Sawyer International Airport Expansion Project

Rail Design

Design Team: Alex Lakenen PM, Aaron Townley, Chase Daavettila, Justin Daavettila

Advisors: David Nelson, PE . Pasi Lautala, PE. William Leder, PE.

Objective

Provide conceptual rail designs for a proposed transload facility involving two warehouses on Sawyer International Airport properties, connecting proposed industry track to the existing CN mainline.

Sawyer International Airport:

- **Located in Gwinn, Michigan: see Figure 1.**
- **Former Air Force base which opened to passenger service in 1999 with undeveloped land surrounding the airport.**
- **Largest Airport in the Upper Peninsula.**

Figure 1: Location of Sawyer International Airport in Michigan's Upper Peninsula

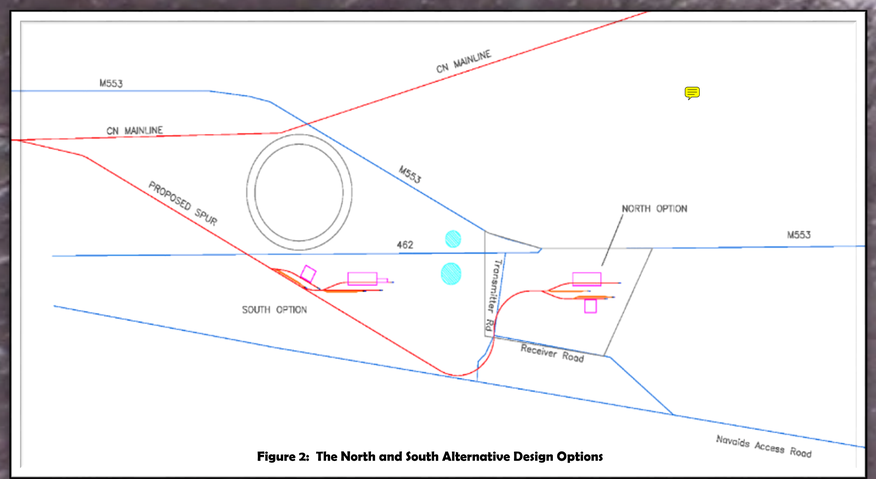

Figure 2: The North and South Alternative Design Options

Alternative Designs: refer to Figure 2 above

JCAA Consulting Engineers developed two preliminary alternative designs

North Alternative

- **Property is currently owned by Telkite Enterprises LLC which is open for development.**
- **Constrained by bordering properties which limits the area available for expansion.**
- **Much longer lead track which coincides with a more expensive project.**
- **Large S-curve to avoid depressions in the land creating feasibility issues.**

South Alternative

- **Property is owned by the airport and offers more acreage for future growth.**
- **Both warehouses are located West of the track, this is more convenient for transload operations.**
- **There is much less track needed and is a much more constructible option given the simple design.**

Ultimately, Sawyer International approved to move on with the South Alternative for the final design.

Phasing the Expansion

We have developed our design, incorporating three phases, for the potential client at Sawyer International. Each phase has its own operational demands, the client has the ability to determine the phase which fits their needs best. These phases are directly related to the increase in service of rail cars. Figure 3 breaks down the assumptions made for each phase.

Assumptions			
	Phase 1	Phase 2	Phase 3
Train Service	1 every 2 days	1 every 2 days	1 every 2 days
Cars per Train	12	22	32
Cars to Large Warehouse	7	14	21
Cars to Small Warehouse	3	6	9
Track Storage for x Cars	24	44	64
Truck-Loading Ramp	2	2	2
Car Length	67 feet	67 feet	67 feet
Warehouse Services			
Large Warehouse		**Small Warehouse**	
100,000 sf		40,000 sf	
Boxcars (10' 8" wide)		Boxcars (10' 8" wide)	
Contents: Paper, Food, Hardwood, Panel Wood		Contents: Paper, Food, Hardwood, Panel Wood	
Forklift to Load/Unload		Forklift to Load/Unload	
Boxcars (10' wide)		**Truck Transload Ramp**	
Contents: Paper, Food, Hardwood, Panel Wood		Boxcars: Bulk Materials	
Forklift to Load/Unload		Forklift to Load/Unload	

Figure 3: Assumptions for Each Design Phase and The Product

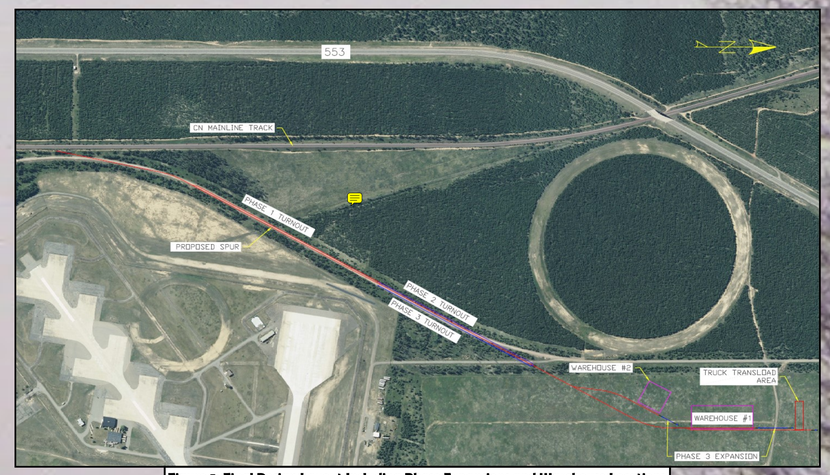

Figure 5: Final Design Layout Including Phase Expansions and Warehouse Locations

Final Design: refer to Figure 5 for the layout and Figure 6 for the estimated costs

- **We have developed our design for the projection of two different clients.**
- **The large warehouse (Warehouse #1) at 100,000sf has operations inside of the warehouse and offers client 1 plenty of extra room for storage.**
- **Depressed track in the large warehouse to optimize loading/unloading.**
- **The small warehouse (Warehouse #2) at 40,000sf allows client 2 to store materials and has its operations outside of the warehouse.**
- **The truck transload area allows for direct transload of bulk materials from boxcars to trucks or vise versa.**
- **This design can handle operations on services up to 96 cars per week (Phase 3). This maximum is reasonable considering the vast rural area.**

Phase 1:				
Item	Quantity	Unit	Unit Cost	Total
Rail Work				**$3,344,030.11**
Ballast	10,242.00	Ton	$27.00	$276,534.00
Subballast	9,305.78	Cu Yd	$40.00	$372,231.11
#6 Turnout	1	Each	$121,000.00	$121,000.00
#12 Turnout	4	Each	$145,000.00	$580,000.00
Wood Ties	4,543.00	Each	$95.00	$431,585.00
Steel Ties	693.00	Each	$140.00	$97,020.00
Rail	20,938.00	Feet	$70.00	$1,465,660.00
Misc.				**$621,225.00**
Bump Posts	3	EACH	$7,075.00	$21,225.00
Track Mobile	2	EACH	$300,000.00	$600,000.00
		Phase 1 Costs:	Construction Sub Total	$3,965,255.11
			Cont. 25%	$4,956,568.89

Phase 2:				
Item	Quantity	Unit	Unit Cost	Total
Rail Work				**$478,373.89**
Ballast	1,505.00	Ton	$27.00	$40,635.00
Subballast	1,262.22	Cu Yd	$40.00	$50,488.89
#6 Turnout	1	Each	$121,000.00	$121,000.00
#12 Turnout	0	Each	$145,000.00	$0.00
Wood Ties	710.00	Each	$95.00	$67,450.00
Steel Ties	0.00	Each	$140.00	$0.00
Rail	2,840.00	Feet	$70.00	$198,800.00
		Phase 2 Costs:	Construction Sub Total	$677,173.89
			Cont. 25%	$846,467.36

Phase 3:				
Item	Quantity	Unit	Unit Cost	Total
Rail Work				**$582,683.89**
Ballast	1,685.00	Ton	$27.00	$45,495.00
Subballast	1,622.22	Cu Yd	$40.00	$64,888.89
#6 Turnout	1	Each	$121,000.00	$121,000.00
#12 Turnout	0	Each	$145,000.00	$0.00
Wood Ties	710.00	Each	$95.00	$67,450.00
Steel Ties	202.50	Each	$140.00	$28,350.00
Rail	3,650.00	Feet	$70.00	$255,500.00
		Phase 3 Costs:	Construction Sub Total	$838,183.89
			Cont. 25%	$1,047,729.86
			Total Project Cost:	**$6,850,766.11**

Figure 6: Estimated Costs For Each Design Phase and The Total Project Cost