




Memorandum

January 26, 2021

To: Ava Langston-Kenney, Saint Paul Port Authority Ref. No.: 11217890

From:  Eric Tripi, GHD
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**Subject: Railroad Crossing Analysis
Southport River Terminal**

1. Introduction

At the request of the Saint Paul Port Authority, GHD Services Inc. (GHD) has prepared this memorandum to provide an assessment of vehicle traffic blockages associated with the at-grade railroad crossing on Barge Channel Road within the Southport River Terminal (Terminal).

2. Background

Vehicle access within the Terminal is provided by Barge Channel Road, a 0.75-mile long, two-lane, public roadway owned and maintained by the City of Saint Paul. Railroad access within the Terminal is provided by a set of dual tracks operated by the Union Pacific Railroad. The railroad tracks run roughly northbound and southbound and intersect with Barge Channel Road at an at-grade railroad crossing located near the Terminal entrance/exit, approximately 215 feet east of Concord Street. The railroad crossing is equipped with crossing arms and signals. The location of the at-grade crossing is shown on Figure 1, below.



Figure 1 Location of At-Grade Railroad Crossing on Barge Channel Road

During freight train movements, the at-grade railroad crossing on Barge Channel Road blocks all vehicle traffic from entering/exiting the Terminal. These temporary blockages have the potential to increase response time for emergencies within the Terminal. The blockages also impact traffic flow near the Terminal entrance/exit. Traffic backups east of the at-grade railroad crossing can block individual business entrances within the Terminal and backups west of the railroad crossing can force vehicle traffic to queue onto Minnesota Highway MN-156/Concord Street, creating congestion at the intersection.

3. Data Collection

In order to assess the frequency and duration of vehicle traffic blockages associated with the at-grade railroad crossing on Barge Channel Road, 24-hour bi-directional railroad crossing data was collected over a 5-day study period (August 31, 2020 through September 4, 2020). The railroad crossing data was collected as part of a larger traffic study completed for Barge Channel Road (GHD, November 2020).

The following railroad crossing data was collected for every crossing arm actuation cycle (arms lowered to arms raised) that occurred over the study period:

- Date/Time of Crossing Arm Actuation (Lowered)
- Date/Time of Freight Train Arrival
- Direction of Travel (Northbound/Southbound)
- Date/Time of Freight Train Departure
- Date/Time of Crossing Arms Actuation (Raised)

The railroad crossing data sheets from the traffic count report are provided in Attachment A.



4. Data Analysis

GHD analyzed the railroad crossing data to assess the frequency and duration of freight train crossings observed during the study period. GHD's assessment of the freight train crossings is summarized in Table 1 below.

Table 1 Frequency and Duration of Freight Train Crossings (8/31/2020 – 9/4/2020)

Day	Number of Train Crossings	Duration of Each Train Crossing			Start Time of the Longest Train Crossing	Timeframe of Each Train Crossing > 10 Minutes		
		<5 Minutes	5-10 Minutes	>10 Minutes		12 AM - 10 AM	10 AM - 3 PM	3 PM - 12 AM
8/31/2020	10	4	4	2	10:38 PM	1	-	1
9/1/2020	8	1	5	2	5:16 PM	-	-	2
9/2/2020	5	1	4	-	11:47 PM	-	-	-
9/3/2020	10	-	6	4	7:43 PM	1	-	3
9/4/2020	8	2	5	1	11:12 PM	-	-	1
Total	41	8	24	9	-	2	-	7

Actual vehicle traffic blockages associated with the at-grade railroad crossing on Barge Channel Road include the total length of the crossing arm actuation cycles (arms lowered to arms raised) that occur with each freight train crossing (or that may occur with no associated freight train crossing). Therefore, GHD also assessed the frequency and duration of all crossing arm actuation cycles observed during the study period. GHD's assessment of the crossing arm actuation cycles is provided in Table 2, below.

Table 2 Frequency and Duration of Crossing Arm Actuation Cycles (8/31/2020 – 9/4/2020)

Day	Number of Crossing Arm Actuation Cycles ¹	Duration of the Crossing Arm Actuation Cycles (Total Blockage Time)			Timeframe of Each Crossing Arm Actuation Cycle		
		Minimum	Average	Maximum	12 AM - 10 AM	10 AM - 3 PM	3 PM - 12 AM
8/31/2020	16	0m 38s	3m 57s	11m 51s	5	1	10
9/1/2020	13	0m 25s	5m 47s	14m 56s	3	1	9
9/2/2020	8	0m 31s	4m 30s	8m 22s	2	2	4
9/3/2020	15	0m 16s	6m 31s	18m 20s	7	1	7
9/4/2020	12	0m 37s	4m 46s	16m 49s	3	2	7
Total	64	0m 16s	5m 9s	18m 20s	20	7	37

¹ Actuation Cycle = Crossing Arms Lowered to Crossing Arms Raised



5. Findings

Based on the data collected, GHD identified the following general findings from the study period:

- Crossing arm blockages occurred on average 13 times per day and the average blockage duration was 5m 20s.
- Blockages associated with freight train crossings occurred on average 8 times per day and the average blockage duration was 7m 37s.
- Blockages with no associated freight train crossing (e.g., engine-only, hi-rail trucks, no movement on track) occurred on average 5 times per day and the average blockage duration was 0m 44s.
- 89% of crossing arm blockages occurred between 3 PM and 10 AM (outside peak vehicle traffic hours); during peak vehicle traffic hours (10 AM to 3 PM), the average crossing arm blockage duration was 4m 13s.
- 80% of all freight train blockages lasted longer than 5 minutes and 22% lasted longer than 10 minutes; the maximum freight train blockage duration was approximately 18m 20s.
- 78% of the blockages lasting longer than 10 minutes were associated with freight trains traveling southbound.

Attachment A
Railroad Crossing Data Sheets
(8/31/2020 – 9/4/2020)

Date	Arms Down	Train Arrival	Train Departure	Time to Clear	Direction Traveled	Arms Up	Notes
31-Aug	12:50:10 AM	N/A	N/A	N/A	N/A	12:51:10 AM	No crossing
31-Aug	1:13:48 AM	1:14:12 AM	1:16:26 AM	0:02:14	Southbound	1:16:38 AM	
31-Aug	1:37:00 AM	N/A	N/A	N/A	N/A	1:37:58 AM	No crossing
31-Aug	4:26:45 AM	4:27:09 AM	4:31:34 AM	0:04:25	Northbound	4:31:49 AM	
31-Aug	7:21:40 AM	7:21:50 AM	7:31:22 AM	0:09:32	Southbound	7:32:17 AM	
31-Aug	8:26:29 AM	8:26:54 AM	8:31:55 AM	0:05:01	Northbound	8:32:15 AM	
31-Aug	5:56:21 PM	5:56:49 PM	6:00:15 PM	0:03:26	Southbound	6:01:26 PM	
31-Aug	8:25:22 PM	8:25:26 PM	8:29:00 PM	0:03:34	Southbound	8:29:15 PM	
31-Aug	8:31:37 PM	8:31:59 PM	8:32:38 PM	0:00:39	Northbound	8:32:41 PM	
31-Aug	8:45:59 PM	8:46:04 PM	8:46:36 PM	0:00:32	Southbound	8:46:47 PM	2 connected engines only
31-Aug	8:49:16 PM	8:49:28 PM	8:50:00 PM	0:00:32	Northbound	8:50:06 PM	2 connected engines only
31-Aug	9:49:17 PM	9:49:30 PM	9:56:52 PM	0:07:22	Southbound	9:57:09 PM	
31-Aug	10:38:29 PM	10:38:45 PM	10:50:05 PM	0:11:20	Southbound	10:50:20 PM	
31-Aug	10:59:51 PM	11:00:25 PM	11:03:44 PM	0:03:19	Northbound	11:04:00 PM	
31-Aug	11:52:36 PM	11:52:56 PM	11:53:05 PM	0:00:09	Southbound	11:53:24 PM	Engine only
31-Aug	11:56:01 PM	N/A	N/A	N/A	N/A	11:56:39 PM	No crossing
1-Sep	1:00:59 AM	1:01:29 AM	1:09:38 AM	0:08:09	Northbound	1:09:56 AM	
1-Sep	8:44:27 AM	8:45:02 AM	8:45:05 AM	0:00:03	Northbound	8:45:27 AM	Non-train equipment crossing
1-Sep	8:45:33 AM	8:45:51 AM	8:45:55 AM	0:00:04	Northbound	8:45:58 AM	Non-train equipment crossing
1-Sep	10:00:46 AM	10:01:15 AM	10:06:55 AM	0:05:40	Northbound	10:07:05 AM	
1-Sep	3:35:07 PM	3:35:30 PM	3:35:48 PM	0:00:18	Northbound	3:36:00 PM	2 connected engines only
1-Sep	4:58:39 PM	4:58:55 PM	5:11:53 PM	0:12:58	Northbound	5:12:09 PM	
1-Sep	5:14:01 PM	N/A	N/A	N/A	N/A	5:14:33 PM	No crossing
1-Sep	5:16:17 PM	5:16:41 PM	5:30:55 PM	0:14:14	Southbound	5:31:13 PM	
1-Sep	5:38:18 PM	5:38:52 PM	5:39:52 PM	0:01:00	Northbound	5:40:44 PM	
1-Sep	6:10:02 PM	6:10:29 PM	6:18:26 PM	0:07:57	Southbound	6:18:44 PM	
1-Sep	7:29:58 PM	7:30:22 PM	7:30:32 PM	0:00:10	Southbound	7:30:48 PM	Engine only
1-Sep	8:54:16 PM	8:54:40 PM	9:02:34 PM	0:07:54	Southbound	9:02:52 PM	
1-Sep	9:17:36 PM	9:18:05 PM	9:25:38 PM	0:07:33	Northbound	9:25:27 PM	
2-Sep	1:17:27 AM	1:17:55 AM	1:23:56 AM	0:06:01	Northbound	1:24:15 AM	
2-Sep	2:52:21 AM	2:52:43 AM	2:56:38 AM	0:03:55	Northbound	2:56:54 AM	
2-Sep	1:26:20 PM	N/A	N/A	N/A	N/A	1:26:51 PM	No crossing
2-Sep	1:27:10 PM	N/A	N/A	N/A	N/A	1:27:42 PM	No crossing
2-Sep	7:54:43 PM	7:55:15 PM	8:01:38 PM	0:06:23	Southbound	8:01:58 PM	

Date	Arms Down	Train Arrival	Train Departure	Time to Clear	Direction Traveled	Arms Up	Notes
2-Sep	8:43:42 PM	8:44:11 PM	8:44:21 PM	0:00:10	Southbound	8:44:37 PM	Engine only
2-Sep	11:04:48 PM	11:05:16 PM	11:11:34 PM	0:06:18	Northbound	11:11:52 PM	
2-Sep	11:47:09 PM	11:48:13 PM	11:55:12 PM	0:06:59	Northbound	11:55:31 PM	
3-Sep	11:59:37 PM	11:59:55 PM	12:05:19 AM	0:05:24	Northbound	12:06:18 AM	Starts 2-Sep
3-Sep	1:56:38 AM	N/A	N/A	N/A	N/A	1:57:22 AM	No crossing
3-Sep	2:25:21 AM	2:25:52 AM	2:38:46 AM	0:12:54	Southbound	2:39:24 AM	
3-Sep	6:44:52 AM	N/A	N/A	N/A	N/A	6:45:43 AM	No crossing
3-Sep	8:05:36 AM	8:05:56 AM	8:11:37 AM	0:05:41	Northbound	8:11:55 AM	
3-Sep	8:17:01 AM	8:17:25 AM	8:21:30 AM	0:04:05	Northbound	8:22:18 AM	
3-Sep	9:49:01 AM	9:49:31 AM	9:49:37 AM	0:00:06	Southbound	9:49:52 AM	Non-train equipment crossing
3-Sep	9:50:15 AM	9:50:20 AM	9:50:26 AM	0:00:06	Southbound	9:50:31 AM	Non-train equipment crossing
3-Sep	2:36:26 PM	2:36:56 PM	2:42:28 PM	0:05:32	Northbound	2:42:43 PM	
3-Sep	5:17:23 PM	N/A	N/A	N/A	N/A	5:18:12 PM	No crossing
3-Sep	7:43:24 PM	7:43:56 PM	8:01:24 PM	0:17:28	Southbound	8:01:44 PM	
3-Sep	8:12:06 PM	8:12:34 PM	8:18:38 PM	0:06:04	Northbound	8:18:55 PM	
3-Sep	9:16:54 PM	9:17:24 PM	9:30:19 PM	0:12:55	Southbound	9:31:20 PM	
3-Sep	9:40:12 PM	9:40:33 PM	9:45:12 PM	0:04:39	Northbound	9:45:33 PM	
3-Sep	11:23:15 PM	11:23:42 PM	11:33:34 PM	0:09:52	Southbound	11:33:52 PM	
4-Sep	3:57:02 PM	3:57:30 PM	4:01:48 PM	0:04:18	Northbound	4:02:05 PM	
4-Sep	5:17:13 AM	N/A	N/A	N/A	N/A	5:17:56 AM	No crossing
4-Sep	7:40:26 AM	7:40:47 AM	7:45:02 AM	0:04:15	Northbound	7:46:19 AM	
4-Sep	8:48:31 AM	8:48:48 AM	8:48:55 AM	0:00:07	Northbound	8:49:12 AM	Engine only
4-Sep	10:06:47 AM	10:07:03 AM	10:15:39 AM	0:08:36	Northbound	10:15:59 AM	
4-Sep	11:28:42 AM	11:29:21 AM	11:34:05 AM	0:04:44	Southbound	11:34:22 AM	
4-Sep	5:15:28 PM	5:15:58 PM	5:17:02 PM	0:01:04	Northbound	5:17:20 PM	
4-Sep	5:25:10 PM	N/A	N/A	N/A	N/A	5:25:51 PM	No crossing
4-Sep	5:27:15 PM	5:27:38 PM	5:28:30 PM	0:00:52	Northbound	5:28:50 PM	Reverses and leaves going SB
4-Sep	6:07:21 PM	6:08:02 PM	6:15:30 PM	0:07:28	Southbound	6:15:50 PM	
4-Sep	8:13:54 PM	N/A	N/A	N/A	N/A	8:14:31 PM	No crossing
4-Sep	11:12:32 PM	11:13:09 PM	11:29:04 PM	0:15:55	Northbound	11:29:21 PM	