Pembina-Emerson Port of Entry Transportation Study

NDDOT
North Dakota Department of Transportation

North Dakota
Department of Transportation

Transport Canada
Transports Canada

Manitoba
Manitoba Infrastructure and Transportation

Phase 1: Conceptual Planning

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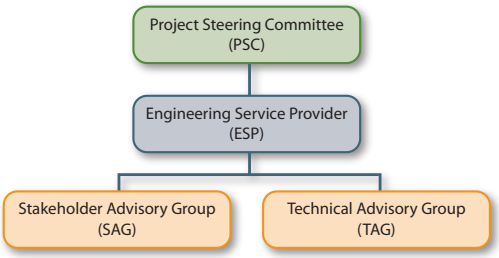
S.1 Study Purpose

This study is phase 1 (conceptual planning) of the Pembina-Emerson Port of Entry (POE) Transportation Study. The phase 1 study was jointly funded by Transport Canada (under the Gateways and Border Crossing Fund-GBCF), Manitoba Infrastructure and Transportation (MIT) and the North Dakota Department of Transportation (NDDOT). The study partnership also included regional level participation on the project steering committee (PSC) by the General Services Administration (GSA), Customs and Border Protection (CBP) and the Canada Border Services Agency (CBSA). The study included the participation of numerous functional specialists from PSC agencies as part of a Technical Advisory Group (TAG) and over 40 stakeholders from Canada and the United States that comprised the Stakeholder Advisory Group (SAG). The consulting firm of Gannett Fleming was retained to assist the PSC undertake this initiative and prepare the study documentation. Exhibit S.1 illustrates the project governance model and Appendix A provides a detailed membership list for each of the study team groups.

The basic objective of the phase 1 conceptual planning study was to conduct a comprehensive assessment of the Pembina-Emerson POE and to prepare a long range concept plan for the port that would address traffic demand and operational requirements of the POE up to the planning horizon year 2035. The concept plan is intended to facilitate coordinated border facility and transportation infrastructure improvements by various agencies to the year 2035 within the context of bi-national, national, state and provincial frameworks. This concept plan would also provide guidance to local municipalities for land use decisions in the vicinity of the Pembina-Emerson POE.

Exhibit S.1 – *Project Governance*



S.2 Plan Context

The Pembina-Emerson POE is an international border crossing between Canada and the United States of America located 115 km (70 miles) south of Winnipeg, MB and 130 km (80 miles) north of Grand Forks, ND (exhibit S.2). Since 2006, nearly 1 million bi-directional vehicles have been processed through the POE on an annual basis. The southbound (SB) and northbound (NB) traffic splits are relatively equal and the auto-truck traffic split is approximately 60-40. Total bi-directional traffic processed through the POE is expected to double and exceed 2 million vehicles by the year 2035. These projected volumes are also expected to retain the same 50-50 directional and 60-40 auto-truck vehicle split characteristics (exhibits S.3& S.4). Since 2006, the Pembina-Emerson POE has been the fifth busiest land POE along the Canada-U.S. border in terms of two-way truck-based trade. In 2011, the Pembina-Emerson POE processed nearly $17 billion in two-way truck based trade. This figure is anticipated to grow to $27.5 billion in annual truck-based trade by the year 2035 (exhibits S.5 & S.6).

The current port facilities were constructed in 1997 (CBP) and 1999 (CBSA) with little or no inter-agency or bi-national coordination. Land use decisions regarding the location of developments in the vicinity of the POE or on leased POE lands (specifically duty free operations) have also contributed to some functional and operational problems currently being experienced at the POE. These problems have been amplified by the traffic increases that have occurred at the POE since the current port facilities were reconstructed in the late 1990s. Additionally, the terrorist events of September 11, 2001 resulted in the subsequent introduction of new POE technologies and inspection protocols, further exacerbating some functional and operational issues. Furthermore, the economic development goals and trade posture for both Canada and the United States are at risk when POEs are incapable of managing anticipated facility demands in a safe, secure, efficient and reliable manner to promote broad trade and economic development goals. These issues have most recently been addressed on a strategic bi-national policy level through the Beyond the Border declaration released by Prime Minister Harper and President Obama on February 4, 2011. The Beyond the Border declaration and subsequent Action Plan (released December 7, 2011) articulate a shared vision of perimeter security and economic competitiveness.

Exhibit S.2 – *Pembina-Emerson POE: Regional Context*

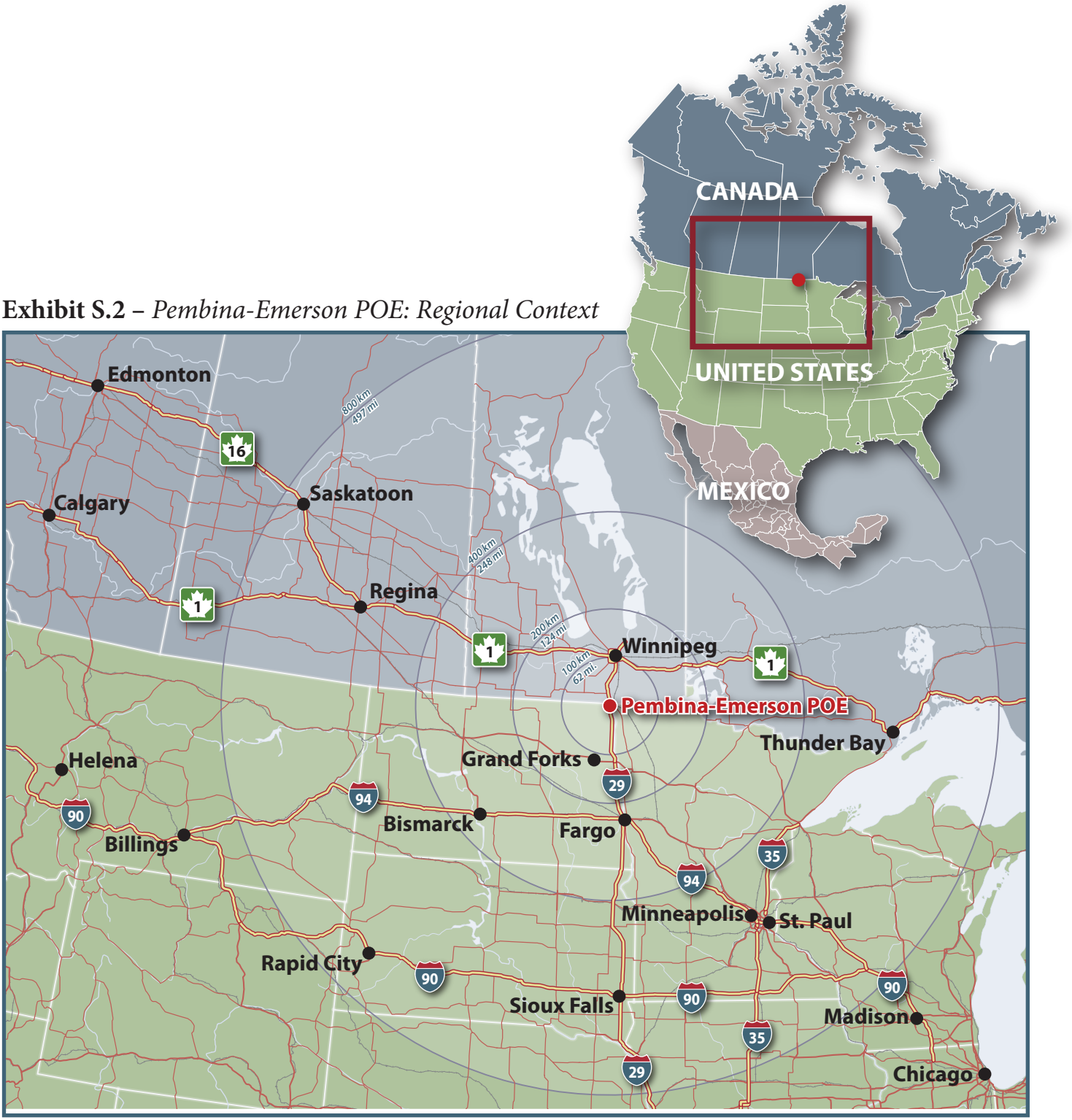
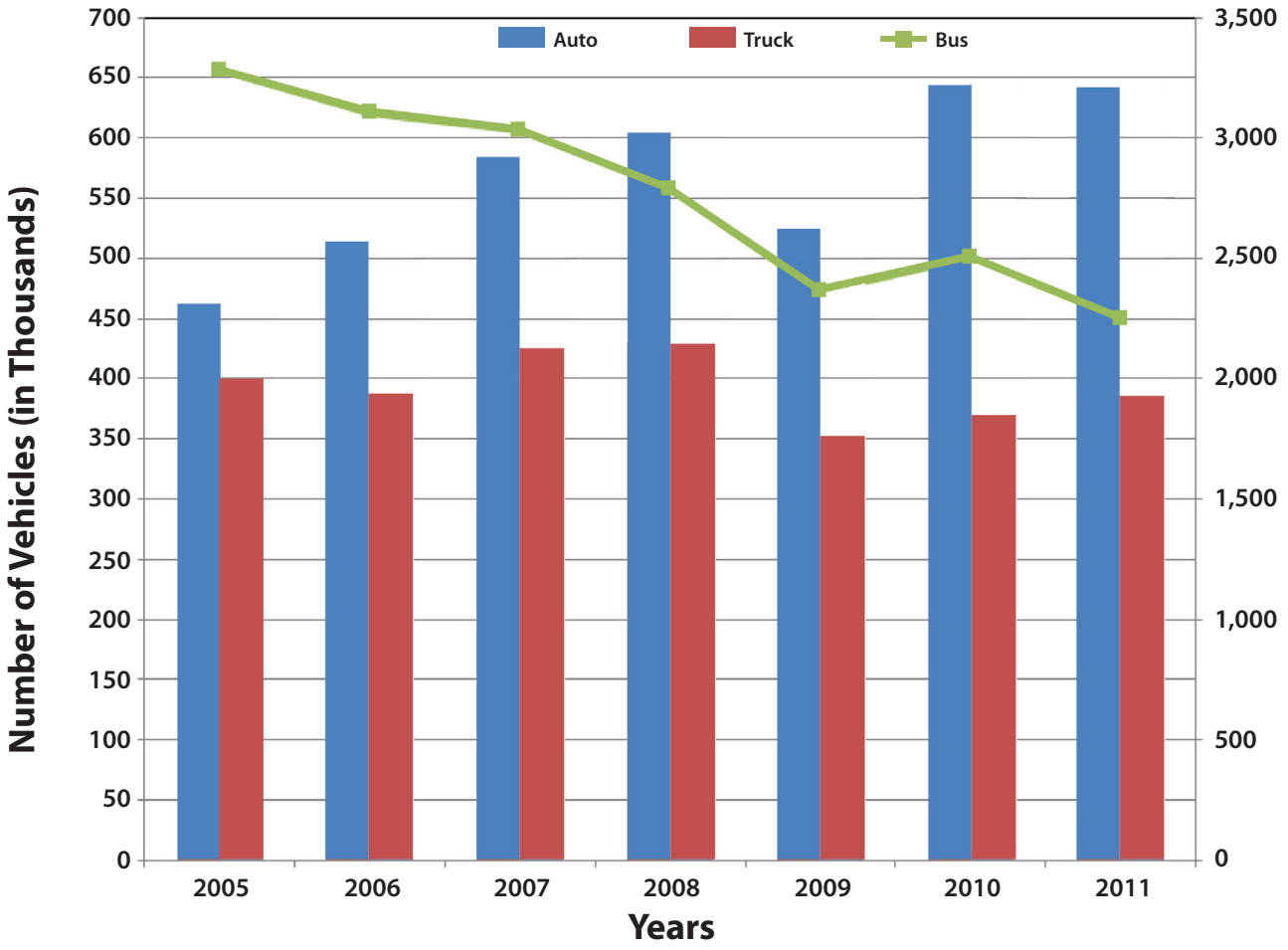
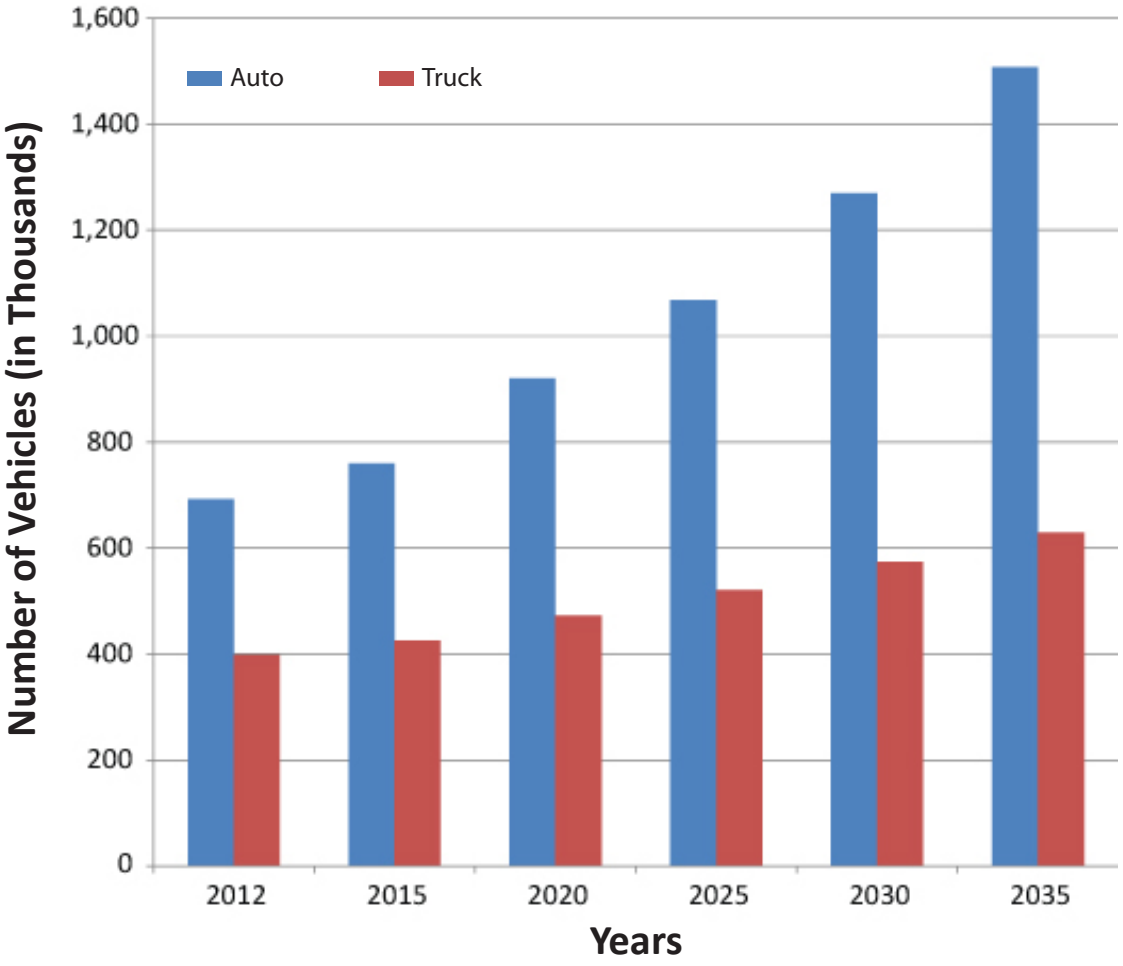


Exhibit S.3 – *Bi-Directional Annual Traffic (2005-2011)*



Traffic Type	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
Southbound							
Autos	235,011	276,415	308,031	324,458	265,210	326,445	317,750
Trucks	198,843	200,541	228,455	224,512	189,393	202,438	208,509
Buses	1,744	1,624	1,593	1,481	1,280	1,357	1,095
Total SB Traffic	***435,598***	***478,580***	***538,079***	***550,451***	***455,883***	***530,240***	***527,354***
Northbound							
Autos	228,091	236,993	276,027	280,429	259,747	318,769	324,578
Trucks	199,642	187,007	197,516	205,525	162,738	167,771	177,216
Buses	1,537	1,480	1,439	1,306	1,082	1,146	1,155
Total NB Traffic	***429,270***	***425,480***	***474,982***	***487,260***	***423,567***	***487,686***	***502,949***
Bi-Directional							
Autos	463,102	513,408	584,058	604,887	524,957	645,214	642,328
Trucks	398,485	387,548	425,971	430,037	352,131	370,209	385,725
Buses	3,281	3,104	3,032	2,787	2,362	2,503	2,250
Total Traffic	***864,868***	***904,060***	***1,013,061***	***1,037,711***	***879,450***	***1,017,926***	***1,030,303***

Exhibit S.4 - *Bi-Directional Traffic Forecast (2012-2035)*



Traffic Type	*2012 Total Volume*	*2015 Total Volume*	*2020 Total Volume*	*2025 Total Volume*	*2030 Total Volume*	*2035 Total Volume*
Southbound						
Autos	356,684	390,907	470,513	546,619	646,746	774,602
Trucks	218,213	232,271	255,983	278,725	301,167	324,068
Total Traffic	574,897	623,178	726,496	825,344	947,913	1,098,670
Growth from Preceding Column in Table:		8.4%	16.6%	13.6%	14.9%	15.9%
Northbound						
Autos	335,564	368,291	449,904	520,985	622,201	733,445
Trucks	179,348	193,088	216,990	242,513	272,297	305,167
Total Traffic	514,912	561,379	666,894	763,498	894,498	1,038,612
Growth from Preceding Column in Table:		9.0%	18.8%	14.5%	17.2%	16.1%
Bi-Directional						
Autos	692,248	759,198	920,417	1,067,604	1,268,947	1,508,047
Trucks	397,561	425,359	472,973	521,238	573,464	629,235
Total Traffic	1,089,809	1,184,557	1,393,390	1,588,842	1,842,411	2,137,282
Growth from Preceding Column in Table:		8.7%	17.6%	14.0%	16.0%	16.0%

Exhibit S.5 - *Top 6 Canada-US POEs (Truck Trade in $ Billions)*

Rank	U.S.	Canada	2006	2007	2008	2009	2010	2011
1	Detroit, MI	Windsor, ON	$115.1	$114.4	$101.2	$72.5	$91.7	$98.7
2	Buffalo, NY	Fort Erie, ON	$58.9	$62.3	$59.0	$47.8	$56.2	$62.2
3	Port Huron, MI	Sarnia, ON	$37.5	$40.4	$44.4	$35.2	$42.7	$47.8
4	Champlain, VT	Lacolle, QB	$16.5	$17.8	$19.1	$16.1	$18.4	$21.0
5	**Pembina, ND**	**Emerson, MB**	**$13.7**	**$14.4**	**$16.0**	**$12.8**	**$14.3**	**$16.9**
6	Blaine, WA	Surrey, BC	$13.6	$14.7	$15.2	$12.3	$13.9	$15.5

Source: BTS-RITA

Exhibit S.6 - *Pembina-Emerson POE Trade Data*

	Historical (2005-2011)							
	2005	2006	2007	2008	2009	2010	2011	% Growth 2005-2011
Bi-Directional Annual Truck Traffic	398,485	387,548	425,971	430,037	352,131	370,209	385,725	(0.1)
Bi-Directional Annual Trade Value	$12.0	$13.7	$14.4	$16.0	$12.8	$14.3	$16.9	40.8
Bi-Directional Annual Metric Tonnes	-	5,225,833	5,575,125	5,854,507	5,680,776	5,791,735	5,930,954	13.5

Note: *Annual Trade Value in current year USD, billions.*

	Forecast (2012-2035)						
	2012	2015	2020	2025	2030	2035	% Growth 2012-2035
Bi-Directional Annual Truck Traffic	397,561	425,359	472,978	521,238	573,464	629,235	58.3
Bi-Directional Annual Trade Value	$17.6	$19.1	$20.9	$22.9	$25.1	$27.5	56.3
Bi-Directional Annual Metric Tonnes	6,066,018	6,545,831	7,421,661	8,292,085	9,155,132	10,108,006	66.6

Note: *Annual Trade Value in 2011 constant USD, billions*

S.3 Bi-National Policy Context

The Pembina-Emerson POE is a key surface mode transportation asset that supports the economic development goals and trade posture of Canada and the United States as well as the Province of Manitoba and the State of North Dakota. The significance of the Pembina-Emerson POE is reflected in the bi-national (Beyond the Border) and national policy context of both Canada and the United States. The bi-national importance of the Pembina-Emerson POE is reflected in references contained in both the Beyond the Border Action Plan and the 5-year Border Infrastructure Investment Plan.

Within the Canadian policy context the primary frameworks are the National Highway System (NHS) and the National Policy Framework of Strategic Gateways and Trade Corridors as well as current funding mechanisms such as the Building Canada Fund (BCF). At the provincial level the key policy elements are the Strategic Highway System (SHS) and Manitoba International Gateway Strategy (MIGS).

Within the American context the primary policy framework also includes a NHS component (which includes the interstate system of highways) and a system of congressionally mandated high priority corridors. Major funding for the surface transportation programs will come from the recently approved "Moving Ahead for Progress in the 21st Century Act" or MAP-21. At the state level, NDDOT has adopted TransAction III (October 2012) which provides strategic direction for maintaining and developing a safe, secure and efficient transportation system.

S.4 Study Process

In developing a conceptual plan for the Pembina-Emerson POE the following generalized study process was followed:

- Issue and problem identification
- Background data gathering and analysis
- Opportunities and constraints analysis
- Traffic operations and safety analysis
- Demand forecasting
- Requirements analysis
- Alternative development and evaluation

Three key study methodologies (demand forecasting, traffic operational analysis, and a Level of Service (LOS) framework) were integrated to identify the broad facility and infrastructure planning requirements as well as establish the trigger points for implementing improvements as embodied in the various alternatives. First, annual forecasts to 2035 for the key vehicle categories (autos, trucks) were converted to daily and hourly arrivals using custom algorithms to better assess peak demands on POE facilities and infrastructure. Hourly forecasts were utilized in the Syncho-SimTraffic simulation model to establish the 30th highest hour design for the key POE infrastructure components (i.e.: PIL booth requirements). Finally, an innovative Level of Service (LOS) framework was developed for custom plaza applications based on concepts from the Highway Capacity Manual (HCM) to provide sensitivity analysis regarding the phasing implications of proposed improvements.

S.5 Recommended Concept Plan for the Pembina-Emerson POE

A synthesis of all relevant study outputs to prepare conceptual alternatives was based on the following key planning principles:

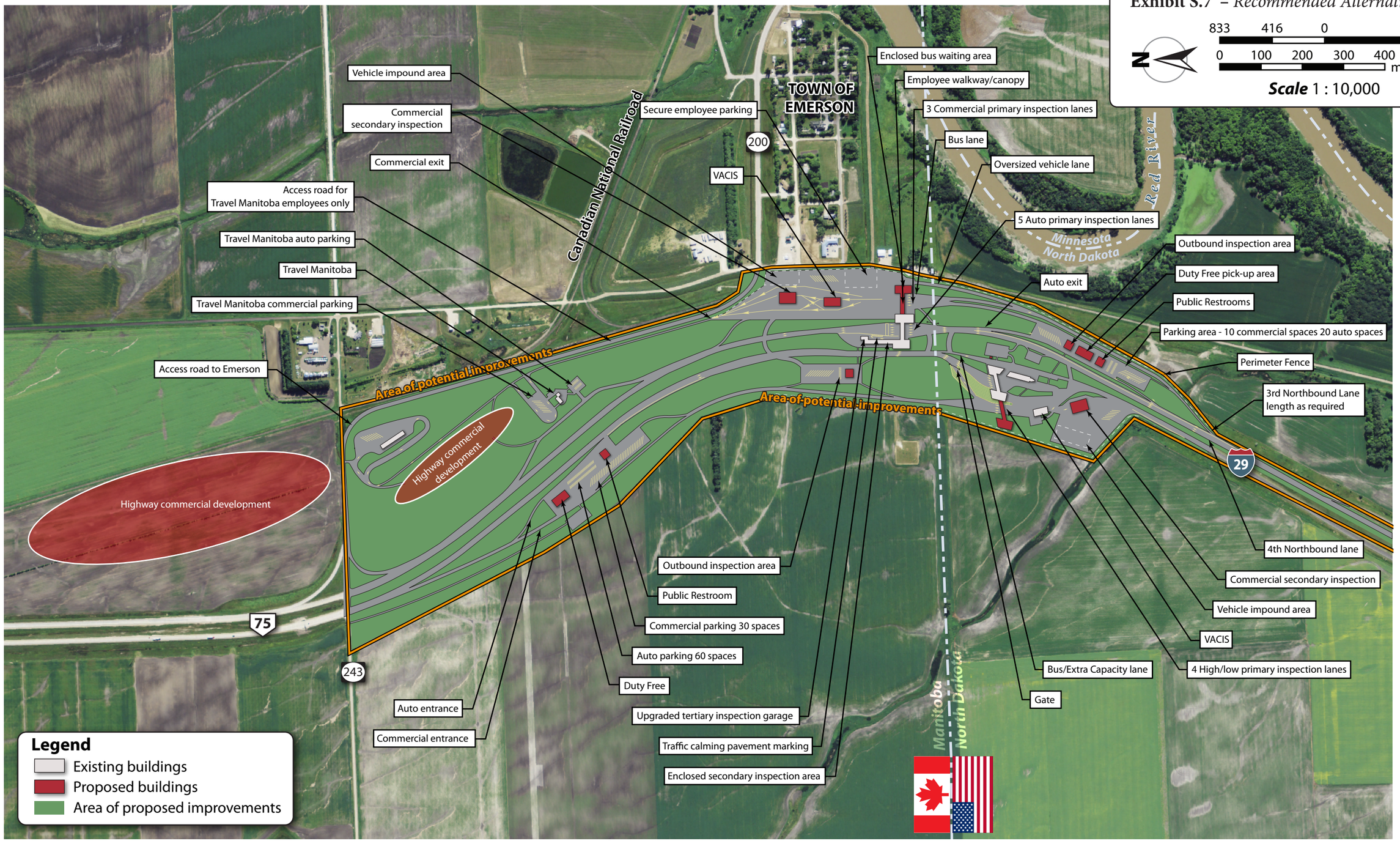
- Optimize use of existing border service facilities and transportation infrastructure investments.
- Implement hierarchical land assignment strategies and displace non-essential functions away from POE.
- Incorporate Transportation System Management (TSM) principles where practical.
- Reflect agency operational, funding and phasing considerations.
- User friendly and user safe regarding vehicular and non-vehicular movements.
- Cost effective solutions that are based on appropriate methodologies.
- Provide opportunities for private investment that do not compromise key POE functions.

Exhibit S.7 – *Recommended Alternative*

833 416 0 833 Feet

0 100 200 300 400 meters

Scale 1 : 10,000



The alternatives that were developed for the Pembina-Emerson POE addressed the demand for facility/infrastructure requirements based on vehicle forecasts to the year 2035. The over arching principle for preparing POE concepts was to utilize existing facilities and infrastructure to the fullest practical extent. POE facilities for CBP and CBSA were recently rebuilt and it was deemed that these facilities only required retrofitting to meet the 2035 planning requirements as proposed in the recommended concept. Existing highway infrastructure (PTH 75 southbound and I-29 northbound) would be utilized to deliver automobile traffic to the CBP and CBSA custom plazas, further reinforcing the incremental approach to meeting 2035 demand and facility infrastructure requirements.

New highway capacity would be provided by constructing two new dedicated commercial lanes for both southbound (SB) and northbound (NB) truck traffic (a FAST and non-FAST lane for each direction of travel) to eliminate a number of traffic operations issues arising from auto/truck conflicts when approaching the POE. Vehicle segregation also allows for more effective technology deployment to support trusted traveller/trader programs (NEXUS/FAST) as well as optimizing the capacity benefits from proposed infrastructure improvements. Furthermore, the development of new commercial lanes would create both southbound and northbound median areas to accommodate new duty free facilities, public washrooms and outbound inspection areas. A new northbound service road and a new Emerson access road were also required to complete the overall concept. The recommended alternative for the Pembina-Emerson POE is illustrated in exhibit S.7. The trigger points for implementing the recommended improvements are 2020 for the southbound elements and 2025 for the northbound elements.

The recommended alternative also provides preliminary guidance to municipalities and property owners regarding a number of land use issues adjacent to PTH 75 by identifying long-term port and transportation improvements required up to the year 2035.

S.6 Measures of Effectiveness (MOEs)

A broad range of MOEs as outlined below were developed to evaluate the conceptual alternatives:

- Safety issues
- Costs and benefits
- Measures of delay
- Fuel consumption and vehicle emissions
- Improved efficiency and operational considerations
- Land use and environmental considerations
- Business case implications
- Ease of implementation
- Stakeholder acceptance

Exhibit S.9 summarizes MOE outputs for the recommended long-term concept related to delay, emissions, fuel consumption and costs. Two of these MOEs (measures of delay and benefits-costs) require brief elaborations.

Exhibit S.8 - *Measures of Effectiveness for Recommended Concept*

Year	*Existing (2012)*		*No Build (2035)*		*Full Build-Out (2035)*	
Criteria	*Southbound*	*Northbound*	*Southbound*	*Northbound*	*Southbound*	*Northbound*
Delay (Freq./Mag.)	171 > 20 min 39 > 60 min	541 > 20 min 103 > 60 min	1,682 > 20 min 233 > 60 min	2,957 > 20 min 338 > 60 min	45 > 20 min 0 > 60 min	66 > 20 min 0 > 60 min
Fuel Consumption	39 gal/hr 147 litres/hr	24 gal/hr 91 litres/hr	215 gal/hr 814 litres/hr	178 gal/hr 674 litres/hr	87 gal/hr 330 litres/hr	86 gal/hr 326 litres/hr
Vehicle Emissions	5,150g (CO) 616 g (NO_x)	2,948g (CO) 420g (NO_x)	23,336g (CO) 3,447g (NO_x)	21,243g (CO) 3,611g (NO_x)	12,662g (CO) 1,358g (NO_x)	10,998g (CO) 1,195g (NO_x)
Benefits (2012 dollars)					$356 million	$222 million

S.6.1 Measures of Delay

Delay was evaluated for vehicle types and also for day, date and time of day. Measures of delay were evaluated on the basis of frequency (number of occurrences), magnitude (delay to individual vehicles) and duration (length of delay period for vehicle queues). A good measure to illustrate the effectiveness of the recommended concept is to assess the number of 20 minute delay periods expected by the year 2035 under the no-build and full build-out scenarios for the recommended alternative. Exhibit S.9 illustrates the frequency of 20 minute delay periods for both southbound and northbound directions. In 2012, 20 minute delay periods were estimated at 171 (southbound) and 541 (northbound). With no improvements, the number of 20 minute delay periods in 2035 will increase to 1,682 (southbound) and 2,957 (northbound). With full build-out of the recommended alternative, the number of delay periods in 2035 will decrease to 45 (southbound) and 66 (northbound). Projected 20 minute delay periods in 2035 with full build-out are significantly below 2012 levels, even with a doubling of traffic. This MOE illustrates how much more efficiently the POE will function by just adding dedicated commercial lanes and by segregating auto/truck traffic streams.

S.6.2 Costs and Benefits

Synchro-SimTraffic was used to calculate benefits and costs associated with the recommended alternative. A discount rate of 6% was used to provide sensitivity analysis to calculate project benefits. The benefits in terms of quantifiable savings related to delay and congestion measures in 2012 current year dollars are estimated to be $356 million (southbound) and $222 million (northbound). Combined benefits are estimated to be $488M and do not reflect an aggregation of directional benefits due to economic rules associated with calculating net present value. Total cost to implement the recommended concept in 2012 current year dollars is $62 million. The benefit-cost ratio is estimated to be 9.4:1.

S.7 Next Steps

This Executive Summary provides a brief overview of the study context and process as well as the recommended alternative for improving CBP and CBSA facilities and transportation infrastructure at the Pembina-Emerson POE to meet forecasted vehicle demand up to the year 2035. The final report detailing this conceptual plan for the P-E POE will be used by border service and transportation agencies as a basis for proceeding to the next stages in their respective project assessment and implementation processes. On a broad level, this planning study will be used by agencies to make informed decisions regarding the coordination of future port improvements. The PSC has taken steps to establish an ongoing Planning Coordination Committee (PCC) for the P-E POE to maintain ownership and stewardship of this process. The PCC will provide a formal mechanism for facilitating long-term liaison and coordination for projects, initiatives and issues that will likely emerge as proposed elements of the conceptual plan for the POE are given further detailed consideration. Part D of the final report contains a Terms of Reference for the PCC that was prepared by the PSC.