40 MPH	N/A
<u>Eastbound only</u> , between MP 14.10 and Alvarado Rd. grade crossing.....	35 MPH	N/A
<u>Westbound only</u> , between MP 15.00 and MP 14.50.....	50 MPH	N/A
Straight switch alignment, within limits of Baltimore Junction interlocking....	20 MPH	N/A

**BETWEEN BROADWAY WYE AND IMPERIAL JUNCTION**

	<b><u>SDTI</u></b>	<b><u>SD&amp;IV</u></b>
Through all curves at America Plaza station.....	10 MPH	N/A
Between America Plaza station and Imperial Junction.....	25 MPH	N/A
Except at:		
• Straight route through crossover switches at: India Street .....	15 MPH	N/A
• Diverging route through crossover switches at: ▪ India Street, Union Street, 9 <sup>th</sup> Avenue, F Street, G Street, K Street, L Street	10 MPH	N/A

• Curve at 9 <sup>th</sup> and C Street (Eastward Track only).....	20 MPH	N/A
• Curves at 11 <sup>th</sup> & C Street and Park Blvd. & Broadway.....	10 MPH	N/A
• Curve on 12 <sup>th</sup> between L Street and Imperial Avenue.....	15 MPH	N/A
<b><u>BETWEEN IMPERIAL JUNCTION AND BALTIMORE JUNCTION</u></b>	<b><u>SDTI</u></b>	<b><u>SD&amp;IV</u></b>
Maximum permitted speed on signalized private right-of-way, Unless otherwise indicated.....	50 MPH	40 MPH
Imperial Junction to 32 <sup>nd</sup> Street.....	25 MPH	15 MPH
Except at:		
• Curve between Imperial station and 13 <sup>th</sup> & Commercial.....	10 MPH	N/A
• Trailing switch no. 7 (spring and return).....	10 MPH	5 MPH
• Diverging route at crossover switches nos. 9 and 11.....	10 MPH	5 MPH
• Diverging route at crossover switches nos. 3A/B.....	5 MPH	5 MPH
Curve at 32 <sup>nd</sup> Street station.....	15 MPH	15 MPH
32 <sup>nd</sup> Street through Francis Street grade crossing.....	30 MPH	20 MPH
Between Francis Street crossing and MP 4.50.....	45 MPH	35 MPH
Curve between MP 4.50 and 43 <sup>rd</sup> Street grade crossing.....	40 MPH	30 MPH
<u>Eastbound only</u> , Between 65 <sup>th</sup> Street and 68 <sup>th</sup> Street Pedestrian crossings	40 MPH	40 MPH
<u>Eastbound only</u> , MP 9.25 and MP 9.71 (San Miguel crossing).....	45 MPH	40 MPH
<u>Eastbound only</u> MP 10.25 and MP 10.50.....	35 MPH	25 MPH
<u>Eastbound only</u> MP 10.50 and MP 11.25.....	40 MPH	25 MPH
<u>Westbound only</u> MP 11.25 and MP 10.25.....	40 MPH	25 MPH
Between MP 11.25 and MP 11.50.....	30 MPH	20 MPH
Through three (3) curves between MP 11.50 and MP 12.00.....	25 MPH	15 MPH
Between MP 11.60 and 11.80 (Spring Street Curve).....	15 MPH	15 MPH
Curve between MP 12.75 and MP 13.00 (Baltimore Junction Interlocking).....	20 MPH	10 MPH
<u>Westbound only</u> , Between Baltimore TPSS and I-8 crossings	20 MPH	20 MPH
<b><u>BETWEEN BALTIMORE JUNCTION AND SANTEE TOWN CENTER</u></b>	<b><u>SDTI</u></b>	<b><u>SD&amp;IV</u></b>
Between MP 14.50 and MP 15.25.....	40 MPH	25 MPH
Curves between MP 15.25 and MP 15.75.....	35 MPH	20 MPH
Curve between MP 15.75 and Hill Street grade crossing.....	45 MPH	20 MPH
Between MP 16.50 and El Cajon (Palm Ave Crossing).....	30 MPH	20 MPH
Between Palm Avenue grade crossing and MP 17.00.....	35 MPH	20 MPH
Between MP 17.00 and Arnele Avenue station.....	40 MPH	20 MPH
Through curves over Fletcher Parkway Bridge.....	30 MPH	N/A

Curves between MP 18.25 and MP 18.50.....	15 MPH	N/A
Curve between MP 19.25 and Gillespie Field station.....	25 MPH	N/A
Between Gillespie Field station and Mission Gorge Road intersection.....	35 MPH	N/A

Except at:

- Curve at Cuyamaca Street grade crossing..... 25 MPH N/A
- Curve at Cuyamaca Street and Mission Gorge Road..... 15 MPH N/A

Mission Gorge Road to Santee Town Center station.....	20 MPH	N/A
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Except at:

- Diverging route at Santee Town Center switch..... 15 MPH N/A

<b><u>BETWEEN IMPERIAL JUNCTION AND SAN YSIDRO</u></b>	<b><u>SDTI</u></b>	<b><u>SD&amp;IV</u></b>
Curve between Imperial station and Newton Crossover.....	10 MPH	N/A
Diverging route at Newton Crossover.....	10 MPH	N/A
<u>Westbound only</u> , between MP 1.50 and Newton Crossover.....	15 MPH	N/A
<u>Eastbound only</u> , between MP 1.50 and Sigsbee Street grade crossing.....	25 MPH	N/A
Between MP 14.60 and SD&IV Access Road grade crossing.....	40 MPH	N/A
Through curve between SD&IV Access Road grade crossing and Gateway Inn #1 grade crossing.....	20 MPH	N/A
Through curve between Gateway Inn #1 grade crossing and Gateway Inn #2 grade crossing.....	15 MPH	N/A
Straight route at crossover switches S97A/B and S99A/B.....	15 MPH	N/A
Diverging route at crossover switches S97A/B and S99A/B.....	10 MPH	N/A



Brian Riley  
 Superintendent of Transportation

- cc: Chief Operating Officer – Rail, Bulletin Board  
 Transportation Department Bulletin Board  
 Central Control Bulletin Board  
 LRV Maintenance Department Bulletin Board  
 Wayside Maintenance Department Bulletin Board  
 SD&IV Railroad

APPENDIX D - SANDAG Transportation Analysis & Modeling TCIF GHG  
Reduction Estimates

## SANDAG Transportation Analysis & Modeling TCIF GHG Reduction Estimates

### Background:

As part of the Data & Modeling group's effort to assist in providing information that will help inform other departments, an evaluation was requested pertaining to increased San Diego & Arizona Eastern (SD&AE) South Line Railway freight throughput and estimated GHG and pollutant reductions.

It was requested that the estimates for increased throughput and storage on the South Line and San Ysidro yard be used to calculate a potential GHG and pollutant reduction benefits for the project. The project was completed in late 2016 and the capacity of the yard, according to TCIF documents, was increased by 9,600 train carloads per year, which will be used as the basis for this analysis.

### Results: (approximate)

Potential GHG & Pollutant Reductions for increase South Line & San Ysidro yard capacity

Year	Annual CO2 Emissions (pounds)	Annual NOx Emissions (pounds)	Annual PM10 Emissions (pounds)	Annual CO Emissions (pounds)
2020	1,964,824	6,657	264	1024
2021	1,924,562	5,697	240	879
2022	1,864,320	4,521	188	598
2023	1,768,249	3,199	171	492
2024	1,744,463	3,223	172	505
2025	1,718,370	3,236	172	516
2026	1,690,658	3,236	173	526
2027	1,658,596	3,219	173	532
2028	1,625,736	3,196	173	536
2029	1,593,302	3,164	172	538

Discussion:

- This is not an actual reduction of pollutants due to post-project freight tonnage statistics being unavailable.
- The diverted truck trips and diverted VMT were used by assuming one fully laden truck traveling from BNSF Yard/10th Ave Marine terminal to outbound Otay Mesa commercial POE (~19.5 miles)
- This analysis does not consider any deadheading of trucks or additional trips made due to trucks not being fully loaded.
- This analysis used the CO2 emissions factors from EMFAC2017 and was specifically limited to the, 'T7-Tractor' vehicle type. Which is for tractor trailer rigs.
- If one wishes to convert any of these annual figures to daily, it is strongly recommended that 327 effective days be used, not 365. The 327 effective annual days for commercial activity was researched by USD EPIC for the 2008 San Diego County GHG inventory

Figures:

Year	Additional Annual South Line & San Ysidro yard carload capacity	Annual Truckloads <sup>α</sup>	Annual VMT <sup>β</sup>	CO2 Emissions pounds/mile <sup>Δ</sup>	Annual CO2 Emissions (pounds)	NOx Emissions pounds/mile <sup>Δ</sup>	Annual NOx Emissions (pounds)	PM10 Emissions pounds/mile <sup>Δ</sup>	Annual PM10 Emissions (pounds)	CO Emissions pounds/mile <sup>Δ</sup>	Annual CO Emissions (pounds)	Displaced VMT % of Total T7 EMFAC VMT
2020	9,600	31,680	617,760	3.18	1,964,824	1.078E-02	6,657	4.266E-04	264	1.657E-03	1024	0.42%
2021	9,600	31,680	617,760	3.12	1,924,562	9.223E-03	5,697	3.892E-04	240	1.422E-03	879	0.41%
2022	9,600	31,680	617,760	3.02	1,864,320	7.319E-03	4,521	3.044E-04	188	9.684E-04	598	0.40%
2023	9,600	31,680	617,760	2.86	1,768,249	5.179E-03	3,199	2.769E-04	171	7.961E-04	492	0.39%
2024	9,600	31,680	617,760	2.82	1,744,463	5.217E-03	3,223	2.782E-04	172	8.171E-04	505	0.38%
2025	9,600	31,680	617,760	2.78	1,718,370	5.238E-03	3,236	2.791E-04	172	8.360E-04	516	0.38%
2026	9,600	31,680	617,760	2.74	1,690,658	5.238E-03	3,236	2.795E-04	173	8.509E-04	526	0.37%
2027	9,600	31,680	617,760	2.68	1,658,596	5.211E-03	3,219	2.795E-04	173	8.607E-04	532	0.36%
2028	9,600	31,680	617,760	2.63	1,625,736	5.173E-03	3,196	2.793E-04	173	8.676E-04	536	0.35%
2029	9,600	31,680	617,760	2.58	1,593,302	5.122E-03	3,164	2.787E-04	172	8.711E-04	538	0.35%

Remarks: <sup>α</sup> - Truckload assumes 3.3 truckloads per carload

<sup>β</sup> - Assumes one fully laden truck traveling from BNSF Yard/10th Ave Marine terminal to outbound Otay Mesa commercial POE (~19.5 miles)

<sup>Δ</sup> - (pollutant total exhaust) / (VMT) from EMFAC2017 for T7-Tractor vehicle class for that fleet year

APPENDIX E – Construction Photos



**Photo 1 – Grading Operations in Progress (March 2015)**



**Photo 2 – Track Ballast Installation in Progress**



**Photo 3 – Crossover Installation in Progress (February 2015)**



**Photo 4 – Crossover Construction in Progress**



**Photo 5 – Retaining Wall Construction in Progress**