SOURCE SEPARATED ORGANICS TRANSFER STATION - FEASIBILITY STUDY

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Essex-Windsor Solid Waste Authority

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 BACKGROUND

The Essex-Windsor Solid Waste Authority (EWSWA) is a governmental agency responsible for providing an economic and environmentally conscious solid waste management program for the County of Essex (County) and the City of Windsor (City). The EWSWA provides service for the following municipalities:

- City of Windsor
- Municipality of Lakeshore
- Municipality of Leamington
- Town of Amherstburg
- Town of Essex
- Town of Kingsville
- Town of LaSalle
- Town of Tecumseh

The solid waste from parts of the City and County are currently conveyed to the Transfer Station Site No. 1 (the Site) located at 3560 North Service Road, Windsor, ON. This facility is situated on a 'mixed use' light industrial district property along with other City of Windsor assets including Environmental Services and Transit Windsor. This property is owned by the City of Windsor and the facility is operated by the EWSWA. The Site includes the following:

- Transfer Station No. 1;
- Scales – both attended and automated;
- Fibre Material Recovery Facility (MRF);
- Container MRF;
- Public Drop Off Depot;
- Household Chemical Waste Depot; and
- Leaf and Yard Waste pad.

In recent years, there has been increasing attention paid to managing the organic fraction in waste streams. The environmental benefits of diverting organic materials from landfills include reduced methane emissions (a potent greenhouse gas) and decreased leachate discharges, to name a few. On April 30th, 2018, the Food and Organic Waste Policy Statement came into effect under the Resource Recovery and Circular Economy Act (2016). The policy provides direction to municipalities, industrial, commercial, and institutional (ICI) establishments, and the waste management sector to increase waste reduction and resource recovery of food and organic waste. Further the policy sets out specific obligations and targets for the diversion of food and organic waste from various establishments or entities including municipalities. The Food and

Organic Waste Policy Statement and new Blue Box Regulation, O.Reg. 391/21 will have significant impact on the EWSWA and its municipalities' integrated waste management systems.

Requirements under the Policy Statement differ based on the municipality and include:

- The City of Windsor to
  - Achieve 70% waste reduction and resource recovery of food and organic waste generated by single-family dwellings in urban settlement areas by 2025; and
  - Provide curbside collection of food and organic waste to single-family dwellings in the urban settlement area within the municipality.
- Municipalities of Amherstburg, LaSalle, Leamington, and Tecumseh to
  - Achieve a target rate of 50% waste reduction and resource recovery of food and organic waste generated by single family dwellings in urban settlement areas by 2025; and
  - Provide collection of food and organic waste to single family dwellings in an urban settlement area (the required collection services can be provided either through provision of a public drop-off depot, community composting area or curbside collection).
- Municipalities of Essex, Kingsville, and Lakeshore, at this time, are not required to achieve target rates of reduction for food and organic waste, as their population and population densities do not meet the thresholds for inclusion in the relevant Framework policies.

The City and County Councils (including the County municipalities) have charged the EWSWA with the responsibility to manage a Regional Source Separated Organics (SSO) program including collection, transfer, and processing herein, the Green Bine Program, which is set to begin in late 2025. As a result of these upcoming program changes, the EWSWA must construct a new Source Separated Organics Transfer Station (TS-SSO) and is evaluating options for use of the Site in Windsor. The TS-SSO is to receive SSO where it would be consolidated, loaded for haul, and hauled off-site for processing. All tipping, consolidating, and loading of transfer vehicles would take place within the new TS-SSO.

The SSO which may potentially be accepted through this program include food scraps, food-soiled paper products, and other organic waste. This program may include pet waste (excluding kitty litter) as an acceptable material. The EWSWA intends to permit the use of compostable plastic bags as bin liners.

The EWSWA has projected the estimated amount of SSO it will collect from the eight local municipalities from 2025 to 2027. The mass of SSO accepted at the new TS-SSO is highly dependent on public participation in the Green Bin Program and the projections are based on a gradual roll-out of the program throughout Essex-Windsor. This TS-SSO will receive SSO from the City of Windsor, the Municipality of Lakeshore and the Town of Tecumseh. The intent for the Green Bin Program is to provide collection on a four day per week schedule. Upon the launch of the Green Bin Program, the City of Windsor's garbage collection program will be changed to a bi-weekly collection frequency. The Municipality of Lakeshore and Town of Tecumseh's garbage collection program will remain with a weekly collection frequency.

1.2 PURPOSE OF THIS REPORT

The purpose of this report is to evaluate the feasibility of implementing a new TS-SSO using existing infrastructure at the Site in Windsor. This study includes (i) review of background information; (ii) feasibility assessment of retrofitting the existing Fibre MRF to a TS-SSO; (iii) development of a conceptual design and drawings including conceptual operating procedure, TS-SSO layout, modification requirements, and implementation timeline; (iv) identification of TS-SSO permitting requirements or considerations; and (v) preliminary opinion of probable cost. The conceptual design outlined in this report is to effectively inform decision-making by the EWSWA Board and facilitate discussions with the Ministry of Environment, Conservation and Parks (MECP).

2.0 FEASIBILITY ASSESSMENT

2.1 PROJECTED MASS OF COLLECTED SOURCE SEPARATED ORGANIC WASTE

2.1.1 Projected Annual Mass

A Green Bin Program is anticipated to begin in the City of Windsor by the end of 2025 to align with the requirements of the Food and Organic Waste Policy Statement. Additional municipalities within the County of Essex are expected to join the program at various times between 2025 and 2027. SSO collected within the City and County will be conveyed to three separate facilities for transfer and/or processing: (1) Windsor Transfer Site, (2) Essex Regional Landfill, and (3) directly to the processing site. The 'Logistics and Transfer of Regional Solid Waste and Source Separated Organics: Review and Strategic Plan' (Strategic Plan) prepared for the EWSWA by EXP Services Inc. in May of 2023, included estimates of SSO to be collected from 2025 to 2032 and indicated that the TS-SSO should be designed to accommodate 12,000 tonnes of SSO per year.

2.1.2 Verification of Projected Annual Mass

To verify the design criteria and anticipated required capacity of the TS-SSO a review of historic waste delivered to the Windsor Transfer Station No. 1 was carried out. **Table 2.1** outlines the annual mass of residential solid waste received at the Windsor Transfer Station No. 1 from 2017 to 2022. The table shows the average residential solid waste delivered annually was 71,500 tonnes.

As outlined in the 'Technical Document on Municipal Solid Waste Organics Processing' (Environment Canda 2013), organic waste can make up to 40% of the total solid waste; however, the mass of SSO accepted in the future is highly dependent on public participation. It is considered conservative for the screening phase of this study to assume 20% of the total solid waste will be separated and recovered through this program.

Table 2.1: Historic Solid Waste Delivered at Windsor Transfer Station No. 1 from 2017 to 2022

Year	Historic Solid Waste (tonnes / yr)	Estimated Potential SSO (tonnes / year)
2017	69,500	13,900
2018	67,700	13,500
2019	68,900	13,800
2020	74,400	14,900
2021	75,400	15,100
2022	72,900	14,600
Average	**71,500**	**14,300**

Based on the historical data from the EWSWA, a peak of 15,100 and an average of 14,300 tonnes of SSO could be anticipated at the TS-SSO. This estimate is approximately 20 - 26 % higher that the long-term estimate developed through the Strategic Plan. To further verify the required capacity for the TS-SSO, a detailed evaluation of SSO Collection Programs in Ontario was carried out and is presented in **Table 2.2**. This table presents the launch date, collection schedule, population, estimated SSO collection mass, and generation rate for fourteen (14) municipalities throughout the province of Ontario. The launch date and collection schedule for garbage and recycling was collected from the official website of each respective municipality. The population data and annual population growth rate for each municipality was collected from Statistics Canada Census of Population for 2021. The approximate annual tonnage was collected from the Ontario Resource Productivity & Recovery Authority Datacall Reporting Network (2021)[1] or Municipal Annual Reports (2018)[2] where available. The SSO Generation Rate in tpy per capita was calculated as the Approximate Annual Tonnage (tpy) divided by the Population (capita).

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(1) RPRA. (2024, February 1). *2021 Datacall Report*. Resource Productivity & Recovery Authority (RPRA). https://rpra.ca/programs/about-the-datacall/

(2) McKay, J. (2018, June 25). *Green Bin Organic Waste Processing and Capacity in the Province of Ontario* . City of Toronto Solid Waste Management Services.

Table 2.2: Summary of SSO Collection Programs in Ontario, Canada

Municipality	Launch Year	Collection Schedule	Population	Approximate Annual Tonnage (tpy)	SSO Generation Rate (tpy per capita)
Muskoka; District Municipality	2022	Weekly SSO; Weekly Garbage (1 Bag / Week)	66,674	1,195	0.0179
Wellington; County	2020	Weekly SSO; Bi-Weekly Garbage ($/Bag)	241,026	2,679	0.0111
Stratford; City	2020	Weekly SSO; Weekly Garbage (1 Bag / Week)	33,232	991	0.0298
Sudbury; City	2009	Weekly SSO; Bi-Weekly Garbage (2 Bags / Collection)	170,605	4,661	0.0273
Kingston; City	2009	Weekly SSO; Weekly Garbage (1 Bag / Week)	132,485	3,925	0.0296
Halton; Regional Municipality	2008	Weekly SSO; Bi-Weekly Garbage (3 Bags / Collection)	596,637	32,930	0.0552
Durham; Regional Municipality	2007	Weekly SSO; Bi-Weekly Garbage (4 Bags / Collection)	696,992	33,042	0.0474
Peel; Regional Municipality	2007	Weekly SSO; Bi-Weekly Garbage	1,451,022	68,790	0.0474
York; Regional Municipality	2007	Weekly SSO; Bi-Weekly Garbage	1,173,334	107,917	0.0920
Hamilton; City	2006	Weekly SSO; Weekly Garbage (1 Bag / Week)	569,353	19,316	0.0339
Barrie; City	2006	Weekly SSO; Bi-Weekly Garbage	147,829	6,436	0.0435
Waterloo; Regional Municipality	2006	Weekly SSO; Bi-Weekly Garbage (3 Bags / Collection)	587,165	27,123	0.0462
Guelph; City	2000's	Weekly SSO; Bi-Weekly Garbage	165,588	9,790	0.0591
Toronto; City	2002	Weekly SSO; Bi-Weekly Garbage	2,794,356	170,600	0.0611

The average SSO Generation Rate for all of the municipalities is 0.043 tpy/capita. In addition, the following general trends were noted in the data set for all of the municipalities:

Collection Program Type

- Regional Collection Programs in Ontario generally had a higher participation rate with an average SSO Generation Rate of 0.045 tpy/capita. Whereas Collection Programs specifically for Cities had an average SSO Generation Rate of 0.041 tpy/capita.
- It is anticipated that the participation rates for this TS-SSO would generally be more similar to that of the regional collection as the EWSWA is implementing a Regional Green Bin Program.

Program Maturity

- The more recent the launch date of the Green Bin Program (i.e. less mature) the lower the SSO Generation Rate. The three most recent SSO Collection Programs were implemented in Muskoka (2022), Wellington (2020), and Stratford (2022). The average SSO Generation Rate for these municipalities is 0.020 tpy/capita. When municipalities implement new SSO Collection Programs, low participation rates can be expected in the first few years as it takes time for the community to learn about and adjust to the new program.
- The older the launch date of the SSO Collection Program (i.e., more mature) the higher the SSO Generation Rate. The four oldest SSO Collection Programs were implemented in Toronto (2002), Hamilton (2006), Waterloo (2006), and Barrie (2006). The average SSO Generation Rate for these municipalities is 0.046 tpy/capita.

Collection Frequency

- Implementing policies that prioritize diversion of SSO materials would increase public participation and increase the overall SSO Generation Rate. This could include switching to bi-weekly garbage collection and weekly SSO collection, setting a limitation on the allowable disposal volume (i.e., one bag per week), and / or implementing a fee based on the disposal volume (i.e., pay per bag).
- When the Green Bin Program begins, the City of Windsor's is intending to change its garbage collection program to a bi-weekly collection frequency. The Municipalities of Lakeshore and Tecumseh's garbage collection program will remain with a weekly collection frequency.
- As identified in **Table 2.2**, all of the municipalities in Ontario which report to the Ontario Resource Productivity & Recovery Authority Datacall Reporting Network are offering bi-weekly garbage collection or significantly limited weekly collection (one (1) bag per week); therefore, it is not possible to draw a conclusion related to the SSO Generation Rate for weekly vs. bi-weekly garbage collection.
- For the TS-SSO, program changes such as the implementation of bi-weekly garbage collection in the County, contingency capacity requirements, and/or program expansion to include the industrial, commercial, and institutional (ICI) sector, or other materials (e.g., compostable packaging, pet

waste), may lead to higher SSO Generation Rates in the future. At this time, it is considered conservative to use the SSO Generation Rates from this data set for this application, since the reviewed municipalities utilize collection frequencies that promote the diversion of SSO (i.e., higher SSO Generation Rate).

<u>Population</u>

- The municipality with the most similar population to the cumulative population of the City of Windsor, Town of Tecumseh, and Municipality of Lakeshore (293,370) is the County of Wellington with a population of 241,026. However, the Green Bin Program in Wellington was implemented in 2020 and the participation in 2021 was quite low with an SSO Generation Rate of 0.011 tpy/capita (lowest overall participation rate of the reviewed municipalities).
- The next closest municipalities were Guelph (165,588), Sudbury (170,605), Waterloo (587,165), and Halton (596,637) with an average SSO Generation Rate of 0.047 tpy/capita. These populations vary greatly, -44 % and +103%, from the population in City of Windsor and Municipality of Lakeshore and Town of Tecumseh; therefore, the 'Program Maturity' Trend was used for the projections for the new TS-SSO.

Based on the data trends throughout Ontario, a SSO Generation Rate of 0.020 tpy/capita was used for the short-term projection and 0.046 tpy/capita was used for the mid and long-term projections. The short-term SSO Generation Rate was selected to match the average of the most recently implemented Green Bin Program. As a conservative approach, the mid and long-term SSO Generation Rate was selected to match the average of the least recently implemented Green Bin Programs, which was higher when compared to the overall Ontario average and regional collection Green Bin Program average.

The population data and annual population growth rate for each municipality was collected from Statistics Canada Census of Population for 2021.

The SSO projections for the City of Windsor, Town of Tecumseh, and Municipality of Lakeshore are presented in **Table 2.3**. In engineering design, it is standard practice to design for the 20-Year Scenario. Therefore, it is recommended that the long-range projection of 16,700 tpy be used for the design capacity of the TS-SSO.

Table 2.3: SSO Projections for the TS-SSO

Municipality	Population (2021)	Annual Population Growth Rate	Annual Tonnage Projection (tpy)		
			Short-Range (2025)	Mid-Range (2032)	Long-Range (2044)
Windsor	229,660	1.1%	4,803	11,889	12,973
Tecumseh	23,300	0.1%	467	1,079	1,085
Lakeshore	40,410	2.1%	875	2,284	2,632
Total (Rounded to the Nearest 100)	**<u>293,400</u>**	**-**	**<u>6,200</u>**	**<u>15,300</u>**	**<u>16,700</u>**

2.1.3 Proposed Capacity for the TS-SSO

The average daily tonnage of SSO to be transferred at the TS-SSO is dependant on the collection schedule and frequency. As of the time of this study, the contributing City and County municipalities do not have an Green Bin Program in place. A four day per week per week collection schedule was evaluated to be implemented throughout the service area resulting in an average collection of 80 tonnes per day (tpd). To account for variation in the mass of SSO collected due to seasonal changes, holidays, weather, etc. a peaking factor of 1.15 was applied, which is typical for this application. The projected peak daily mass and volume as well as anticipated number of transfer trailers each day is outlined in **Table 2.4**.

Table 2.4: Projected Daily Mass and Volume of Collected SSO

Design Parameter	Capacity Requirements
Collection Frequency	4 Days / Week
Annual SSO Collected (tonnes/yr)	16,700
Average Daily SSO (tpd)	80
Peaking Factor	1.15
Peak Daily SSO (tpd)	92
Peak Daily SSO Volume (m^3) [(1)]	230
No. of Transfer Trailers per Day 40 Cubic Yard Bin 100 Cubic Yard Bin	 6 - 8 3 - 4

Notes:

(1) Average Density of SSO = 400 kg/m^3; assumed based on U.S. Environmental Protection Agency Conversion Factors:

US EPA. (2016, April). *Volume-to-Weight Conversion Factors U.S. Environmental Protection Agency Office of Resource Conservation and Recovery*. U.S. Environmental Protection Agency. https://www.epa.gov/sites/default/files/2016-04/documents/volume_to_weight_conversion_factors_memorandum_04192016_508fnl.pdf

2.2 Design Basis for the Source Separated Organic Transfer Station

In this feasibility study alternative conceptual designs will be identified and evaluated to inform the selection of a recommended conceptual design. The conceptual design for the new TS-SSO will involve retrofitting the existing Fibre MRF to accommodate projected annual tonnage of SSO. As a basis for the conceptual design, the TS-SSO must satisfy the following design requirements:

- Accommodate the transferring of 16,700 tonnes per year on a 4 day a week collection schedule. Consideration will be given to accommodating additional and contingency tonnage (through operational changes or future expansion).

- SSO delivered to the TS-SSO will be pre-screened, consolidated, loaded for haul, and hauled off-site for processing (i.e., no processing of materials will occur at the TS-SSO). All SSO should be tipped, consolidated, and loaded onto transfer vehicles within the confines of the new TS-SSO.
- Construction of dividing walls (as needed) to enclose the new TS-SSO.
- Comprehensive odour control system (discussed in more detail in **Section 3.3.3**).
- Heating and ventilation system as deemed to support operations (e.g., freezing of water lines, tip floor).
- Robust overhead door system.
- Comprehensive leachate collection system (discussed in more detail in **Section 3.4.1**).
- Adequate space for the following equipment:
  - Collection vehicles (tipping of material);
  - Push wall and tipping floor (temporary staging of material);
  - Front-end loader and/or other loader (loading of material);
  - Transfer vehicle and/or transfer container (transferring of material); and
  - Washing vehicles and emptying traps/reservoirs.

The following design limitations will be taken into consideration for the conceptual design of the TS-SSO:

- The capacity of the TS-SSO will be limited by the number and size of the loading bays.
- The facility is limited by the size of the tipping floor, push wall and temporary staging area. If the size of the tipping area is small than the floor must be cleared after each collection vehicle is unloaded and there will be limited space to consolidate and stage material. Queuing will be necessary during peak hours.

2.3 EVALUATION OF ALTERNATIVE CONCEPTUAL DESIGNS

In this feasibility study alternative conceptual designs will be identified and evaluated leading to the selection of the recommended conceptual design. The alternative conceptual designs will be evaluated based on a variety of social, natural environmental, economic, and technical criteria. The following evaluation criteria were developed based on SSO waste management needs, recommendations from the EWSWA, applicable municipal plans / commitments, design principles, and past industrial experience.

Technical Criteria:

- Ability to meet SSO waste management needs;
- Impact to other on-site activities;
- Constructability, implementation timeline, and reliability;
- Flexibility to meet future needs; and
- Ease of Operation and Maintenance (O&M).

Social Criteria:

- Off-site impacts including noise, vibration, odour, or air pollution emissions;
- Permanent changes or impacts to society; and
- Development policies and agreements.

Natural Environmental Criteria:

- Impacts to natural environment including air, climate, vegetation, fish and wildlife, areas of natural and scientific interest, environmentally sensitive areas, surface drainage and groundwater, and soil / geology;
- On-site stormwater management and drainage impacts;
- Permitting requirements; and
- Regulatory compliances and applicable governmental policies.

Economic Criteria:
- Capital cost.

2.3.1 Alternative No. 1 – Tipping Floor within the Fibre MRF

The initial design concept for the conversion of the existing Fibre MRF involved enclosing the existing tipping floor space to be utilized for the TS-SSO. This design concept was to assess the feasibility of operating the new TS-SSO in the Fibre MRF while maintaining operation of the Blue Box Program during the Blue Box Transition. With this strategy two bays and the existing tipping floor would be used for tipping, consolidating, loading, and transferring the SSO. The collection vehicles will enter and exit through the north bay of the TS-SSO and dump materials on the north section of the tipping floor. A front-end loader would be used to transfer and top-load materials in a 40 cubic yard roll off bin located in the southern bay. A transfer truck would enter and exit through the southern bay to replace the roll off bin. A small area for temporary surge storage would be available in the northwestern section of the tipping floor. Based on the record drawings provided by the EWSWA, the entire tipping floor in the existing Fibre MRF is 19 m (62'-3") in width and 27.5 m (90'-2") in depth, corresponding to an area of approximately 523 m^2 (5600 ft^2). The preliminary floor plan for this option is shown in **Figure 2.1** of **Appendix A**.

Table 2.5 presents the discussion of evaluation criteria for this alternative.

Table 2.5: Discussion of Evaluation Criteria for Alternative No. 1

Evaluation Criteria	Discussion
Technical	In terms of the technical feasibility, this layout offers limited space for material dumping, vehicle maneuvering, loading, or temporary staging of SSO. This layout would have a severely limited capacity as it results in a linear workflow with (i) collection vehicle tipping, (ii) clearing the tip floor and loading the roll-off bins, and (ii) exchanging the roll-off bins occurring in succession. Since this layout requires the use of one bay for transfer vehicles and one bay for collection vehicles, movement within the tipping floor would be constrained. Queuing of collection vehicles and transfer trailers can be expected throughout the day due to the inability to handle a surge in vehicle arrivals. This issue is further exacerbated by the small tipping area that offers limited temporary staging and would need to be cleared after each collection vehicle is unloaded. For these reasons, it is not expected that this

	design would be able to meet the SSO waste management needs of 16,700 tonnes per year on a 4-day a week collection and working schedule.
Social, Natural Environmental, and Economic	This alternative is not considered feasible from a technical point of view and would not be able to meet capacity requirements for the TS-SSO. Therefore, social, natural environmental, and economic impacts for this alternative were not evaluated at this time.

2.3.2 Alternative No. 2 – Expansion of the Fibre MRF

Alternative No. 2A and 2B for the conversion to a TS-SSO involves enclosing the existing tipping floor space and expanding outside the north or west wall of the of the existing Fibre MRF. With this strategy three bays and the existing tipping floor would be used for tipping, consolidating, loading, and transferring the SSO. The preliminary floor plans are shown in **Figure 2.2** and **Figure 2.3** of **Appendix A**.

For Alternative No. 2A, the collection vehicles will enter through the existing north bay of the TS-SSO and dump materials on the north section of the tipping floor. A front-end loader would be used to transfer and top-load materials into a transfer trailer equipped with a 40 cubic yard bin. The transfer vehicle would enter and exit through a new bay provided by an extension off the north end of the Fibre MRF. An area for staging with contingency capacity would be available in the western section of the tipping floor.

For Alternative No. 2B, the collection vehicles will enter through the existing north bay of the TS-SSO and dump materials on the north section of the tipping floor. A front-end loader would be used to transfer and top-load materials onto a truck equipped with a 40 cubic yard bin. The transfer vehicle would enter and exit through a new bay provided by an extension off the west side of the Fibre MRF. A small area for temporary surge storage would be available in the southwestern section of the tipping floor.

Table 2.6 presents the discussion of evaluation criteria for these design alternatives.

Table 2.6: Discussion of Evaluation Criteria for Alternative No. 2A and 2B

Evaluation Criteria	Discussion
Technical	In terms of the technical feasibility when compared to Alternative No. 1, these layouts would offer more space for material dumping, vehicle maneuvering, loading, or temporary storage of SSO. One of the existing bays would be used for collection vehicles, one bay would be used for the front-end loader maneuvering, and a new loading bay outside the building footprint would be used to accommodate the transfer trailer. This layout provides some advantage such as the elevation difference between the tipping floor and loading bay which minimizes the need for specialized loading equipment.

	However, with this layout, the workflow remains linear: collection vehicle tipping and clearing the tipping floor must occur in series; and loading the transfer trailer, removing, and replacing the transfer trailer must occur in series which limits operational flexibility and capacity. Additionally, as the TS-SSO facility can only accommodate a single collection vehicle at any given time it is unlikely to cope during peak hours and queuing is to be expected. Although this Alternative offers advantages in comparison to Alternative No. 1, this option is not considered technically or operationally feasible.
Natural Environmental, and Economic	On-site stormwater management is an important aspect of this project as significant changes will be limited due to regulatory compliance and permitting requirements. Currently, stormwater on the EWSWA site is conveyed to and retained at a stormwater management pond (SWMP) on adjacent City of Windsor property. Due to the age and size of this stormwater management pond, changes to stormwater management practices at the EWSWA site would require significant upgrades to the SWMP, capital cost investments from the City of Windsor, and permitting updates or amendments. Expansion of the existing Fibre MRF would require the conversion of existing permeable surfaces to impervious surfaces and changes to site drainage impacting site stormwater management practices. Since this would result in a need for upgrades to the SWMP, this is not considered a preferred design for the new TS-SSO. In addition, an expansion to the north of the existing Fibre MRF is not considered preferable due to the unknowns and restrictions related to a property easement and Crown land to the north.
Social	This alternative is not considered feasible from a technical, natural environmental, and economic point of view. Therefore, social impacts for this alternative were not evaluated at this time.

2.3.3 Alternative No. 3 – Expand Footprint Within the Fibre MRF

Alternative No. 3 for the conversion to a TS-SSO involves enclosing four bays of the existing Fibre MRF to meet long-term capacity requirements that Alternative No.1 does not meet. With this strategy three bays would be used for tipping, consolidating, loading, and one bay would be used for transferring the SSO.

The collection vehicles will enter and exit through the two bays of the TS-SSO and dump materials onto the tipping floor. A front-end loader would be used to push the materials to the temporary storage area along the push wall. A specialized loader would be used to transfer the materials from the temporary storage area and load a transfer trailer equipped with a 100 cubic yard bin. The transfer vehicle would enter and exit through the fourth bay. A larger area for temporary surge storage would be available in the western section of the tipping floor.

2.3.3.1 LOADING ALTERNATIVES

Two (2) alternative methods for loading material into the transfer trailer were considered for this design iteration.

Alternative 3X – Push Pit Transfer

Alternative 3Y –Equal Elevation Transfer

For Alternative 3X – Push Pit Transfer, an elevation difference in combination with a front-end loader would be utilized to load material through the top of a transfer trailer equipped with a 100 cubic yard bin. In this scenario an approximately 4 ~ 4.5 m (13 ~ 15 ft) pit within one bay of the Fibre MRF would need to be created to accommodate the transfer trailers. This would allow for material to be pushed across the dumping area and into the top of the transfer trailer via the front-end loader. With push pit transferring, materials do not need to be lifted saving time and improving the operational capacity. Significant structural modifications would need to be made to the existing Fibre MRF to create a push pit. These structural modifications pose an issue for the following reasons:

- There are unknowns related to record drawings for the Fibre MRF and the sub-surface conditions. Detailed geotechnical and structural investigations, and utility locates to identify possible underground obstructions would be required to assess the feasibility of implementing a push pit within the existing Fibre MRF.
- The push pit would ideally be 4 ~ 4.5 m deep. Implementing a push pit at this depth would require considerable work. Existing concrete floor needs to be sawcut and removed. Due to the depth of the excavation, a sheet pile shoring is required to protect the area adjacent to the new pit from collapsing and sliding into the new excavation. A loading ramp outside the building needs to be constructed to access the pit. New retaining walls on either side of the ramp is required to protect the adjacent ground areas. Due to the depth of the pit, the construction of it would undermine the existing building footings. Underpinning of existing building footings would also be required.
- Pump systems for leachate and wash water management would need to be implemented.
- A push pit at this depth would require a long sloping ramp to provide access for the transfer vehicles. Implementation of this ramp would alter site drainage and impact the existing stormwater management practices which would likely result in upgrade requirements for the City SWMP along with permitting updates or amendments. In addition, the long ramp would impact the traffic flow and operation of adjacent facilities.

Due to the regulatory requirements and capital costs associated with the structural and stormwater management modifications, this is not considered a preferred design for the new TS-SSO.

For Alternative 3Y – Equal Elevation Transfer, with this option there is no elevation difference between the floor of the tipping area and the transfer area. A specialized piece of equipment would be utilized to load material through the top of a transfer trailer equipped with a 100 cubic yard bin.

A standard front-end loader would be dumping near or at its maximum lift height; therefore, it is recommended that a specialized loader is used to transfer materials. Initially an excavator was considered for this application; however, this was deemed not to be preferred due to concerns regarding capital cost requirements, equipment downtime, and the over speciality (unable to use for alternative functions on the site). As an alternative, a telescopic front-end loader was considered for this concept/feasibility study based on discussion with the manufacturer and applications in Ontario. Other suitable equipment includes a front-end loader with extended reach and preferred equipment should be refined/selected during the detailed design stage. The specialized front-end loader would allow for efficient and effective loading of the transfer trailer and the equipment is less specialized so it may be used for additional functions throughout the site.

The use of this equipment for the transfer of SSO would not require significant structural modifications or impact stormwater management on the EWSWA site; therefore, the preferred loading alternative is Alternative 3Y – Equal Elevation Transfer and will be evaluated further in **Section 2.3.3.3.**

2.3.3.2 LAYOUT ALTERNATIVES

Two (2) areas within the existing Fibre MRF were considered for this alternative. The general areas are demarked on **Figure 2.4** of **Appendix A**.

Alternative 3A – North End of Fibre MRF

Alternative 3B – Centre of Fibre MRF

Considerations for **Alternative 3A** include:

- One (1) interior partition wall would be constructed to enclose the TS-SSO and the existing push wall would be modified to accommodate the SSO.
- A new concrete curb needs to be built to protect the metal wall along grid line 3a between grid lines A and A3 at the north end of the building.
- One (1) section of existing concrete wall (along grid line 1) and a portion of the existing fibre recycling equipment would need to be removed from the space. The existing underground conveyor unit will need to be removed and the pit be filled to match the existing floor level.
- The spacing of the overhead doors are acceptable for use as in the TS-SSO. Minor building modifications including modifications to the fire life safety system will be required to replace the overhead doors. The overhead doors would need to be replaced with a high-speed model for improved operation and environmental control (open/close capabilities).
- If an expansion is required in the future, the TS-SSO could likely be expanded to the south (or west if site stormwater management limitations are remediated) with additional structural modifications.

Considerations for **Alternative 3B** include:

- Two (2) interior partition walls would be erected to enclose and isolate the TS-SSO, and new push walls would be constructed to accommodate the SSO.
- A portion of the existing fibre recycling equipment would need to be removed from the space.
- The spacing and sizing of the overhead doors in this area are not well suited for the TS-SSO station; therefore, building modifications to adequately space, size, and replace the truck doors as well as man doors would be required.
- If an expansion is required in the future, the TS-SSO could likely be expanded to the north with additional structural modifications. Expanding to the south would be more limited due to the lack of space and depth at the south end of the building.

Implementing the TS-SSO in the centre portion of the Fibre MRF would require more structural modifications, and higher capital cost in comparison to Alternative 3A. Therefore, the preferred layout is Alternative 3A – North End of the Existing Fibre MRF, which is evaluated further in **Section 2.3.3.3**. The preliminary floor plan for this option is shown in **Figure 2.5** of **Appendix A**.

2.3.3.3 DISCUSSION OF EVALUATION CRITERIA

The preferred loading method, equal elevation transfer (Alternative No. 3Y), and layout, north end of the Existing Fibre MRF (Alternative No. 3B) form and are henceforth referred to as Design Alternative No. 3. **Table 2.7** presents the discussion of evaluation criteria for this design alternative.

Table 2.7: Discussion of Evaluation Criteria for Alternative No. 3

Evaluation Criteria	Discussion
Technical	This alternative would provide sufficient space to accommodate material dumping, vehicle maneuvering and washing, loading, and temporary staging of SSO. Two of the existing bays would be used for collection vehicles, one bay would be used for general transferring or materials, and one bay would be used for the transfer trailer. In addition, a fourth bay allows for an additional receiving area if needed as well as redundancy in the event of an operational issue (e.g., broken door, issue with collection vehicle, or spill). A 100 cubic open top trailer would be utilized to improve the operational capacity of the TS-SSO. The collection vehicles and the transfer trailers will both enter and exit the TS-SSO on the east side of the building. In addition, collection vehicles will queue in the space east of the TS-SSO (between the Fibre and Container MRF). This area will need to accommodate a large number of vehicles throughout the day at peak capacity (14 to 21 collection vehicles and 3 to 4 transfer trailers each day). Traffic

	controls measures should be reviewed during the detailed design stage to manage incoming and outgoing traffic during peak times. This layout would allow for a non-linear workflow where: (i) collection vehicle tipping, (ii) clearing the tipping flow (iii) loading transfer trailer and (iii) removing and replacing transfer trailers can occur concurrently resulting in improved operational flexibility. The TS-SSO capacity will be dependent on the productivity of the specialty front-end loader, which can be reviewed and optimized through operational procedures developed in the detailed design phase. It is anticipated that this alternative will maximize receiving capacity thereby minimizing queuing during peak hours. During peak hours and at peak capacity, the use of a front-end loader and specialized front-end loader will allow for more efficient clearing of the tipping floor and loading of the transfer trailer. However, with no elevation difference between the tipping floor and the loading bay, this may present an operational challenge as visibility would be limited when loading the trailer. Alternative systems or operational practices (e.g., weigh scale on loader, mirror(s) in the transfer area) would need to be developed during the detailed design phase to ensure the materials are distributed appropriately and the transfer trailer is filled to the desired level. The overhead doors are to remain closed throughout the dumping and washdown process. One general operational concern for this option is the depth of the TS-SSO. With this layout the collection vehicles would have approximately 20 m of space from the back of the dumping area to the TS-SSO doors. Based on the manufacturer's specifications for the collection vehicles, provided by the EWSWA, dumping within this space is possible. However, there is potential for collection vehicles to run into and damage the doors of the TS-SSO when unloading materials and particularly in instances where vehicles pull forward in an attempt to dislodge materials stuck in the cavity. Despite these drawbacks, it is anticipated that this alternative would be able to meet the SSO waste management needs of 16,700 tonnes per year on a 4 day a week collection schedule. Alternative No. 3 is constructable and would be operational within the desired implementation timeline (Fall of 2025). Since all changes are occurring within the existing Fibre MRF, minimal impacts to other onsite activities are expected or will be mitigated through design controls discussed in **Section 3.0**. This layout would provide a reliable solution to meet current SSO waste management needs and would provide some additional flexibility to meet future needs through operational changes. From an O&M perspective, the proposed conceptual designs would function for the desired purpose with ideal space for all TS-SSO procedures.

Social	Off-site impacts due to noise, vibration, odour, or air pollution are expected to be mitigated using best management practices to comply with regulatory requirements. Mitigation measures for these off-site impacts are further identified and evaluated in **Section 3.2**. Due to the implementation of mitigation measures, compliance with applicable regulatory policies and agreements, and since the facility is currently used to transfer waste, impacts to the community are expected to be minimal.
Natural Environmental	All modifications are occurring within the confines of the existing Fibre MRF; therefore, it is not anticipated that amendments to the City SWMP or changes to stormwater management practices at the EWSWA site would be required. Impacts to natural environment are expected to be minimal for this project as it is occurring within the existing footprint of the Fibre MRF and is located on an industrial site. Impacts to the surrounding community or natural environment may include some air or odour impacts which will be mitigated using best management practices to meet regulatory requirements. Mitigation measures for these impacts are identified and evaluated in **Section 3.2**. Further, permitting requirements and considerations are outlined in **Section 4.0**.
Economic	The factors and considerations for the development of the opinion of probable cost is outlined in **Section 5.0**. The detailed opinion of probable cost for the implementation of this conceptual design is available in **Appendix B**.

2.3.4 Alternative No. 4 – Remove Building Extension and Modify Layout

Alternative No. 4 for the conversion to a TS-SSO involves removing the 2004 building extension consisting of the existing Fibre MRF tip floor and maintenance shop; modifying the layout such that the collection vehicles enter through the north end of the existing Fibre MRF; and expanding on the west side of the building to accommodate the transfer trailer. With this strategy three bays would be available for tipping, consolidating, loading, and one bay would be used for transferring SSO. The preliminary floor plan is shown in **Figure 2.6** of **Appendix A**.

The collection vehicles will enter and exit through the two bays of the TS-SSO and dump materials onto the tipping floor. A front-end loader would be used to push the materials to the temporary staging area along the push wall. An additional front-end loader would be used during peak hours to transfer the materials from the temporary staging area and load a transfer trailer equipped with a 100 cubic yard bin. The transfer vehicle would enter and exit through the extended west bay. A larger area for staging with contingency capacity would be available in the southern section of the tipping floor.

Table 2.8 presents the discussion of evaluation criteria for these design alternatives.

Table 2.8: Discussion of Evaluation Criteria for Alternative No. 4

Evaluation Criteria	Discussion
Technical	This alternative would provide sufficient space to accommodate material dumping, vehicle maneuvering and washing, loading, and temporary storage of SSO. On the north end of the TS-SSO, two bays would be used for collection vehicles and one bay would be used for general staging of materials and equipment. On the west side of the TS-SSO, one bay would be used for the transfer trailer. A 100 cubic open top trailer would be utilized to improve the operational capacity of the TS-SSO. One additional benefit of this alternative is that there is sufficient space for temporary staging of unacceptable material in the northwest bay. The collection vehicles will enter and exit on the north end of the TS-SSO and queue in the space east of the TS-SSO (between the Fibre and Container MRF). The transfer trailers will enter and exit the TS-SSO on the west side of the TS-SSO. A flag person may be required to regulate traffic and spot the transfer vehicle (3 or 4 times per day). With this layout there will be less interaction between the collection vehicles and transfer trailers routes, which is ideal from an operational standpoint. Traffic controls measures should be reviewed during the detailed design stage to manage incoming and outgoing traffic during peak times. This layout would allow for a non-linear workflow where: (i) collection vehicle tipping, (ii) clearing the tipping flow (iii) loading transfer trailer and (iii) removing and replacing transfer trailers can occur concurrently resulting in improved operational flexibility. The TS-SSO capacity will be dependent on the productivity of the specialty front-end loader, which can be reviewed and optimized through operational procedures developed in the detailed design phase. It is anticipated that this alternative will maximize receiving capacity thereby minimizing queuing during peak hours. During peak hours and at peak capacity, the use of front-end loaders will allow for efficient clearing of the tipping floor and loading of the transfer trailer. With this option, an elevation difference of approximately 2.6 m would be provided between the tipping floor and the loading bay floor. This would allow for more efficient loading of the transfer trailer and aligns with best management practices for transfer stations. In addition, this would remove operational concerns regarding visibility during loading as the front-end loader would be able to see materials within the transfer trailer, ensure the materials are distributed appropriately, and fill to the desired level. The overhead doors are to remain closed throughout the dumping and washdown process. This alternative would provide approximately 27.5 m of space from the back of the dumping area to the TS-SSO doors. Based on manufacturer specifications for the truck type provided by the EWSWA, dumping within this space will be possible.

	This layout would minimize potential for damage to the doors in comparison to Alternative No. 3. Overall, this alternative would align more appropriately with best management practices for transfer stations and resolves operational concerns identified for Alternative No. 3. It is anticipated that this alternative would be able to meet the SSO waste management needs of 16,700 tonnes per year on a 4 day a week collection schedule. Alternative 4 is constructable and could be operational within the desired implementation timeline (Fall of 2025). Since all changes are occurring within the existing Fibre MRF footprint, minimal impacts to other onsite activities are expected or will be mitigated through design controls discussed in **Section 3.0**. This layout would provide a reliable solution to meet current SSO waste management needs and would provide some additional flexibility to meet future needs through operational changes. From an O&M perspective, the proposed conceptual designs would function for the desired purpose with ideal space for all TS-SSO procedures.
Natural Environmental	Off-site impacts due to noise, vibration, odour, or air pollution are expected to be mitigated using best management practices to comply with regulatory requirements. Mitigation measures for these off-site impacts are further identified and evaluated in **Section 3.2**. Due to the implementation of mitigation measures and compliance with applicable regulatory policies and agreements, impacts to the community are expected to be minimal.
Social	For the implementation of this alternative, the total roof area of the existing Fibre MRF will be reduced. Based on this it is not anticipated that amendments to the City SWMP or major changes to stormwater management practices at the EWSWA site would be required. Minor modifications to the site drainage are expected on the west side of the TS-SSO to accommodate the lowering of the loading area floor. Impacts to natural environment are expected to be minimal for this project as it is occurring within the existing footprint of the impervious surfaces on site and is located on industrial lands. Impacts to the surrounding community or natural environment may include some air or odour impacts which will be mitigated using best management practices to meet regulatory requirements. Mitigation measures for these impacts are identified and evaluated in **Section 3.2**. Further, permitting requirements and considerations are outlined in **Section 4.0**.
Economic	The factors and considerations for the development of the opinion of probable cost is outlined in **Section 5.0**. The detailed opinion of probable cost for the implementation of this conceptual design is available in **Appendix B**.

	The cost for this conceptual design is anticipated to be approximately 25 to 30 % greater than that for Alternative No. 3.

2.4 PREFERRED ALTERNATIVE

The alternative TS-SSO layouts that have been considered are summarized as follows:

- Alternative No. 1 – Tipping Floor within the Fibre MRF
- Alternative No. 2A/2B - Expansion of Existing Fibre MRF
- Alternative No. 3 - Expand Footprint within the Existing Fibre MRF.
- Alternative No. 4 –Remove Building Extension and Modify Layout

Alternative No.'s 1, 2A, and 2B provide a linear operational workflow with limited flexibility to accommodate the capacity needed for SSO. These alternatives do not provide sufficient space for maneuvering, loading and/or storage; therefore, they are not considered viable alternatives to meet the EWSWA's SSO waste management needs.

Alternative No.'s 3 and 4, provide a non-linear workflow with improved capability to accommodate the SSO. These alternatives provide sufficient space for maneuvering, loading and storage and are expected to be able to accommodate the SSO waste management needs of 16,700 tonnes per year on a 4 day a week collection schedule.

The general layout and operational procedure for Alternative No. 4 is the most aligned with best management practices for transfer stations and provides several advantages over Alternative No. 3:

- The entry and exit points for the collection vehicles and transfer trailers are separated resulting in less interaction and overlap of routes for the two vehicle types. There is limited space for the transfer trailers to backup in this space which would cause additional congestion.
- An elevation difference of approximately 2.6 m would be provided between the tipping floor and the loading bay floor, which would allow for more efficient loading of the transfer trailer. Further, this would mitigate operational concerns regarding visibility during loading.
- This alternative would not require a specialized piece of equipment for the loading process (i.e., no telescopic front-end loader would be required).
- This alternative would provide additional space for the collection vehicles to enter and dump the materials which lowers the potential for damage to the overhead doors when they are in the closed position and contains odour, noise, and wash water inside the TS-SSO. This additional space also provides more operational flexibility in the short-term and increases the adaptability in the long-term (in case of changes to operations, collection vehicle types, capacity needs, etc.).

- This alternative would provide space in the northwest bay for temporary storage of unacceptable materials.

The main drawback of Alternative No. 4 is the increased capital cost investment associated with structural modifications. The opinion of probable cost for the implementation of this conceptual design is anticipated to be approximately 15 to 25 % greater than that for Alternative No. 3.

Alternative No.'s 3 and 4 are both considered technically feasible alternatives. It is recommended that prioritizing the operational flexibility and capacity of the TS-SSO to provide a reliable long-term solution would be the best approach for this project. Based on this, Alternative No. 4 is the recommended alternative for Windsor TS-SSO and is outlined further in the following sections as the 'Conceptual Design'.

3.0 CONCEPTUAL DESIGN

This section describes the conceptual design, high-level operating procedures, and controls for the preferred alternative. The following have been taken into consideration for the development of the conceptual design:

- Collection vehicles have not been finalized by EWSWA as such side loading collection trucks with a 7-tonne capacity have been assumed. For a conservative approach, the collection trucks are assumed to arrive at the transfer station at 70 to 100 % capacity, which corresponds to 14 to 21 collection vehicles each day (for the peak capacity of 16,700 tonnes/year)
- 100 cubic yard open top transfer trailers will be used for the new TS-SSO. Trailers must be leak proof and be covered for transport.
- It is assumed that the space indicated for the new TS-SSO will be made available for that purpose.
- The proposed conceptual layout (including structural features, doors, and openings) should be refined during the detailed design phase after details related to the existing conditions, operational needs, health and safety requirements, etc. have been confirmed.
- Measures to prevent extreme temperatures (i.e., freezing in the winter) should be reviewed during detailed design. Examples of these control measures may include adequate HVAC sizing, restoration of the vegetative buffer on the north, keeping the overhead doors closed, and sealing openings in the TS-SSO.
- The use of separate bunkers to stage material should also be considered during detailed design.

The proposed conceptual layout for the TS-SSO is shown in **Figure 2.6** of **Appendix A**.

3.1 TRANSFER STATION CAPACITY

The conceptual design is anticipated to have a transfer capacity up to 130 tonnes/day (approximately 4 trailer loads per day) with the ability to cope with a peak of up to 30 tonnes/hour. Therefore, the transfer station is anticipated to have the capacity to meet the capacity requirement of 16,700 tonnes/ year. The above-mentioned capacity is based on the following assumptions:

- A duty and a standby transfer trailer are always available during the workday or scheduled for arrival in order to meet transfer needs;
- An average trailer capacity of 36 tonnes;
- An average trailer replacement time of 30 minutes; and
- Peak delivery hours between 10:00 am – 12:00 pm and 4:00 pm – 6:00 pm with two groupings of collection vehicle arrivals (1) in the mid-morning and (1) near the end of day.

In an emergency situation such as unexpected downtime of equipment or unavailability of transfer trailers, onsite storage can be provided for 1- day. During the detailed design process, points of engineering redundancy (i.e., additional equipment or transfer trailers) should be developed and incorporated into the Detailed Design and Operations Manual.

3.2 OPERATING PROCEDURE

The basic function of the TS-SSO is to receive waste on tip floor, inspect the waste, bulk, and load the waste for transport to an approved processing facility. The following sections provide a basic outline of the proposed operations procedures at the TS-SSO and should be further refined during the detailed design process.

3.2.1 Material Receiving

When a collection vehicle enters the site, it will proceed to the automated scale area. While on the scale, the vehicle will be weighed and checked against the standard tare weight in order to record the load weight. Then the vehicle will proceed along the designated route to the queuing area. Collection vehicles with a tear weight will not be required to weigh out upon exiting the site assuming the collection vehicles are completely emptied.

3.2.2 Transfer Station Tipping Floor Receiving Operations

- Collection vehicles will queue in the designated area between the TS-SSO and the existing Container MRF where they will use the next available bay and tipping floor area. The use of red/green signal lights may also be used to semi-automate this process by EWSWA staff.
- Once the collection vehicle enters the space and parks, the driver will exit the vehicle to shut the overhead door so that the door remains shut throughout the dumping process.
- Vehicles will unload the material under the direction of a tipping floor spotter who will visually inspect the material as it is unloaded for the identification of unacceptable material. Material that is unacceptable or contaminated will be rejected and separated.
- Before opening the door and exiting the transfer station, the wheels and rear end of the collection vehicle will be power washed by the driver or an EWSWA operator. It is recommended that an EWSWA operator power wash the vehicle for improved efficiency and to ensure washwater is directed to the floor drain; however, this detail can be refined during detailed design. Once complete, the driver will open the door and safely exit the TS-SSO.
- All appropriate materials will be cleared from tipping floor and moved to the staging area by EWSWA staff using a front-end loader, as needed.
- An additional front-end loader operator will then load material into a transfer trailer for transport to the approved SSO Processing Site, as needed.

3.2.3 Transfer Trailer Transportation

The existing automated weigh station is unsuited to accommodate the 100-cu. yd transfer trailer. Therefore, it is proposed that the transfer trailers be weighed at the attended scale on the east side of the site.

- When the transfer trailers arrive on the site they will proceed along the designated route and reverse into position in the TS-SSO. A flag person may be required to regulate traffic and spot the transfer vehicle (3 or 4 times per day).
- Once the trailer enters the space and parks the driver will exit the vehicle to shut the overhead door so the door remains shut throughout the loading process.
- Once loaded, the transfer trailer will be inspected for leaks by the driver or an EWSWA operator (recommended).
- The sides and wheels of the transfer trailers will be power washed by the driver or an EWSWA operator (recommended).
- The door will be opened by the driver then the transfer vehicle will exit the TS-SSO. The transfer vehicle will then proceed along the route to the attended scale. While on the scale, the vehicle will be weighed and checked against the standard tare weight in order to record the load weight.
- The transfer vehicle will then be directed to exit the site and travel a specified route to the designated SSO Processing Site.
- Upon arrival, the material will be disposed of at the direction of the receiving facility.

3.3 Recommendations for Off-Site Impact Control

An appropriately permitted, designed, and operated TS-SSO can mitigate offsite impacts to the surrounding communities and the natural environment (air, water, and soil). The following sections outlines permitting requirements and other considerations for the implementation of the conceptual design at the Windsor Site.

3.3.1 Noise Control Requirements

The operation of mobile equipment at SSO Transfer Stations can be a significant source of noise and vibration. The primary sources for noise at the TS-SSO may include equipment noise (such as engines, backup alarms, and hydraulic power units) and unloading noise caused by material tipping and transfer. Based on literature review and previous experience with design of organic waste transfer stations, best management practices (BMPs) for the mitigation of off-site impacts due to noise include the following:

- Enclosing all waste-handling operations to contain noise within the transfer station. The overhead doors should be kept closed at all times and opened only for a short period when vehicles enter/exit.
- The selection of appropriate building materials should be considered to reduce off-site noise emissions.

- Utilize concrete walls and structures, where feasible, to offer improved sound absorption in comparison to metal structures.
- Insulate the walls of the transfer station with sound-absorbing materials where feasible.
- For window installations, utilize double-glazed windows to offer improved sound absorption in comparison to single-glazed windows.

- Revitalize / restore the vegetative buffer on the north and west side of the Transfer Station Site to aid in the absorption and dispersion of noise and vibrations. This could include vegetation (select trees and/or shrubs), berms, or walls to block and absorb noise.

- Operational Procedures:
  - Frequent maintenance of mobile equipment to reduce potential for noise emissions.
  - Frequent maintenance of overhead doors to reduce potential for noise emissions.
  - Frequent (monthly) inspection of the TS-SSO to identify irregular or new sources of noise and vibrations. Following inspection take necessary steps to eliminate or mitigate sources of noise and vibration.
  - Plan for operation and maintenance activities to occur within standard working hours or avoid working during off-peak hours.

The recommendations for which BMPs to implement at the TS-SSO are outlined in **Table 3.1**.

Table 3.1: Screening Matrix for Noise Control Requirements

Control Measure	Recommendation
Enclosing all waste-handling operations.	Enclosing all waste-handling operations within the building and ensuring overhead doors are kept closed at all times, will be a cost-effective and likely regulatory required solution for the TS-SSO. This operational procedure and corresponding capital upgrades will be beneficial for the control of noise, vector and vermin, and odour; therefore, it is highly recommended for the TS-SSO. The structural modifications required to enclose the TS-SSO space will be considered in the opinion of probable cost.
Selection of Building Materials	The selection of building materials and level of sound attenuation required on the site should be determined through consultation with the MECP. Due to the industrial nature of the site, existing noise emission levels from the Fibre MRF operation, and implementation of other noise mitigation practices, insulation of the TS-SSO or use of high sound absorbing materials may not be necessary at this time. The TS-SSO will have similar operations and equipment to that currently in use at the Fibre MRF, which do not currently represent a noise or vibration concern.
Restoration of Vegetative Buffer	The restoration of the vegetative buffer on the north and west side of the site would likely be a cost-effective solution for the mitigation of noise at the TS-

	SSO. This vegetative buffer will also aid in odour mitigation and improve the aesthetics of the facility from the property lines. For these reasons, this control measure is recommended for the site but may be undertaken as a separate project from the TS-SSO conversion.
Operational Procedures	Due to the relatively low cost for implementation, the operational procedures outlined above are recommended to be used at the TS-SSO. These operational procedures should be incorporated into the Detailed Design and Operations Manual.

3.3.2 Vector and Vermin Control Requirements

Due to the nature of the Site and the composition of the SSO, this TS-SSO has high potential for the attraction of vector and vermin. Vector and vermin control is required for SSO transfer stations to mitigate off-site impacts to surrounding properties. Some measures currently in-place at the Fibre MRF and BMPs for the mitigation of off-site impacts due to odour include the following:

- Restore and maintain the TS-SSO with a focus on sealing or screening openings that would allow vector and vermin to enter the building.
- Retain and/or review service requirements with a professional licensed pest control company with expertise and experience in controlling specific vector populations.
- Operational Procedures:
  - Remove all waste from the tipping floor every 24 hours (i.e., no storage of waste for longer than 24 hours).
  - Frequent (daily) cleaning and washdowns of the tipping floor and mobile equipment.
  - Frequent (daily) collection of litter and other debris in the area surrounding the TS-SSO.
  - Frequent (weekly) inspection of the TS-SSO to identify, treat, and eliminate vector and vermin breading areas.
  - Frequent (monthly) inspection of the TS-SSO to identify and repair holes or other openings in the TS-SSO where vector and vermin may be entering the building. Main areas of concern and the focus of the inspection should be on door and window frames, vents, points where utilities (pipes or wires) enter the building, lower sections of the walls and masonry cracks.
  - Frequent (quarterly) power washing of the inside of the building (as part of maintenance program).

The recommendations for which BMPs to implement at the TS-SSO are outlined in **Table 3.2**.

Table 3.2: Screening Matrix for Vector and Vermin Control Requirements

Control Measure	Recommendation
Restore and Maintain the Fibre MRF for TS-SSO.	The existing Fibre MRF has been in service for approximately 20 years and shows signs of aging, wear, and tear. This is especially prevalent in the lower sections of the exterior walls and surrounding the overhead doors where collection vehicles and front-end loaders have created holes and openings throughout the years. During the detailed design period, it is recommended that the building including all structural elements (foundation, walls, framing, roof) be inspected, and areas of concern be identified for restoration. This restoration and screening of openings may occur in conjunction with other structural modifications during the conversion process. A line item has been included in the Opinion of Probable Cost for potential building restoration and should be further refined during the detailed design.
Retain a Professional Licensed Pest Control Company.	It is our understanding that a professional licensed pest control company has been retained for the site. It is recommended to meet with this service provider to review and update control requirements given the change in materials to be accepted at the TS-SSO.
Operational Procedures	Due to the relatively low cost for implementation, the operational procedures outlined above are recommended to be used at the TS-SSO. These operational procedures should be incorporated into the Detailed Design and Operations Manual.

3.3.3 Odour Control Requirements

Due to its composition, SSO has high potential for the generation of odour. These odours can vary significantly and tend to increase during periods of warm and/or wet weather. Odour management is required for SSO Transfer Stations to mitigate off-site impacts to residents. Increasing the separation distance between the odour sources and sensitive land use receptors is typically effective for odour mitigation; however, additional mitigation measures should be considered, where applicable, to mitigate nuisance odours to nearby residents. BMPs for the mitigation of off-site impacts due to odour may include the following:

- Implementation of a comprehensive odour control system.
- Complete an Emission Summary and Dispersion Modelling (ESDM) Report.
- Installation of a Vinyl PVC Curtain on overhead doors to contain odours when vehicles are entering or exiting the facility.

- Implementation of two (2) door entry system.
- Installation of an air curtain as part of the comprehensive odour control system.
- Explore alternative materials or coatings for push wall and tipping floor.
- Revitalize / restore the vegetative buffer on the north side of the Transfer Station Site to aid in the absorption and dispersion of odours.
- Operational Procedures:
    - The overhead doors should remain in the closed position as much as possible.
    - Remove all waste from the tipping floor every 24 hours (i.e., no storage of waste for longer than 24 hours).
    - Frequent cleaning and washdowns of the tipping floor and mobile equipment.
    - Frequent cleaning and washout of the floor drains to promote leachate drainage.
    - Maintain a method for the collection of and response to public odour complaints.

The recommendations for which BMPs to implement at the TS-SSO are outlined in **Table 3.3**.

Table 3.3: Evaluation Matrix for Odour Control Requirements

Control Measure	Recommendation
Comprehensive Odour Control System	Implementing a comprehensive odour control system will be a regulatory requirement for the TS-SSO. The preliminary recommendations for such a system are outlined below and should be further refined during the detailed design process. A high-level estimate for this odour control system have been included in the opinion of probable cost.
ESDM Report	The completion of an ESDM Report would likely be a regulatory requirement for the TS-SSO. Therefore, it is recommended for an ESDM Report to be prepared during the detailed design phase. The cost associated with this report will be included in the opinion of probable cost.
Vinyl PVC Curtain	As a part of this project, a comprehensive odour control unit will be implemented in the TS-SSO. This comprehensive system should be designed to effectively mitigate off-site impacts due to odour and comply with regulatory compliances. These curtains would encounter a lot of wear and tear throughout a standard workday. Although PVC curtains for industrial applications are available, they would require frequent replacements throughout the year. Due to the application of a comprehensive odour control system and anticipated concerns with durability, the use of vinyl PVC curtains is not recommended.

Two Door Entry System	The use of a two parallel door entry system is a commonly applied best management practice for the mitigation of odour emissions. With this system one set of doors remains closed at all times minimizing the potential for odour to exit the TS-SSO. One major drawback of this system is the need for a larger building footprint to accommodate the collection vehicles between the two doors. At this site, there is insufficient space and turning radius for a double door entry system; therefore, it is not recommended.
Air Curtain	As their name implies, air curtains are a device which may be installed above an entryway to create an air barrier across the opening. This would work to minimize the amount of air / odour from exiting the TS-SSO when the overhead doors are opened. Although this technology is effective for odour control management, they would increase the capital cost requirements for the odour control system and would increase energy consumption of the TS-SSO. The implementation of air curtains should be further explored and determined through the ESDM Report.
Alternative Materials for Tipping Floor	The existing floor in the area of the TS-SSO is a semi-rough concrete material which is in generally good condition. To protect the existing floors and provide some barrier to odour absorption, the use of alternative materials for tipping floor materials or coatings (for example, metal, epoxies and/or specialty coatings) is recommended. It is common practice for metal covers to be provided for the push walls. Coating the tipping floor with metal covers would be a cost-intensive solution and these areas would encounter a great deal of wear and tear throughout the year. It is common practice for the floors of SSO Transfer Stations to have a sacrificial coating or layer of concrete that is intended to be replaced every five to ten years. Specialty coatings, epoxies, or metallic aggregate floor toppings are available which would provide abrasion, impact, and chemical resistance. A high-level estimate for these materials will be considered in the opinion of probable cost.
Vegetative Buffer	The restoration of the vegetative buffer on the north and west side of the site would likely be a cost-effective solution for the mitigation of odour at the TS-SSO. This control measure is recommended for the site but may be undertaken as a separate project from the TS-SSO conversion.

Operational Procedures	Due to the relatively low cost for implementation, the operational procedures outlined above are recommended to be used at the TS-SSO. These operational procedures should be incorporated into the Detailed Design and Operations Manual.

At such as time, findings from the ESDM Report and consultation with the MECP should be considered in the design criteria. As a preliminary recommendation, the comprehensive odour control system at the TS-SSO should generally include the following measures.

- Building air and process emissions from the TS-SSO should be contained and captured for treatment prior to emission. In this system, contaminated air would be extracted through enclosed duct systems by enclosed fan units that exhaust the air through an odour control unit. The extracted air is replaced by outside fresh air brought in by make-up units.
- A ventilation rate (i.e., minimum of 6 air changes per hour) within the TS-SSO tipping area will be provided to achieve a safe work environment for operations staff. An odour control unit will be provided to treat the exhaust air from the facility based on the operation of the facility being used continuously throughout the year.
- The preferred layout and placement of the odour control units and air handling units should be further determined during the detailed design process. It may be preferrable to place this equipment in an area that would not impede future expansions.
- The building should be maintained under a negative pressure (air pressure inside lower than that outside) as a means to minimize contaminated air from exiting the space when doors are open. Further the implementation of (i) an air curtain which operates when the doors are open or (ii) interlocking the odour collection fans to speed up when the doors are opened to maintain a negative pressure in the tipping floor area, should be reviewed during detailed design phase.
- In order for the odour management system to work effectively, the overhead doors should be kept closed as much as possible and opened only for a short period when vehicles enter/exit. The doors should remain shut during the dumping period.

A number of odour control technologies including ozone oxidation, absorption, chemical scrubbing, and biological filtration (biofiltration) processes are commercially available for odour control. **Table 3.4** outlined the advantages and disadvantages of alternative odour control technologies.

Table 3.4: Summary of Alternative Odour Control Technologies

Odour Control Technology	Advantages	Disadvantages
Ozone Oxidation Systems	• Relatively simple O&M	• Less proven technology • Limited applications
Activated Carbon Absorbers	• High efficiency • Effective for treating odour as opposed to single compounds • Reliable and proven technology • Relatively simple O&M • Relatively low capital cost • Relatively small footprint	• Less applicable for highly concentrated air streams • Replenishing and replacement of filter material required regularly
Wet Chemical Scrubbers	• High efficiency • Effective and reliable • Proven technology • Relatively simple O&M • Relatively low capital cost	• High chemical consumption • High energy cost • Difficulty disposing of wet waste
Biofiltration Processes	• High efficiency • Effective and reliable • Relatively simple O&M • Proven technology	• Sensitive to changes in temperature, moisture, and odour level • Replenishing and replacement of filter material required regularly • Continuous operation required for healthy and effective microbial communities • Relatively large footprint • High capital cost

In general, biofiltration processes are increasingly popular for use at SSO Transfer Stations. However, they would not be applicable for this situation due to the site limitations and their moderately large footprint requirements (up to 60 m^2 or 645 ft^2). For this application, activated carbon absorption is proposed due to relatively high removal efficiencies for odorous constituents. This technology is relatively simple to operate, has a lower capital cost, and requires a smaller footprint. The proposed activated carbon system is recommended to be located inside the existing maintenance building but may also be located outdoors (to be confirmed through the detailed design process).

3.4 SITE MODIFICATIONS AND ON-SITE IMPACTS

All of the modification work for this project is located within the existing Fibre MRF. Assuming that the TS-SSO replaces the fibre recycling activities the impact to other nearby operations, equipment, staff, and contractors is expected to be minimal. The preliminary requirements for structural modifications, leachate and wash water processing, and site stormwater are outlined in the following section. In addition, potential impacts related to roads, traffic control, and vehicle queuing are outlined in **Section 3.4.2**. The extent of modification required for electrical services are dependent on the detailed design requirements of the odour control system, HVAC system, and overhead door power requirements.

3.4.1 Structural Modifications

The structural modifications that would be required for the conversion of the Fibre MRF would generally include the following:

- Removal of 2004 building expansion (walls, roof, beams, etc.). The existing floor and exterior grading are to remain and will be the new access point for the collection vehicles.
- New bollards / guardrail along grid line 3a and B to separate higher and lower elevation areas.
- Removal of the existing push wall (along grid line 1) which runs between the original Fibre MRF and the 2004 Expansion to below floor level and repair area to match existing floor.
- Removal of existing conveyors and recycling equipment in the area of the proposed TS-SSO.
- Refinishing the floor in the area of the underground conveyor including filling in pit.
- New exterior wall and framing (along grid line 1) with three (3) new robust overhead door systems for collection vehicle entry and exit.
- New extension on the west side of the existing Fibre MRF to house the new transfer trailer bay. New opening through the existing wall to provide access to load the transfer trailer from the tip floor area.
- New framing and overhead door system for the transfer trailer bay.
- Remove two (2) existing overhead doors and close openings.
- New dividing wall (south of grid line 5) to enclose the TS-SSO.
- New maintenance room inside the existing Fibre MRF (between grid line 5 and 6) to house the odour control units and air handling unit.
- New push wall.
- General inspection and refurbishment of the existing Fibre MRF (including roof inspection and potential modifications).

There are unknowns related to record drawings for the Fibre MRF building superstructure and the sub-surface conditions. A detailed structural investigation of all structural elements should be completed to assess the appropriate detailed design of the division walls, overhead doors/frames, and other structures.

For the prevention of off-site impacts associated with noise, vector and vermin, and odour, all building modifications should occur prior to the operation of the TS-SSO. It is anticipated that all of the modifications can be made within the proposed implementation timeline outlined in **Section 3.5**.

3.4.2 Traffic Control Requirements

The travelling route and queuing area for the collection vehicles and travelling route for the transfer trailer are shown in **Figure 3.1** and **Figure 3.2** of **Appendix A**.

Based on the preliminary capacity projections for the TS-SSO, the number of collection vehicles expected at the site each day will be in the range of 14 to 21 (for the peak capacity of 16,700 tonnes/year). This number may vary based on the type of collection vehicle selected for this TS-SSO and the amount of public participation in the program. It is assumed that the collection vehicles will arrive and the facility at 70% capacity. The collection vehicles are expected to arrive at the site in two distinct groupings, once in the morning and once in the afternoon. At peak times collection vehicles would que between the TS-SSO and the Container MRF and proceed to the next available bay for unloading.

The number of transfer vehicles expected at the site each day will be in the range of 3 to 4 (for the peak capacity of 16,700 tonnes / year). It is assumed that a transfer vehicle will be available throughout the day through proper scheduling such that loading can occur in an efficient manner. The transfer vehicle to be used for this TS-SSO should be a road legal commercial motor vehicle in compliance with O.Reg 419/15 of the Highway Traffic Act. It is proposed that a standard semi-trailer truck equipped with a leak proof trailer be used for this application. In addition, the trailer should have a retractable or automatic cover that is used on-site and on roadways for the transportation of SSO.

Minor modifications will be required to accommodate the transfer trailers access to the expansion on the west side of the existing Fibre MRF. This would generally include (i) regrading and repaving of the access driveway and (ii) modifications to the driveway apron. The exact requirements should be determined during the detailed design phase.

It is anticipated that the study area will accommodate the estimated number of vehicles to meet the SSO waste management needs of 16,700 tonnes per year on a 4-day a week collection and working schedule.

3.4.3 Leachate and Wash Water Requirements

It's recommended that leachate and wash water be discharged to City of Windsor sewer system. The sanitary discharge from the TS-SSO will be required to meet the City of Windsor Sewer Use By-Laws. Further, written approval should be received from the City of Windsor.

As the site is considered industrial, pre-treatment to remove non-compatible substances such heavy metals. solids, oils, grease, and grit will likely be required prior to discharge into the municipal system. To achieve this, all leachate and wash water will be screened and directed through an oil/grit separator (OGS) to prevent debris, oil and grit from being discharged to the sewer.

The tipping floor is proposed to be graded with a peak along the centerline, which would allow washwater to flow towards trench drains on the east and west sides of the TS-SSO. Additionally, a trench drain should be provided west of gridlines A, B, and 3a (inside the overhead doors) to prevent washwater from leaving the TS-SSO. These trench drains would outlet to a common sanitary pipe upstream of the trash basket and OGS unit. Vehicle washing should be completed by EWSWA and/or vehicle operators and focus on directing wash water to the floor drains will be required. Based on the available elevations, it is anticipated that leachate and wash water conveyance can be via gravity flow. Detailed drainage requirements should be determined during detailed design.

The oil, grit and sludge collected by the pretreatment equipment (trash basket and OGS unit) will have to be periodically removed and disposed of as a hazardous waste. Other types of treatment may be required at the request of the City such as pH adjustment and settling processes. Detailed pretreatment requirements should be developed during detailed design.

3.4.4 Site Stormwater and Drainage Impacts

Site stormwater runoff that does not come into contact with the SSO would be considered clean and would not require special management prior to being released to the environment. This would include stormwater runoff from building roofs and parking lots. Storm water quantity, quality control, sediment and erosion control for this project will not be required for this project.

The implementation of the preferred design will require minor modifications to the site drainage on the west side of the TS-SSO. This may include regrading of the access driveway and surrounding grassed areas as well as the addition of a stormwater interceptor sewer (on the south side of the transfer trailer bay) to accommodate the lowering of the transfer area floor.

3.5 PROPOSED IMPLEMENTATION TIMELINE

The proposed implementation timeline for the TS-SSO is outlined in **Table 3.5**.

Table 3.5: Proposed Implementation Timeline for the TS-SSO

Key Project Milestone	Anticipated Timeline
Feasibility Study	December 2023 – March 2024
Pre-Consultation with the MECP (including consultation with local residents)	March 2024 – July 2024
Design Consultant Procurement	April 2024 – May 2024
Detailed Design and Operations Report	June 2024 – October 2024
Building Permit Approval	October 2024 – January 2025
ECA Amendment Application	October 2024 – September 2025
Tender and Construction	January 2025 – August 2025
Commissioning and Operation Training	September 2025 – October 2025

4.0 PERMITTING REQUIREMENTS AND CONSIDERATIONS

Anticipated permitting requirements for the facility are outlined in **Table** 4.1.

Table 4.1: Permitting Requirements for the TS-SSO

Permit Type	Supporting Documents	Timeline
Environmental Compliance Approval (ECA) Amendment	• Design and Operations Report • Pre-application Consultation Record • Site Plan Drawing • Record of Notification to Adjacent Landowners • Emission Summary and Dispersion Modelling Report • ~~Stormwater Management and Drainage Report~~ (*not required provided the facility does not include outdoor storage of waste or discharge from inside the building to outside*)	12 – 14 Months
Building Permit	These documents may vary in length and scope, depending on the size, nature, and intent of the proposed work. Documents: • Form A – Application for a Permit to Construct or Demolish • Form A.1 – Designer Information (Part 9 Small Buildings) • Form A.2 – Sewage System Installer Information (if on sewage system) • Form A.3 – Commitment to General Review by Architect and Engineers (Part 3 Buildings) • Form A.4 – Licensed Contractors • SB-10 – Energy Efficiency Design Summary • Heritage Alteration Permit (if required) • Geotechnical Report Drawings: • Site Plan • Civil Drawings • Architectural Drawings • Structural Drawings • HVAC Drawings • Plumbing Drawings • Fire Protection Drawings • Electrical Drawings	4 Months

5.0 OPINION OF PROBABLE COST

Opinions of probable cost are commonly provided throughout various stages of a project lifecycle and there are a number of classifications for these estimates that identify the level of accuracy. These classifications can vary based on the industry, but all are based on the fact that the level of accuracy is directly proportional to the level of detail available at each stage of the project.

The level of accuracy for the opinion of probable cost increases as the project moves from the planning stage to the preliminary design and final design. A wide range of accuracy is expected at the planning stage of a project because a number of details remain unknown. As the project moves closer to completion and final design, the estimate would become more accurate due to the increased level of detail and the reduced number of unknowns.

Table 5.1 includes a summary of typical estimate classifications used throughout a project's development including a description of the project stage and range of accuracy. The opinions of probable cost in this study are estimated at the conceptual stage (Class 1) and the corresponding level of accuracy could range from –30% to +50% from the opinion presented in the report.

Table 5.1: Classification of Cost Estimates

Class	Description	Level of Accuracy	Stage of Project Lifecycle
1	Conceptual Estimate	+50% to -30%	Screening of alternatives.
2	Study Estimate	+30% to -15%	Planning and/or environmental assessment report.
3	Preliminary Estimate	+25% to -10%	Preliminary design report.
4	Detailed Estimate	+15% to -5%	Final design report and specifications.
5	Tender Estimate	+10% to -3%	Estimate received from the contractor in response to the Tender.

The opinion of probable cost is an estimate of the future contract price for the engineering and construction work, which is not yet fully defined and may be subject to changes in scope, design, and market conditions. An opinion of probable cost estimate (in January 2024 dollars) is summarized in **Table 5.2**. Additional details for the cost estimate are available in **Appendix B**. The opinion of probable cost was prepared taking into consideration the following factors.

- All estimates are 2024 Canadian dollars based on an Engineering News Record (ENR) Construction Cost Index of 1200.
- It is assumed that the Contractor will have unrestricted access to the site and will complete the work during normal working hours from 7:00 am to 5:00 pm Monday to Friday. There is no allowance for premium time included. Labour costs are based on union labour rates for the Windsor area. Bulk material and equipment rental costs used are typical for the Windsor area.
- An allowance is included for mobilization and demobilization and the Contractor's overhead and profit.

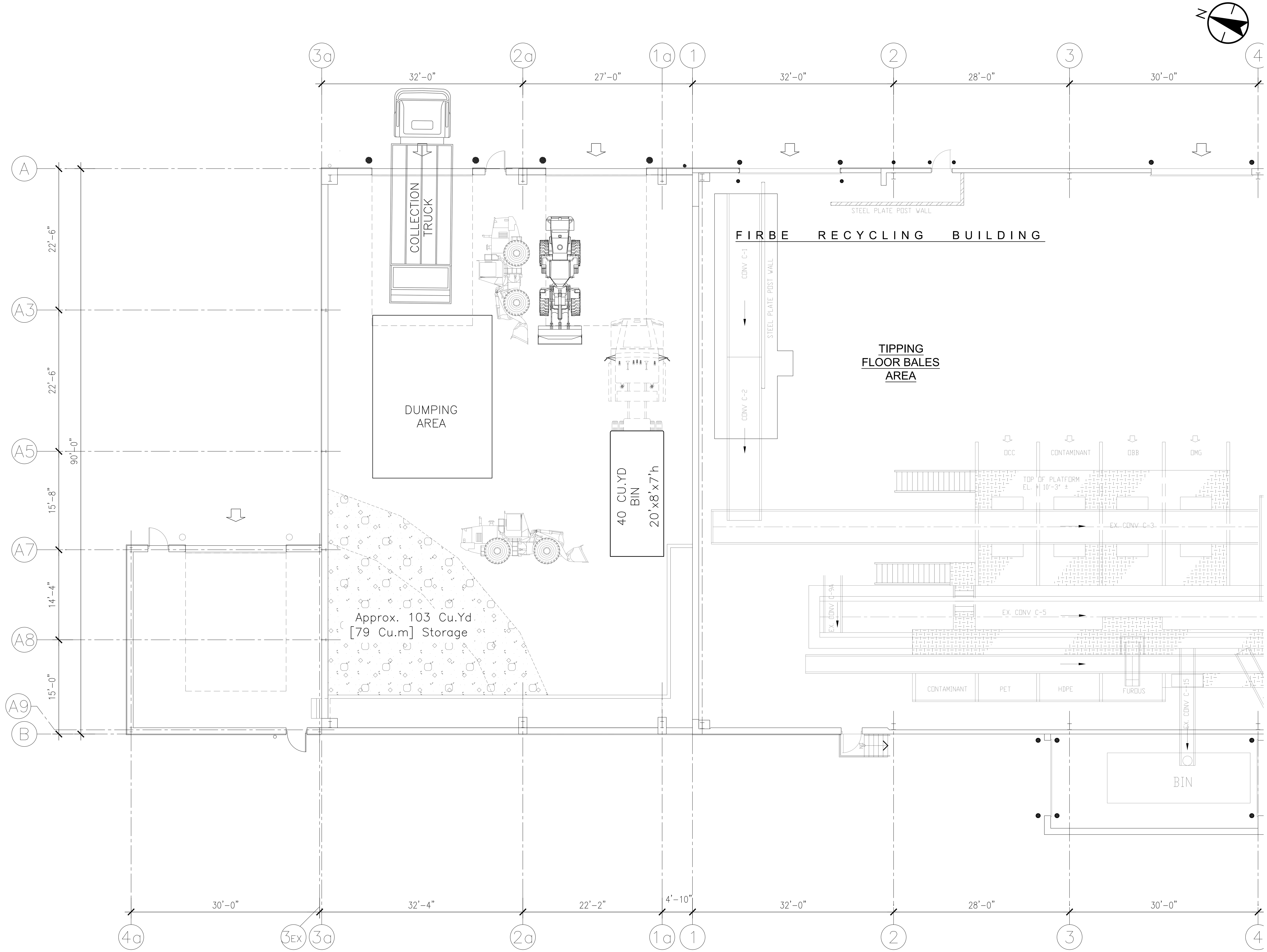
- No allowance is included for interim financing costs or legal costs.
- No allowance is included for escalation beyond the date of this report.

Table 5.2: Opinion of Probable Capital Cost for Preferred Solution

Item	Description	Probable Cost
1	Construction Cost	$3,739,000.00
2	Detailed Design and Project Management	$206,000.00
3	Contract Administration	$169,000.00
4	Supporting Studies and Reports	$78,000.00
5	Permits and Applications	$18,000.00
TOTAL CAPITAL COST (excluding taxes)		**$4,210,000.00**

APPENDICES

APPENDIX A: FIGURES



PARTIAL FIBRE RECYCLING BUILDING PLAN

SCALE: 1/8" = 1'-0"

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Legend

Notes

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD
A			

File Name: 165620305_FIG-1	Q.K.	J.C.	J.C.	2023.12.19
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit/Seal

PRELIMINARY NOT FOR CONSTRUCTION

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Client/Project
ESSEX WINDSOR SOLID WASTE AUTHORITY

SOURCE SEPARATED ORGANICS
TRANSFER STATION REHABILITATION

City of Windsor, Ontario

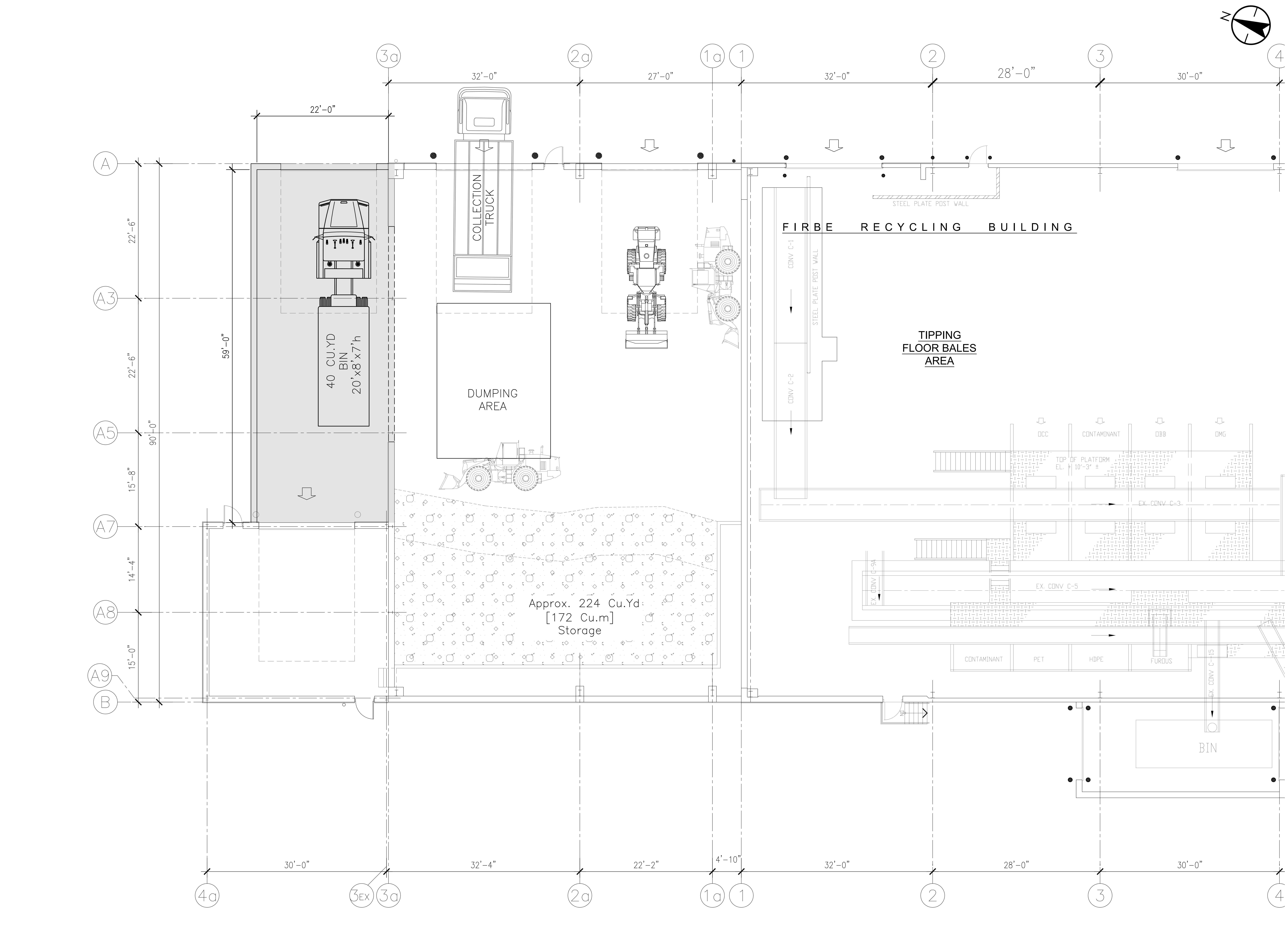
Title
FIRBE RECYCLING BUILDING PLAN
Alternative No. 1

Project No. 165620305

Scale AS SHOWN

Revision

Drawing No. **Figure 2.1**



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File Name: 165620305_FIG-1	Q.K.	J.C.	J.C.	2023.12.19
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SOURCE SEPARATED ORGANICS
TRANSFER STATION REHABILITATION

City of Windsor, Ontario

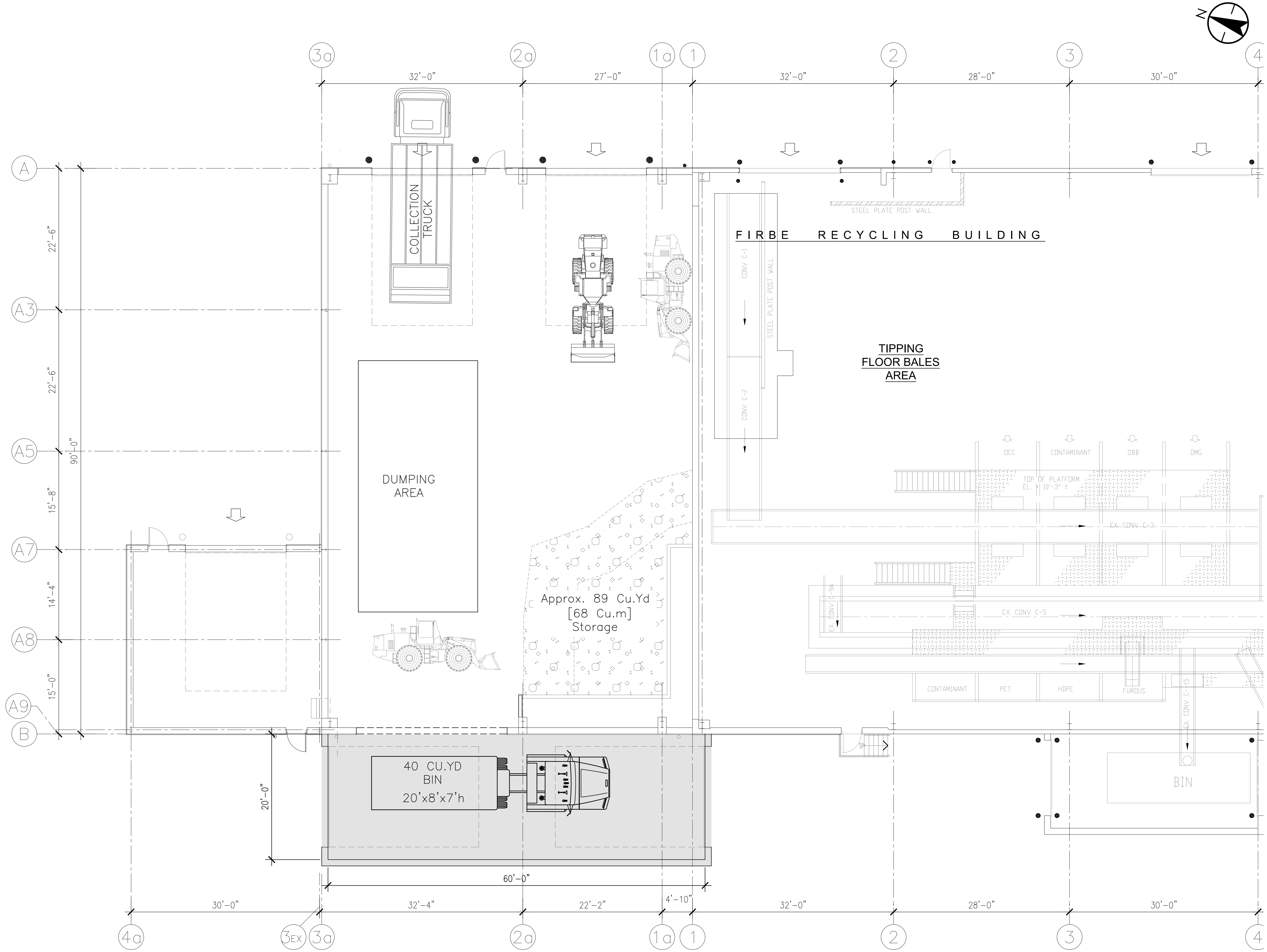
Title
FIRBE RECYCLING BUILDING PLAN
Alternative No. 2A

Project No.
165620305

Scale
AS SHOWN

Revision

Drawing No.
Figure 2.2



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SCALE: 1/8" = 1'-0"

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File Name: 165620305_FIG-1	Q.K.	J.C.	J.C.	2023.12.19
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

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ESSEX WINDSOR SOLID WASTE AUTHORITY

SOURCE SEPARATED ORGANICS TRANSFER STATION REHABILITATION

City of Windsor, Ontario

Title

FIRBE RECYCLING BUILDING PLAN

Alternative No. 2B

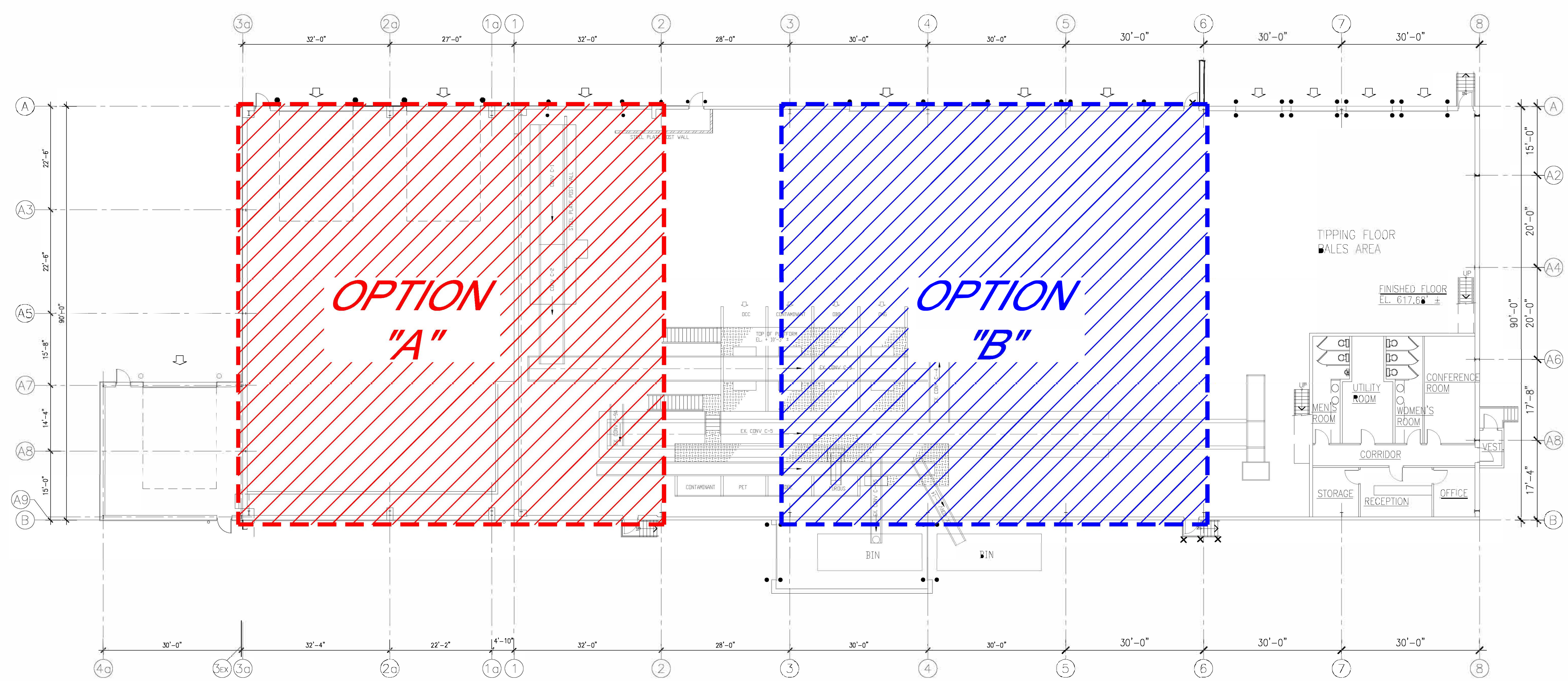
Project No. 165620305

Scale AS SHOWN

Revision

Drawing No.

Figure 2.3



PARTIAL FIBRE RECYCLING BUILDING PLAN
SCALE: 1/8" = 1'-0"

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File Name: 165620305_option A-b	Q.K.	J.C.	J.C.	2023.12.19
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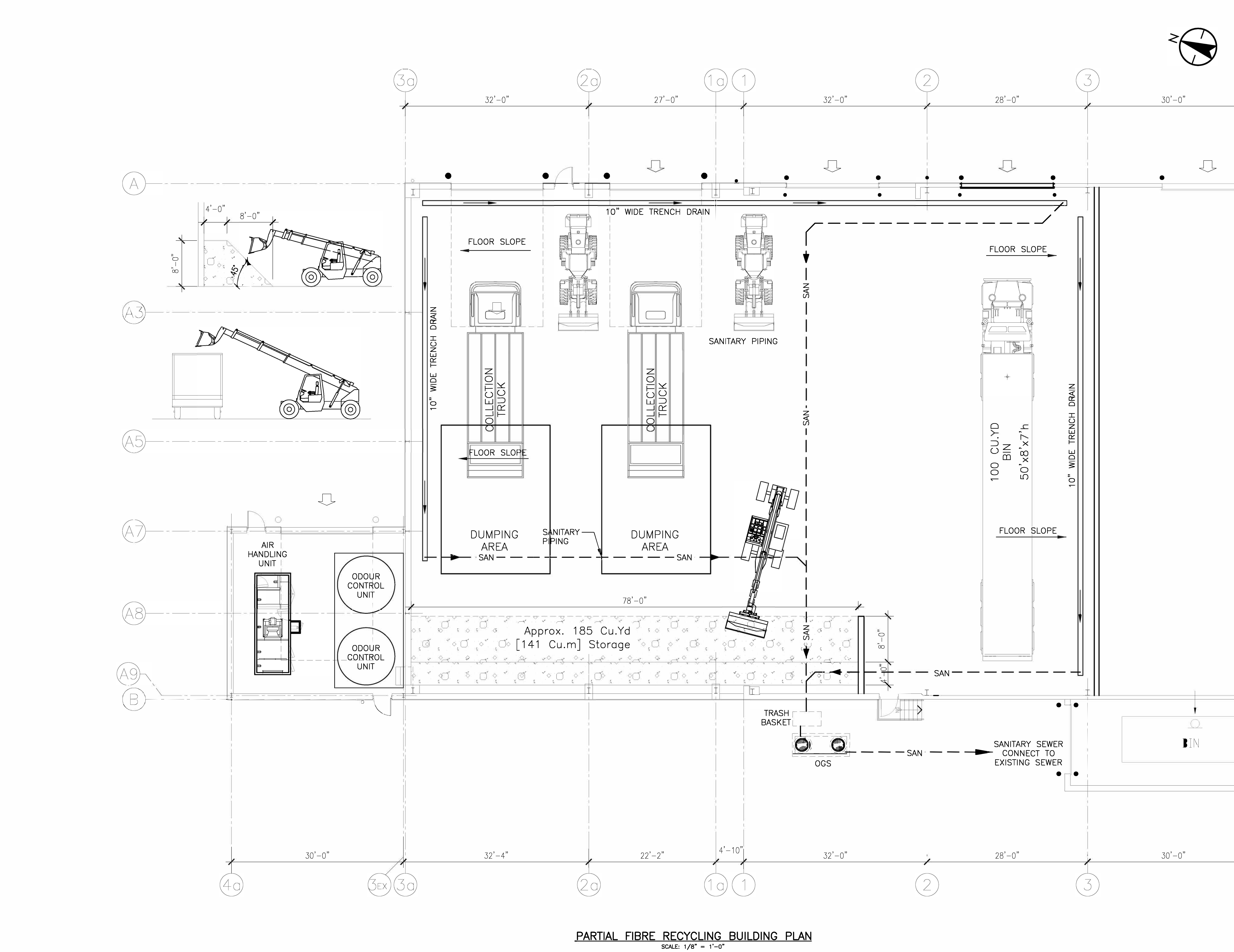
Client/Project
ESSEX WINDSOR SOLID WASTE AUTHORITY

SOURCE SEPARATED ORGANICS
TRANSFER STATION REHABILITATION

City of Windsor, Ontario

Title
FIRBE RECYCLING BUILDING PLAN
Alternative No. 3A &3B

Project No. 165620305
Scale AS SHOWN
Revision
Drawing No.
Figure 2.4



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SCALE: 1/8" = 1'-0"

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File Name: 165620305_FIG-1	G.K.	J.C.	J.C.	2023.12.19
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SOURCE SEPARATED ORGANICS TRANSFER STATION REHABILITATION

City of Windsor, Ontario

Title

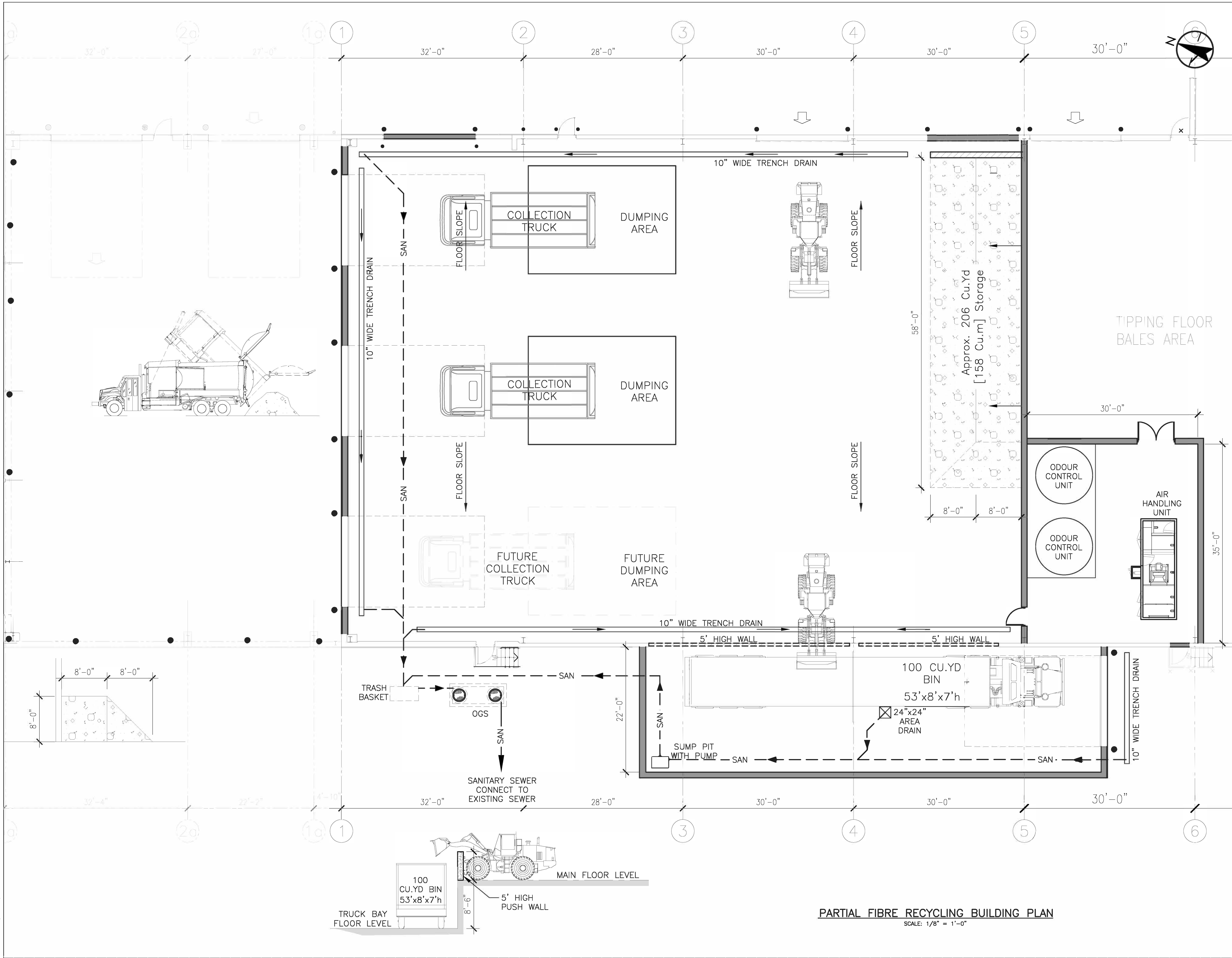
FIRBE RECYCLING BUILDING PLAN
Alternative No. 3

Project No. 165620305

Scale AS SHOWN

Revision

Drawing No.
Figure 2.5



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File Name: 165620305_FIG-1	Q.K.	J.C.	J.C.	2023.12.19
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Client/Project
ESSEX WINDSOR SOLID WASTE AUTHORITY

SOURCE SEPARATED ORGANICS TRANSFER STATION REHABILITATION

City of Windsor, Ontario

Title
FIRBE RECYCLING BUILDING PLAN
Alternative No. 4

Project No. 165620305

Scale AS SHOWN

Revision

Drawing No.
Figure 2.6

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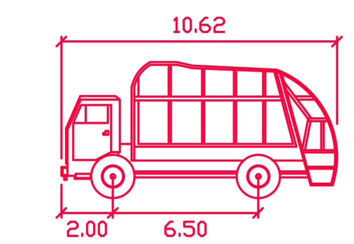

COE - Garbage - Hand Collection Truck

	meters
Width	: 3.20
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.0

Notes

Revision	By	Appd.	YY.MM.DD

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File Name: 165620305C-001	Dwn.	Chkd.	Dsgn.	YY.MM.DD
				2020.

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Client/Project
CITY OF WINDSOR

EWSWA Organics Transfer Station

City of Windsor, Ontario

Title
COLLECTION VEHICLE
Route

Project No.	Scale
165620305	1:500

Revision Sheet Drawing No.

Figure 3.1

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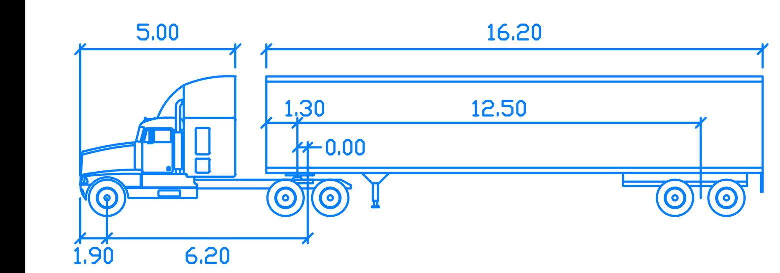

WB-21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 32.1
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

Notes

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

File Name: 165620305C-001	Dwn.	Chkd.	Dsgn.	YY.MM.DD
				2020.

Permit/Seal

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Client/Project
CITY OF WINDSOR

EWSWA Organics Transfer Station

City of Windsor, Ontario

Title
TRANSFER VEHICLE
Route

Project No.
165620305

Scale
1:500

Revision Sheet

Drawing No.
Figure 3.2

APPENDIX B: COST ESTIMATE

ESSEX-WINDSOR SOLID WASTE AUTHORITY
CONVERSION OF EXISTING FIBRE MRF TO SSO TRANSFER STATION
PLANNING OPINION OF PROBABLE COST
ALTERNATIVE NO. 3

Stantec

Item No.	General Description	Description of Work	Quantity	Unit	Unit Price	Stantec Probable Cost
CONSTRUCTION COST						
1	General Trades Work	General Demolition	1	l.s.	$ 50,000.00	$ 50,000.00
2		Removal of Existing Equipment	1	l.s.	$ 80,000.00	$ 80,000.00
3		Grading and Earthwork	0	tonnes	$ 250.00	$ -
4		Access Driveway	0	m^2	$ 50.00	$ -
5	Structural Work	Concrete Curb in Northwest Corner of Existing MRF	1	l.s.	$ 10,000.00	$ 10,000.00
6		Floor Repair	100	m^3	$ 500.00	$ 50,000.00
7		Building Restoration	1	l.s.	$ 50,000.00	$ 50,000.00
8		Interior Separation Wall with Basic Finishing	1	l.s.	$ 120,000.00	$ 120,000.00
9		Building Modifications for New Exterior Wall and Transfer Trailer Extension	0	l.s.	$ 495,000.00	$ -
10		Specialty Coating or Sacrificial Floor Coating	1000	m^2	$ 150.00	$ 150,000.00
11		Push Wall	12	m	$ 1,500.00	$ 18,000.00
12		Push Wall Refurbishment	22	m	$ 500.00	$ 11,000.00
13		Overhead Rolling Doors (Replacement)	4	each	$ 40,000.00	$ 160,000.00
14		Modification to Fire Suppression System to Accommodate Door	1	l.s.	$ 10,000.00	$ 10,000.00
15	Mechanical Work	Plumbing	1	l.s.	$ 60,000.00	$ 60,000.00
16		Floor Drain	1	l.s.	$ 30,000.00	$ 30,000.00
17		Ductwork, Exhaust Fans, Basic Climate Control, Air Handling Unit and Accessories	1	l.s.	$ 100,000.00	$ 100,000.00
18		Odour Control Unit (Carbon Absorption)	1	l.s.	$ 900,000.00	$ 900,000.00
19	Electrical Work	Basic Electrical Requirements including Lighting	1	l.s.	$ 125,000.00	$ 125,000.00
20	Process Equipment	Trash Basket	1	l.s.	$ 20,000.00	$ 20,000.00
21		Oil and Grit Separator	1	l.s.	$ 60,000.00	$ 60,000.00
22	Contract and General Requirements	Mobilization and Demobilization	1	l.s.	$ 31,000.00	$ 31,000.00
23		Bonds (Performance, Labour and Material Payment)	1	l.s.	$ 31,000.00	$ 31,000.00
24		Insurance Certificates (Builders Risk, General Liability, Vehicle, Environmental Impairment)	1	l.s.	$ 17,000.00	$ 17,000.00
25		Contractor Pre-Start Health and Safety Review	1	l.s.	$ 5,000.00	$ 5,000.00
26		Lump sum to cover all other requirements of the contract not specifically covered by or related to preceding items hereof.	1	l.s.	$ 41,000.00	$ 41,000.00
					SUBTOTAL ANTICIPATED CONSTRUCTION COST (excluding HST)	$ 2,129,000.00
					CONTINGENCY ALLOWANCE (30%)	$ 639,000.00
TOTAL ANTICIPATED CONSTRUCTION COST (excluding HST)						$ 2,768,000.00
EQUIPMENT COSTS						
1	Transfer Equipment	Telescopic Front End Loader	1	l.s.	$ 185,000.00	$ 185,000.00
TOTAL ANTICIPATED EQUIPMENT COST (excluding HST)						$ 185,000.00
ENGINEERING AND INCIDENTAL COSTS						
1	Design	Detailed Design and Project Management (including Design and Operations Report)	1	l.s.	$ 167,000.00	$ 167,000.00
2	Contract Administration	Contract Administration	1	l.s.	$ 139,000.00	$ 139,000.00
3	Supporting Studies and Reports	Structural Investigation Report	1	l.s.	$ 20,000.00	$ 20,000.00
4		Emission Summary and Dispersion Modelling (ESDM) Report	1	l.s.	$ 18,000.00	$ 18,000.00
5		Noise and Vibration Impact Technical Memo	1	l.s.	$ 10,000.00	$ 10,000.00
6		Topographic Plan of Survey	0	l.s.	$ 18,000.00	$ -
7		Geotechnical Investigation and Report	0	l.s.	$ 10,000.00	$ -
8	Permits / Applications	Environmental Compliance Approval Application	1	l.s.	$ 8,000.00	$ 8,000.00
9		Building Permit Application	1	l.s.	$ 10,000.00	$ 10,000.00
TOTAL ANTICIPATED ENGINEERING AND INCIDENTAL COSTS (excluding HST)						$ 372,000.00
ANTICIPATED TOTAL PROJECT COST						
TOTAL ANTICIPATED PROJECT COST (excluding HST)						$ 3,325,000.00

ESSEX-WINDSOR SOLID WASTE AUTHORITY
CONVERSION OF EXISTING FIBRE MRF TO SSO TRANSFER STATION
PLANNING OPINION OF PROBABLE COST
ALTERNATIVE NO. 4

Stantec

Item No.	General Description	Description of Work	Quantity	Unit	Unit Price	Stantec Probable Cost
CONSTRUCTION COST						
1	General Trades Work	General Demolition	1	l.s.	$ 150,000.00	$ 150,000.00
2		Removal of Existing Equipment	1	l.s.	$ 100,000.00	$ 100,000.00
3		Grading and Earthwork	530	tonnes	$ 250.00	$ 132,500.00
4		Access Driveway	250	m^2	$ 50.00	$ 12,500.00
5	Structural Work	Concrete Curb in Northwest Corner of Existing MRF	0	l.s.	$ 10,000.00	$ -
6		Floor Repair	100	m^3	$ 500.00	$ 50,000.00
7		Building Restoration	1	l.s.	$ 30,000.00	$ 30,000.00
8		Interior Separation Wall with Basic Finishing	1	l.s.	$ 120,000.00	$ 120,000.00
9		Building Modifications for New North Wall and Transfer Trailer Extension	1	l.s.	$ 495,000.00	$ 495,000.00
10		Specialty Coating or Sacrificial Floor Coating	1150	m^2	$ 150.00	$ 172,500.00
11		Push Wall	23	m	$ 1,500.00	$ 34,500.00
12		Push Wall Refurbishment	0	m	$ 500.00	$ -
13		Overhead Rolling Doors (New)	4	each	$ 25,000.00	$ 100,000.00
14		Modification to Fire Suppression System to Accommodate Door	0	l.s.	$ 10,000.00	$ -
15	Mechanical Work	Plumbing	1	l.s.	$ 60,000.00	$ 60,000.00
16		Floor Drain	1	l.s.	$ 30,000.00	$ 30,000.00
17		Ductwork, Exhaust Fans, Basic Climate Control, Air Handling Unit and Accessories	1	l.s.	$ 110,000.00	$ 110,000.00
18		Odour Control Unit (Carbon Absorption)	1	l.s.	$ 900,000.00	$ 900,000.00
19	Electrical Work	Basic Electrical Requirements including Lighting	1	l.s.	$ 135,000.00	$ 135,000.00
20	Process Equipment	Trash Basket	1	l.s.	$ 20,000.00	$ 20,000.00
21		Oil and Grit Separator	1	l.s.	$ 60,000.00	$ 60,000.00
22	Contract and General Requirements	Mobilization and Demobilization	1	l.s.	$ 41,000.00	$ 41,000.00
23		Bonds (Performance, Labour and Material Payment)	1	l.s.	$ 41,000.00	$ 41,000.00
24		Insurance Certificates (Builders Risk, General Liability, Vehicle, Environmental Impairment)	1	l.s.	$ 22,000.00	$ 22,000.00
25		Contractor Pre-Start Health and Safety Review	1	l.s.	$ 5,000.00	$ 5,000.00
26		Lump sum to cover all other requirements of the contract not specifically covered by or related to preceding items hereof.	1	l.s.	$ 55,000.00	$ 55,000.00
					SUBTOTAL ANTICIPATED CONSTRUCTION COST (excluding HST)	$ 2,876,000.00
					CONTINGENCY ALLOWANCE (30%)	$ 863,000.00
TOTAL ANTICIPATED CONSTRUCTION COST (excluding HST)						$ 3,739,000.00

Item No.	General Description	Description of Work	Quantity	Unit	Unit Price	Stantec Probable Cost
ENGINEERING AND INCIDENTAL COSTS						
1	Design	Detailed Design and Project Management (including Design and Operations Report)	1	l.s.	$ 206,000.00	$ 206,000.00
2	Contract Administration	Contract Administration	1	l.s.	$ 169,000.00	$ 169,000.00
3	Supporting Studies and Reports	Structural Investigation Report	1	l.s.	$ 22,000.00	$ 22,000.00
4		Emission Summary and Dispersion Modelling (ESDM) Report	1	l.s.	$ 18,000.00	$ 18,000.00
5		Noise and Vibration Impact Technical Memo	1	l.s.	$ 10,000.00	$ 10,000.00
6		Topographic Plan of Survey	1	l.s.	$ 18,000.00	$ 18,000.00
7		Geotechnical Investigation and Report	1	l.s.	$ 10,000.00	$ 10,000.00
8	Permits / Applications	Environmental Compliance Approval Application	1	l.s.	$ 8,000.00	$ 8,000.00
9		Building Permit Application	1	l.s.	$ 10,000.00	$ 10,000.00
TOTAL ANTICIPATED ENGINEERING AND INCIDENTAL COSTS (excluding HST)						$ 471,000.00

ANTICIPATED TOTAL PROJECT COST	
TOTAL ANTICIPATED PROJECT COST (excluding HST)	$ 4,210,000.00