THE CITY OF Edmonton

AMBLESIDE INTEGRATED SITE

INTEGRATED PROGRAM + MASTER PLAN REPORT V2

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EXECUTIVE SUMMARY

This report was requested by the City of Edmonton (CoE) to undertake a Synergy and Gap Analysis in March 2017, with the intent of developing a robust integrated programming and a Master Plan for the Ambleside Integrated Site (AIS) to optimize the provision of services to South Edmonton. The marc boutin architectural collaborative (MBAC) was retained to provide the Owner Group and CoE AIS Steering Committee with the information required to develop a programming and planning approach to integrating operations groups on future operations service sites as well as help make informed decisions on how to best achieve an integrated operations service facility at the Ambleside site.

The document has been structured to provide an overview of background information, operations groups' functional programs, integrated optimization strategies, design principles, existing site conditions, and the application of an integrated facility on the Ambleside site. This document also provides a summary of the key characteristics of all Master Plan design options presented to date and clearly documents the selected final Master Plan scheme.

The over arching design concept for all of the Master Plan design options was conceived by rationalizing the City of Edmonton's vision for the future. The City of Edmonton's vision, to achieve a robust and exemplary city where citizens learn, prosper and celebrate today and into the future, is inherently supported by the City's various department groups. This Master Plan focuses on how this vision of stewardship can be met through an integrated operations model, where City Operations and their staff are key metrics to meeting this mandate. A cyclical relationship of stewardship has been used to inform the integrated program and master planning where the City is seen as a leader, the City Operations Groups as cultivators, and the individual as a steward of the City. From a planning perspective, the Master Plan was designed considering efficiency, adaptability, security and safety, sustainability, interface and legibility as the major integrated planning principles. AIS is to achieve LEED Silver per the City of Edmonton's Sustainability Policy C532 and per the City of Edmonton's Consultant Manual.

The Master Plan process to develop an optimized, integrated site involved five primary phases:

Phase A: Existing Facility Review and Needs Assessment

Phase B: Program Abstraction and Analysis

Phase C: Integration Analysis

Phase D: Ambleside Site Test Fits

Phase E: AIS Master Plan

The Existing Facility Reviews including plan reviews and facility tours assessing existing CoE operation facilities and related building drawings in order to gain an in-depth understanding of the programming, workflows, and space relationships currently employed. The day-to-day tasks of the staff from administration to foreman to field staff were then analyzed and subsequently diagrammed.

The Needs Assessment phase began with the confirmation of which Operations Groups would be a part of the Master Plan process. The five final Operations Groups included:

- CoE City Operations - Parks + Roads Services:
  - PARKS MAINTENANCE (PARKS)
  - ROADWAY MAINTENANCE (ROADS)
  - TRAFFIC OPERATIONS (TRAFFIC)
- CoE City Operations - Fleet + Facility Services:
  - MUNICIPAL FLEET MAINTENANCE (FLEET)
  - FACILITY MAINTENANCE SERVICES (FMS)

The existing programs of these groups were extrapolated from the facility reviews to define the base-line program summaries. Operations Group interviews were held with Parks, Roads, FMS, Traffic and Fleet alongside the facility reviews in March and May 2017 to validate and confirm programming requirements of each operational group. Interview questions were developed for the individual operations group interviews and the responses were used to generate summaries for each groups' service priorities, space types, space relationships and staff workflows. The functional programs for each group were further developed with refined itemized space lists, staffing/equipment/vehicle quantities, space areas, and future needs.

While the program summaries were being developed for each operational group, the Program Abstraction and Analysis phase began with simplifying the program into categories that were common between the operation groups. Common workflows between categories were also analyzed and ideal space relationships and adjacencies were diagrammed to effectively take advantage of synergies between the groups.

The Integration Analysis focused on the development of optimization strategies that would allow for the union of the Operations Groups in a single integrated facility. Similarities in the day-to-day workflows across operations were identified and subsequently diagrammed. Spaces that could be standardized throughout the Operations Groups were revealed through the analysis of the individual program summaries and standardized configurations of those spaces were developed. Spaces that could be shared between Operations Groups, such as meeting rooms and workshops, were also identified and a strategy to understand the required quantity of these spaces was established. Lastly, through the application of the optimization strategies and review of the individual operations group program summaries, a single integrated program summary for all five Operations Groups was generated. This integrated program could be applied on any future integrated site and would be the base program to be tested on the Ambleside site.

After the integrated program was confirmed by the Operations Groups representatives, a series of Test Fits were developed and tested on a conceptual site. Through the testing of the integrated program on the conceptual site, the high efficiencies predicted from a integrated site were proven correct and strategies in the application of said program were established. The integrated program was then explored through a series of Test Fits on the Ambleside site which is located between Ellerslie Road SW and Anthony Henday Drive adjacent to the Whitemud Creek Ravine in Edmonton, Alberta (refer to Section 4.0). The site is currently used as a temporary Parks facility and a fully operational Eco Station.

Three stakeholder presentations were held to review the proposed Master Plan Test Fits and involved The City of Edmonton Owner Group, consultants (MBAC), the CoE AIS Steering Committee and representatives from each CoE Operations Groups.

During the first stakeholder presentation on July 28, 2017, the integrated programming and planning outcomes and four Test Fits (1, 2, 3, & 4) on the Ambleside site were presented to the CoE AIS Steering Committee. These four options investigated a series of scenarios exploring the potential of an integrated facility on the Ambleside site. The options tested different building configurations, operation group distribution, and parking strategies. Upon further review of the Ambleside site after the July 28, 2017 presentation, the CoE recommended that in order to find a suitable design option, the stormwater management strategy would have to be fully understood.

The current stormwater pond located on the Ambleside site was designed in 2007 and constructed in 2011. In 2015, the CoE updated their stormwater management requirements resulting in the on-site stormwater pond no longer meeting the mandatory storage capacity. Three new Test Fits entitled Test Fit 2B, 5, and 5B, were presented on November 15, 2017 to the CoE Operations Groups representatives, each exploring a different stormwater management strategy. The three strategies were:

- **Test Fit 2B**: maintaining the stormwater pond in its current location and meeting increased storage requirements through underground storage
- **Test Fit 5**: shifting the stormwater pond as far east as possible while maintaining access to the northeast corner of the site and increasing the size of the stormwater pond to meet increased storage requirements
- **Test Fit 5B**: removing the stormwater pond and meeting increased storage requirements through underground storage

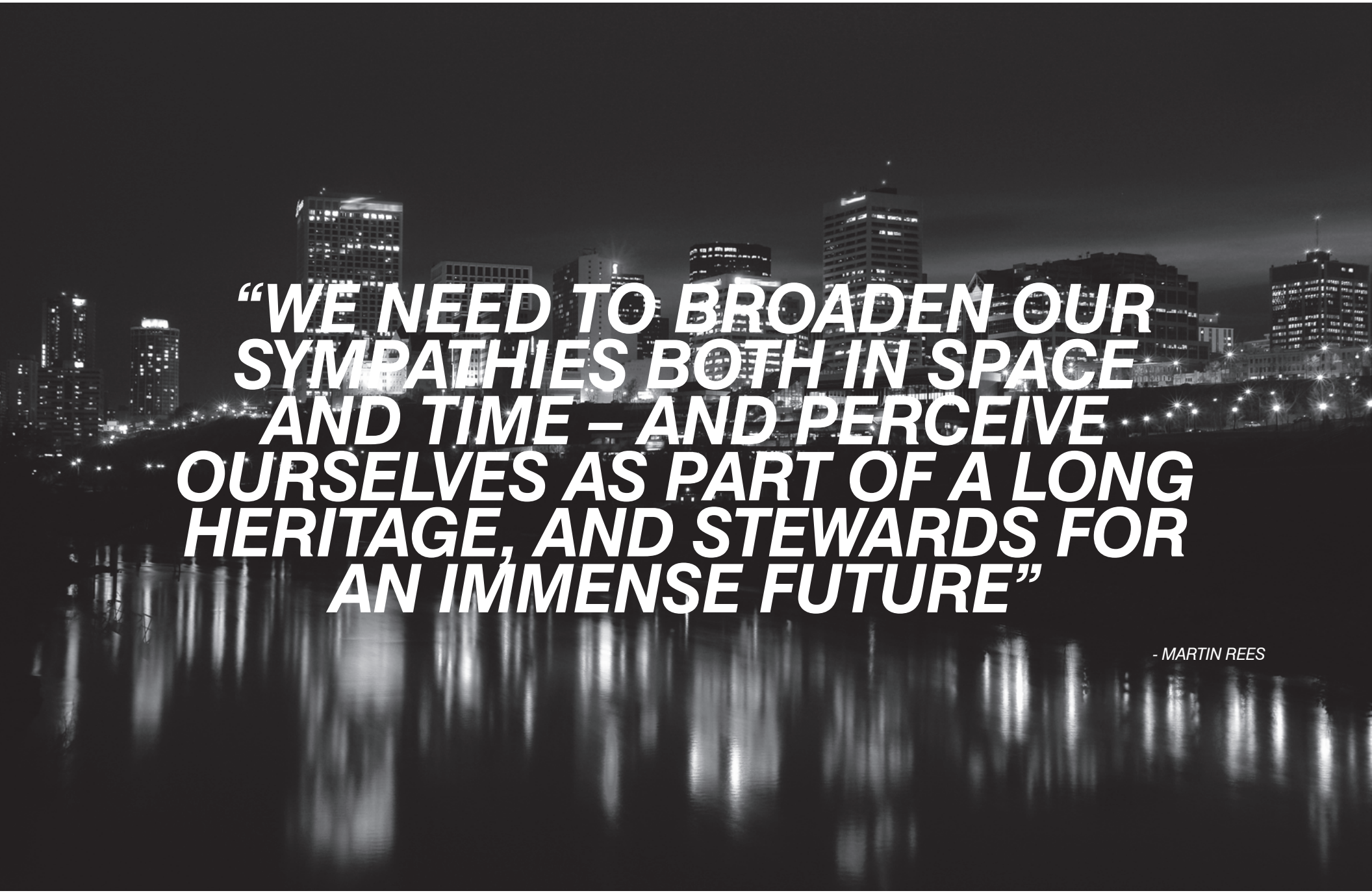
After presenting the three schemes on November 15, 2017, the stakeholders for each of the Operations Groups unanimously agreed to pursue Test Fit 5B for the final scheme in the Ambleside Master Plan as one of the main project mandates was to optimize the design of the Ambleside site and achieve as much programming as possible. On December 15, 2017, Test Fit 5B was presented to the CoE AIS Steering Committee with another unanimous decision to use Test Fit 5B as the Final Master Plan Scheme.

The Final Master Plan Scheme (refer to Section 5.1) includes the following characteristics:

- 95-100% program achievement
- Single, integrated facility
- Removed stormwater retention pond with proposed underground water storage maximizing site area
- Large, open, operations yard
- Consistent close proximity between the administration, staff support, and operations program
- All parking at grade
- Accommodates all Operations Groups
- Requires development over the S.E.S.S.

The Final Master Plan Scheme demonstrates that 95-100% of the Operations Groups programmatic requirements are able to be met within a single integrated facility and that flexibility is instilled within the facility for future project development.

A number of known risks have been identified through the Master Plan design process and communicated with the Owner Group and Steering Committee. These risks include building above an existing deep South Edmonton Sanitary Sewer (S.E.S.S.) line, required approval for the proposed secondary access road by the City of Edmonton Waste Services Branch, the AIS landownership, and achieving the landscaping requirements as stated by the CoE Land Use Bylaw 12800.


“WE NEED TO BROADEN OUR SYMPATHIES BOTH IN SPACE AND TIME – AND PERCEIVE OURSELVES AS PART OF A LONG HERITAGE, AND STEWARDS FOR AN IMMENSE FUTURE”
- MARTIN REES

1.0

Figure 1.1a: City of Edmonton Map

1.1 PROJECT BACKGROUND

The Marc Boutin Architectural Collaborative (MBAC) was retained by the City of Edmonton (CoE) to deliver the Ambleside Master Plan Version 1 (AMPV1), completed in March 2016 and Ambleside Integrated Site Southwest District Office + Service Yard project Schematic Design Report, completed July 20, 2016. the AMPV1 stakeholders included three City Operations Groups (Parks, FMS, and Fleet Services) and Tennis Alberta. The AMPV1 proposed various options for developing the site to better provide services to the south of Edmonton and included integrated and non-integrated options. The final chosen scheme was a non-integrated option that included separate sites at Ambleside for all four groups.

The Parks Schematic Design Phase was completed following approval of the Master Plan; however, the project was put on hold after Schematic Design while the City further reviewed intentions with the broader Ambleside site. The 2016 City Organizational Transformation brought together functions that were previously in separate departments all into one City Operations Department. Many of these Sections had interest in the Ambleside Site to develop future yard and office facilities to service the fast growing and expanding southwest quadrant. This change left the site completely within one department's mandate. This new Department, coupled with potential Annexation requirements and the removal of Alberta Tennis on site, resulted in an opportunity to reconsider the approved master plan, with the expectation that it will result in a more efficient and effective use of existing and future capital and operating resources.

Following the CoE Stakeholder Visioning Session on November 25, 2016, the City confirmed the need for an integrated operations model in order to more efficiently and effectively deliver integrated services to the City of Edmonton, as well as align with the City Operation's mandate to "keep Edmonton working, moving and thriving - a place citizens are proud of" - a vision that is met through integrated, innovative and efficient delivery of services.

A Synergy and Gap Analysis was then requested by the CoE with the intent to develop a robust integrated programming and Master Plan for the AIS to optimize the provision of services to South Edmonton. MBAC was retained to provide the Owner Group and Stakeholder Steering Committee with the information required to develop a model for integrating Operations Groups on future operations service sites as well as help make informed decisions on how to best achieve an integrated operations service facility at the Ambleside site.

1.2 CITY OF EDMONTON VISION

The City of Edmonton's vision, to achieve a robust and exemplary city where citizens learn, prosper and celebrate today and into the future, is inherently supported by the City's various department groups. This report focuses on how this vision of stewardship can be met through an integrated operations model, where City Operations and their staff are key metrics to meeting this mandate.

City Operations "keep Edmonton working, moving and thriving - a place citizens are proud of". The visioning completed by various City Operations Groups illustrates that by providing efficient and enhanced services today and tomorrow, the CoE remains credible and financially responsible to it's citizens.

By bringing various operations service providers together under one roof, an integrated operations model becomes a key facet of achieving effective and adaptive

delivery of services to the City. An integrated model will help City Operations cultivate empowered staff who in turn do their part on a day-to-day basis; staff who are stewards of exemplary public spaces, services and amenities that people will enjoy and experience now and into the future.

1.3 MASTER PLAN V2 PROCESS

Figure 1.3a represents the process undertaken for the Master Plan Version 2. The process began with the assessment of existing CoE operation facilities and related building drawings ("A1") in order to gain an in-depth understanding of the programming, workflows, and space relationships currently employed. The day-to-day tasks of the staff from administration to foreman to field staff were then analyzed and subsequently diagrammed. The reviewed and visited facilities included:

- Kennedale Roadway Maintenance Facility, 13003 56 ST
- Southwest District Operations Roadway Maintenance, 6609 Gateway Boulevard
- Northeast Traffic Field Operations, 13020 56 ST
- Roadway Maintenance Central District
- Fleet Operations Westwood Facility
- FMS 47th Avenue Facility, 9727 47 Avenue
- Kennedale Drainage, 12810 58 ST (Drainage was removed early on from the included Operations Groups)
- Kennedale Waste Management, 12802 58 ST NW (Waste was removed early on from the included Operations Groups)
- The Parks, FMS and Fleet Fuel Station existing review included the previous AIS Master Plan V1 analysis.

The initial portion of the Needs Assessment phase ("A2") involved the CoE confirming which Operations Groups would be a part of the study and what their priorities were. This resulted in the confirmation of Parks Maintenance, FMS Maintenance Services, Roadway Maintenance, Municipal Fleet Maintenance and Traffic Operations as part of the integrated operations study and Ambleside Master Plan. The existing programs of these groups were extrapolated to define the base-line integrated program. Operations Group interviews were held with Parks, Roads, FMS, Traffic and Fleet alongside the facility reviews in March and May 2017 to validate and confirm programming requirements of each operational group. Interview questions were developed for the individual operations group interviews and the responses were used to generate summaries for each groups' service priorities, space types, space relationships and staff workflows. The functional program was further developed with itemized space lists, staffing/equipment/vehicle quantities, space areas, and future needs.

While the programming was being developed for each operational group, Program Abstraction and Analysis ("B") began with simplifying the program into categories that were common between the operation groups. Workflows between categories were analyzed and ideal space relationships were diagrammed to effectively take advantage of synergies between the groups.

The Integration Analysis ('C") focused on the development of optimization strategies that would allow for the union of the Operations Groups in a single integrated facility. Similarities in the day-to-day workflows across operations were identified and subsequently diagrammed. Spaces that could be standardized throughout the Operations Groups were revealed through the analysis of the individual program summaries and a standardized configuration of those spaces was developed. Spaces that could be shared between Operations Groups, such as meeting rooms, were also

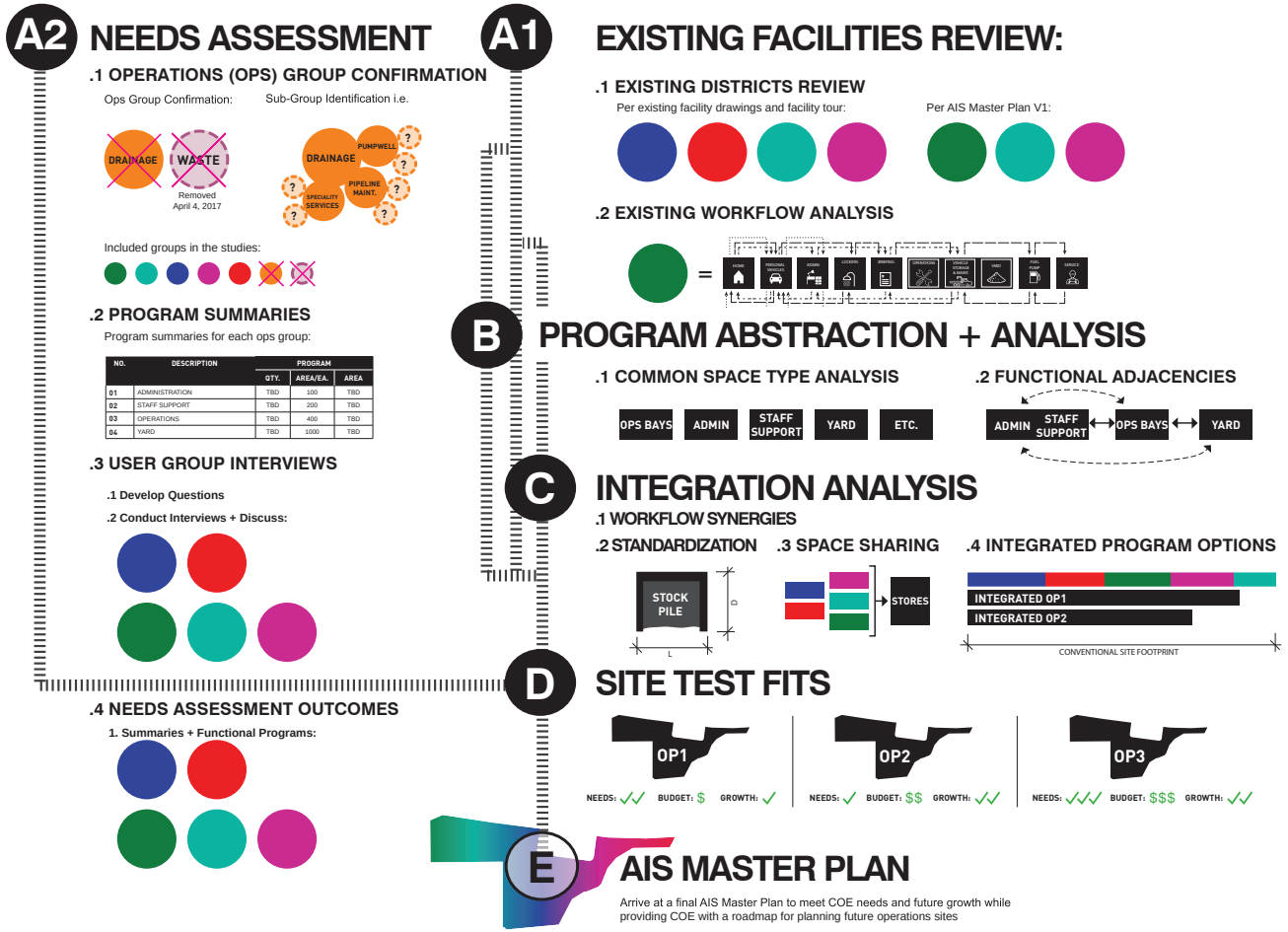


Figure 1.3a: Project Roadmap

identified and a strategy to understand the required quantity of these spaces was established. Lastly, through the application of the optimization strategies and review of the individual operations group program summaries, a single integrated program summary for all five Operations Groups was generated for the Ambleside site.

A series of site Test Fits ("D") on the Ambleside site were developed using the optimization strategies and planning principles and were presented to the CoE steering committee on July 28, 2017, the CoE Operational Group representatives on November 15, 2017, and to the CoE AIS Steering Committee again on December 15, 2017. The Test Fits were evaluated against the integrated principles and program optimization strategies. After the presentation on December 15, 2017 the stakeholders unanimously selected a Test Fit as the final scheme for the AIS Master Plan ("E") which is presented in Section 5.0 of this report.

1.4 APPLICABLE STANDARDS AND POLICIES

The proposed Master Plan has been design based on the following standards:

- Alberta Building Code 2014
- CoE Zoning Bylaw 12800. June 2015
- CoE Design and Construction Standards Volume 1 - General. March 2014
- CoE, Design and Construction Standards Volume 2 - Roadways Design Standards and Construction Specifications. January 2012
- CoE Policy Number C542 - Development Setbacks From River Valley/Ravine Crests. January 2010
- CoE Policy Number C532 - Sustainable Building Policy – Leadership in Energy and Environmental Design (LEED) Silver. May 2007
- CoE Universal Design Checklist. 2008
- Ambleside Neighbourhood Structure Plan. December 2013
- Windermere Area Structure Plan. February 2013
- I.T. Infrastructure Design Guidelines Volume 1. June 2015
- Security and Card Access System Design Guidelines, Draft. June 2015
- Video Surveillance System Design Guidelines, Draft. June 2015
- Imperial Oil - Delivery Site Hazard Checklist

1.5 PUBLIC INVOLVEMENT PLAN

Public involvement was not a requirement of the Master Planning phase as it will occur with each site stakeholder development. Once the Master Plan is in place, information will be made available to the neighbourhood.

1.6 OWNER PROVIDED INFORMATION

The following documents were provided by the Owner Group to the consultant:

- Geotechnical Investigation
  Proposed South West Integrated Services Site
  Ellerslie Road and 142nd Street SW, Edmonton, Alberta
  Prepared By: Hoggan Engineering & Testing (1980) Ltd.
  File No. 6131-12
  Date: April 5,2007

- Geotechnical Evaluation
  Proposed Ellerslie Eco Station
  Part of SE ¼-26-51-25-W4M
  14320 Ellerslie Road, Edmonton, Alberta
  File No: 6131-13
  Date: May 31,2007

- Environmental Site Assessment, Phase 1 – Supplementary Letter
  Proposed South West Integrated Services Site
  Ellerslie Road and 142nd Street SW, Edmonton, Alberta
  Prepared By: Hoggan Engineering & Testing (1980) Ltd.
  File No. 6131-12
  Date: April 5,2007

- Traffic Impact Assessment
  Windermere Neighbourhood One Neighbourhood Area Structure Plan
  Prepared By: Bunt & Associates
  Project No. 3052.03
  Date: July 2005

- Legal Survey
  Navland Geomatics Inc.
  Project No. CP-5333
  Date: November 24, 2015

2.0

2.1 INTRODUCTION

Reviews on a series of existing CoE operation facilities and related building drawings was conducted in order to gain an in-depth understanding of the programming, workflows, and space relationships currently employed. The AMPV1 and Ambleside Southwest District Office + Service Yard Schematic Design Report for the Parks operations group (Parks Schematic Design Report) were also reviewed and analyzed to best understand the needs of the Operations Groups. The day-to-day tasks and schedules of the staff from administration to foreman to field staff were then analyzed and subsequently diagrammed. The reviewed and visited facilities included:

- Kennedale Roadway Maintenance Facility, 13003 56 ST
- Southwest District Operations Roadway Maintenance, 6609 Gateway Boulevard
- Northeast Traffic Field Operations, 13020 56 ST
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- The Parks, FMS and Fleet Fuel Station existing review included the previous AIS Master Plan V1 analysis.

The Needs Assessment phase began with the CoE confirming which Operations Groups would be a part of the study and what their priorities were. This resulted in the Drainage and Waste Operations Groups being removed from the process leaving Parks Maintenance, FMS Maintenance Services, Roadway Maintenance, Municipal Fleet Maintenance and Traffic Operations as part of the integrated study and Ambleside Master Plan. The existing programs of the groups were extrapolated and used to define the base-line integrated program. Interview questions were developed for the individual Operations Groups and used to generate summaries for each groups' service priorities, space types, space relationships and staff workflows. The functional program was further developed with itemized space lists, staffing/equipment/vehicle quantities, space areas, staffing summaries, and future needs.

2.2 COE OPERATIONS GROUPS DESCRIPTIONS

The following section is broken down into a detailed assessment of each of the following groups:

PARKS MAINTENANCE (PARKS)

With over 850 park areas in the City of Edmonton, the Parks operation group is responsible for the upkeep, maintenance, and seasonal clean up of these City owned parks. This requires fabrication and repair bays, with vehicle and material storage space on the operations site.

FACILITY MAINTENANCE SERVICES (FMS)

FMS operates and pro-actively maintains City-owned facilities with a goal of maximizing their lifespan while minimizing costs and disruptions to public services. Facilities include buildings such as recreation facilities, police stations, libraries, City-owned office towers and transit shelters. The facility program on the Ambleside site will include administration, support spaces, yard storage, and operational service bays with specific bays dedicated to painting, locksmithing, and carpentry.

ROADWAY MAINTENANCE (ROADS)

Roads is responsible for services and assets that support mobility within the City. The group ensures that the City streets remain accessible, attractive and safe. The main services to be located at Ambleside are workshops, vehicle maintenance bays, storage bays, and a high amount of bulk storage provided in the yard.

MUNICIPAL FLEET MAINTENANCE (FLEET)

Fleet services ensures that City vehicles, and essential City operations equipment are well maintained, safe and reliable for use on a daily basis. The predominant use of Fleet's program at the Ambleside location will be City fleet vehicles as well as fleet vehicles not belonging to the CoE, accessing the fueling station, maintenance facility, and car wash.

TRAFFIC OPERATIONS (TRAFFIC)

Traffic includes repairs, maintenance, installation and removal of traffic signals, street lights, signage and other traffic related materials. The primary program required for these duties are workbays for minor fabrication and repairs, central storages material storage, and a large amount of exterior space for bulk signage and street light storage.

2.3 PARK MAINTENANCE (PARKS)

INTRODUCTION

The Parks program requirements includes administration offices, support spaces, and operational bays. The service bays require associated storage and auxiliary spaces to accommodate six operational areas: Horticulture, Sports Fields, Play Space Maintenance and Safety, Vegetation Management, Turf, and Forestry. The program includes two categories of parking: 1. service vehicles located in the secured yard, and 2. visitor and staff private vehicles. Staff and visitor parking should be located together where possible to maximize efficiency of the site. The secured service yard has both active and dormant functions. The active functions are to operate in an efficient manner between the operational service bays and the yard, without interference from the dormant functions. The yard includes service vehicle parking from ½ ton to 3 ton vehicles, tractors and mowers, 40-yard garbage bins, aggregate storage bins, open yard bulk storage, covered storage, covered parking for approximately 10 vehicles, fertilizer and cold storage.

WORK FLOW ANALYSIS

An analysis of existing workflow and Park's staffing requirements was conducted and is summarized in Figure 2.3a. The workflows demonstrates the sequence of program usage for each staffing type. These workflows are intended to summarize how the operations facilities are currently utilized.

YEARLY STAFFING SUMMARY

Interviews with existing operations staff were conducted in order to understand Park's staffing schedule with the results being summarized in Figure 2.3b. The interviews revealed that a peak time for the number of staff members exists from May until the end of October with more than twice as many people on duty than the remaining months of the year.

EXISTING FACILITY REVIEW

The design intentions from both the AMPV1 and the Parks Schematic Design (refer to Figure 2.3c) were utilized as a basis for the Parks functional needs assessment. The following were key desirable characteristics from AMPV1 and Parks Schematic Design:

- direct connection between interior operations and the service yard
- edging the site with bulk storage
- at grade parking
- providing a strong urban frontage
- using landscaping elements to increase the experiential quality of the site and to hide heavy operation elements from the public.
- single, open, flexible, and secure yard

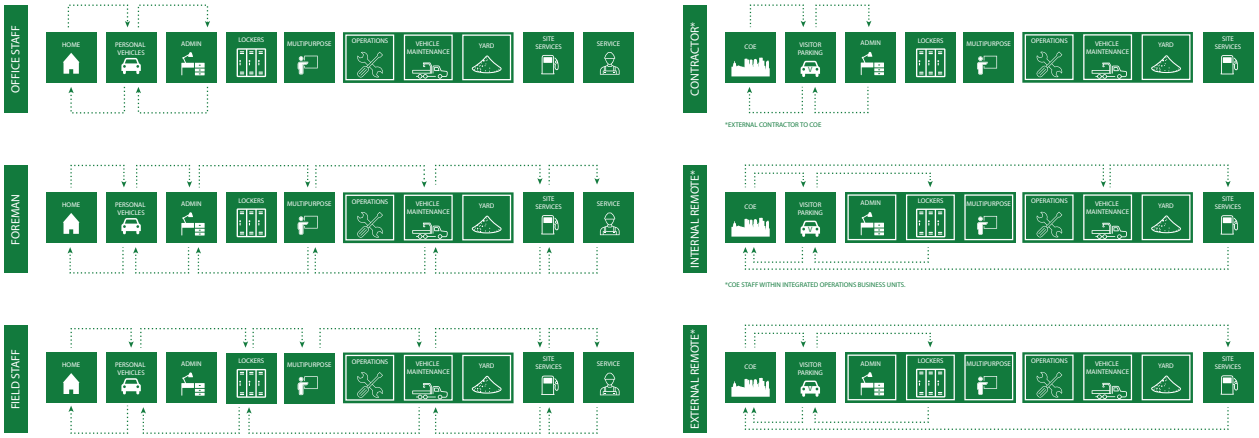


Figure 2.3a: Parks Work Flow Analysis

PARKS

DAY	SHIFT	# STAFF	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mon - Fri	6:00am - 4:00pm	35												
Mon - Fri	10 hr shifts	60												
Mon - Fri	7:00am - 3:00pm	20												
		Total	35									80		35

Figure 2.3b: Parks Yearly Staffing Summary

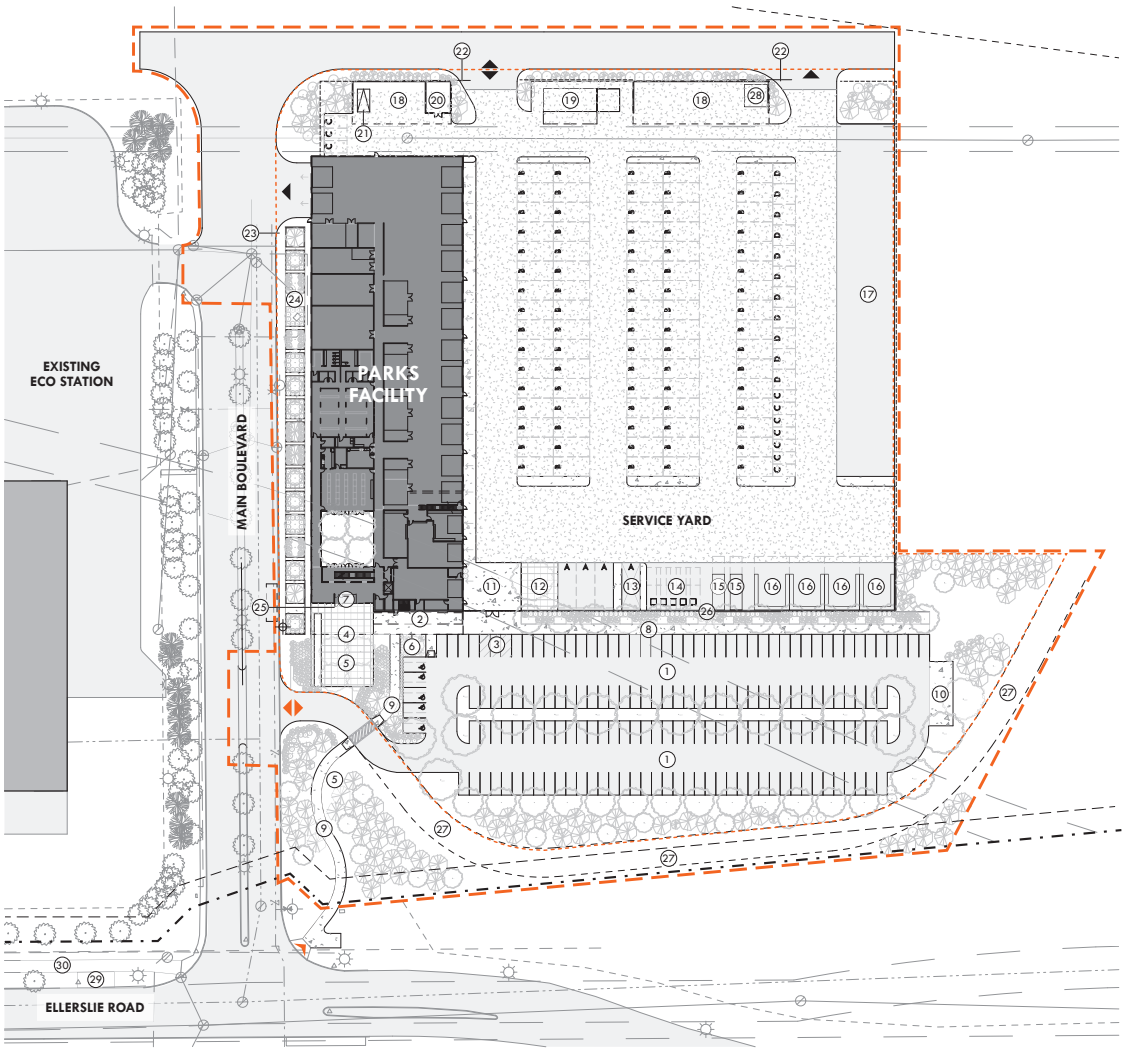


Figure 2.3c: Parks Schematic Design Site Plan

SITE LEGEND

- PROPERTY LINE
- SETBACK
- PROJECT BOUNDARY
- SITE HOLDING LINES
- UTILITY RIGHT OF WAY
- FENCE
- CONCRETE
- ASPHALT
- GRAVEL
- PAVERS
- PUBLIC + STAFF VEHICULAR ACCESS + EGRESS
- PUBLIC + STAFF PEDESTRIAN/BICYCLE ACCESS + EGRESS
- SERVICE VEHICULAR ACCESS + EGRESS
- PROPOSED FIREHYDRANT
- EXISTING FIREHYDRANT
- (1) PUBLIC/STAFF PARKING
- (2) BICYCLE PARKING
- (3) PUBLIC LOADING ZONE
- (4) PUBLIC FORECOURT
- (5) POTENTIAL PUBLIC ART LOCATION
- (6) OVERHANG ABOVE
- (7) MAIN PUBLIC/STAFF ENTRY
- (8) WALKWAY
- (9) PATH
- (10) MOTORCYCLE PARKING + SNOW STORAGE
- (11) CENTRAL RECEIVING + LOADING ZONE
- (12) STAFF PATIO
- (13) VEGETATION MANAGEMENT STALL
- (14) GARBAGE/RECYCLING
- (15) 40-YARD BINS
- (16) AGGREGATE BINS
- (17) BULK STORAGE
- (18) COVERED STORAGE
- (19) TEMPORARY FUEL STATION + FUEL SHED
- (20) PESTICIDE SHED
- (21) BLADE CHANGE RAMP
- (22) AUTOMATIC SLIDING GATE
- (23) SERVICE ZONE SIGNAGE + FLASHING LIGHTS
- (24) TRANSFORMER
- (25) FIRE TRUCK ACCESS
- (26) SOLID SITE FENCE
- (27) FUTURE ACCESS ROAD
- (28) COLD FERTILIZER STORAGE
- (29) FUTURE BUS STOP
- (30) EXISTING MULTI-MODAL PATHWAY

FUNCTIONAL ADJACENCIES: High-Level Adjacency Diagram

A high-level adjacency diagram was developed and describes the functional adjacencies between major program types (refer to Figure 2.3d). This adjacency diagram reflects the previously described workflows.

FUNCTIONAL ADJACENCIES: Detailed Adjacency Diagram

A detailed adjacency diagram was developed and provides an in-depth overview of adjacencies between the program types (refer to Figure 2.3e). This adjacency diagram illustrates the programming space types that were approved in the previous Parks Schematic Design Report. These space types have been organized into programmatic groupings, and illustrate programmatic relationships based on the information obtained through the existing facility reviews and interviews held with the Operations Groups.

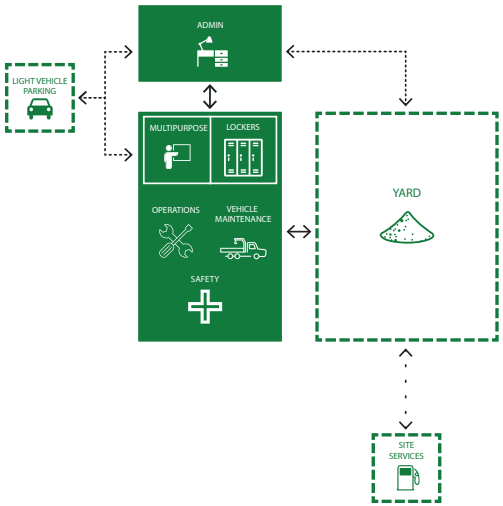


Figure 2.3d: Parks High-Level Adjacency Diagram

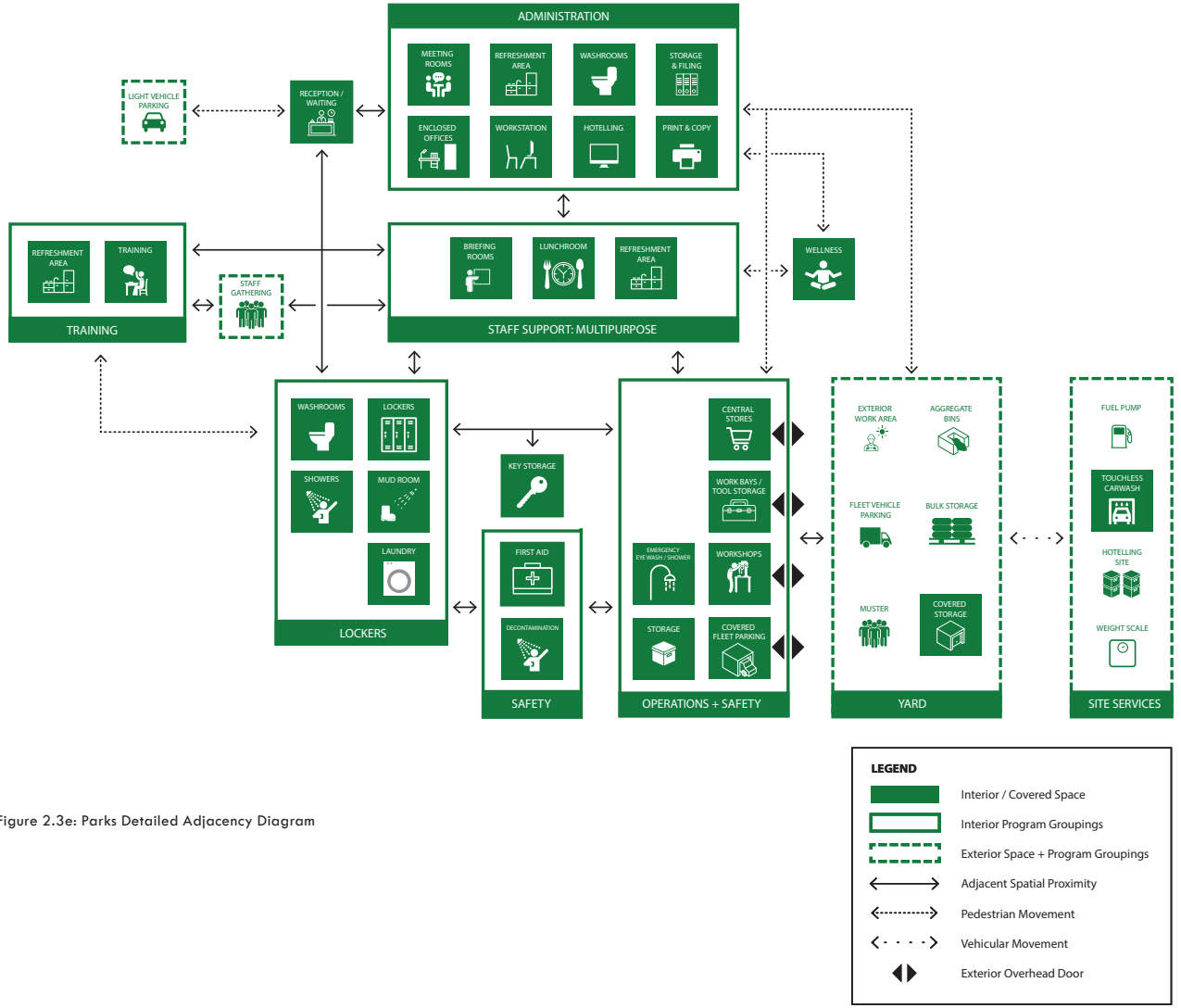


Figure 2.3e: Parks Detailed Adjacency Diagram

PROGRAM SUMMARY

The following Program Summary (refer to Figure 2.3f) is based on the Schematic Design Report work undertaken in the previous Ambleside Integrated Site Southwest District Office + Service Yard project (Parks Schematic Design Report) and was reviewed by the Parks Operations Group representative during the Master Planning process.

The adjusted program was modified from the existing program due to changes in current City Standards and Guidelines and based on subsequent information provided by the Owner Group and the Parks operations group representative. These Adjustments are included in the "Adjusted Program" columns, and are further clarified in the "Comments" column.

PARKS

NO	NAME	DESCRIPTION - ADJUSTED (PER AMP1: PARKS SCHEMATIC DESIGN 2016)	EXISTING PROGRAM - AMP1 QTY.	EXISTING PROGRAM - AMP1 AREA/EA. SQ. M	EXISTING PROGRAM - AMP1 TOTAL AREA SQ. M	ADJUSTED PROGRAM QTY.	ADJUSTED PROGRAM AREA/EA. SQ. M	ADJUSTED PROGRAM TOTAL AREA SQ. M	COMMENTS
ADMINISTRATION									
1.1	ENTRY + RECEPTION								
	ENTRANCE / VEST.		1.0	17.0	17.0	1.0	17.0	17.0	
	LOBBY/WAITING	Includes waiting on main and second floor, main floor lobby and circulation	1.0	187.0	187.0	1.0	187.0	187.0	
	RECEPTION DESK	main floor reception desk	1.0	12.0	12.0	1.0	12.0	12.0	
	RECEPTION DESK	second floor reception	1.0	7.0	7.0	1.0	7.0	7.0	
		1.1 SUB-TOTAL			223.0			223.0	
1.2	OFFICES*								
	WORKSTATIONS - CLOSED **DIRECTOR**	1 workstation w/ computer terminal, VOIP telephone, 1 lateral 4-drawer file cabinet -	1.0	6.0	6.0	1.0	6.0	6.0	
	WORKSTATIONS - OPEN **DISPATCH**	Open plan workstation with data drop for computer terminal, VOIP telephone, 1 lateral 4-drawer filing cabinet, task lighting	2.0	6.0	12.0	2.0	6.0	12.0	
	WORKSTATIONS - OPEN **SUPERVISOR**	1 workstation w/ computer terminal, VOIP telephone, 1 lateral 4-drawer file cabinet	10.0	6.0	60.0	10.0	6.0	60.0	
	WORKSTATIONS - OPEN **CLERK**	Open plan workstation with data drop for computer terminal, VOIP telephone, 1 lateral 4-drawer filing cabinet, task lighting	4.0	6.0	24.0	4.0	6.0	24.0	
	WORKSTATIONS - OPEN **CREW LEADER / COORDINATOR / ADMINISTRATOR**	Open plan workstation with data drop for computer terminal, VOIP telephone, 1 lateral 4-drawer filing cabinet, task lighting	21.0	6.0	126.0	12.0	6.0	72.0	Nine (9) CNS workstations are removed
		WORKSTATION SUB-TOTAL			228.0			174.0	
	OFFICE CIRCULATION GROSS-UP				66.0			120.0	
		WORK STATION TOTAL	38.0		294.0	29.0		294.0	
	ALCOVE MEETING AREA		1.0	27.9	27.9	1.0	27.9	27.9	
	HOTELLING **FOREMEN**	Touchdown Workstations	7.0	2.3	16.1	7.0	2.3	16.1	
		ALCOVE TOTAL			44.0			44.0	
		1.2 SUB-TOTAL			338.0			338.0	
1.3	MEETING ROOMS	1.8 sq. m per person							
	MEETING ROOM (SM)	4-6 people	0.0	10.0		0.0	10.0		
	MEETING ROOM (SM)	8-10 people	2.0	19.5	39.0	2	18.0	36.0	
	MEETING ROOM (LG)	20 people	0.0	48.0		0	36.0		
	MEETING ROOM (LG)	30 people	2.0	48.0	96.0	2.0	54.0	108.0	
	NOW ROOM*	Telephone Room	2.0	3.0	6.0	2	3.0	6.0	
		1.3 SUB-TOTAL			141.0			150.0	
1.4	ADMIN SUPPORT								
	PRINT / COPY		1.0	9.0	9.0	1	9.0	9.0	
	FILE STORAGE	Dispatch File Room; mobile high density shelving units	1.0	7.0	7.0	1	7.0	7.0	
	RESOURCE ROOM		1.0	17.0	17.0	1.0	17.0	17.0	
	STORAGE		1.0	3.0	3.0	1	3.0	3.0	
	REFRESHMENT AREA	appliances, sink, casework, seating	1.0	31.0	31.0	1	31.0	31.0	
	REFRESHMENT AREA	adjacent to meeting rooms	1.0	9.0	9.0	1.0	9.0	9.0	
	WASHROOMS - MALE**		1.0	19.0	19.0	1.0	19.0	19.0	
	WASHROOMS - FEMALE**		1.0	19.0	19.0	1.0	19.0	19.0	
	STAFF CLOSET	Included in casework in Refreshement Area							
		1.4 SUB-TOTAL			114.0			114.0	
1.5	AUXILLARY / BUILDING SERVICES								
	JANITOR	Cart - Shelves for supplies storage - floor sink; Floor finish to be antiskid and easily cleaned	1.0	5.4	5.4	1.0	5.4	5.4	
	ELECTRICAL ROOM								
	COMM. ROOM		1.0	11.0	11.0	1.0	11.0	11.0	
	MECHANICAL ROOM								
	PUBLIC BARRIER FREE WASHROOMS	Located on Main floor lobby area	2.0	6.2	12.4	2.0	6.2	12.4	
		1.5 SUB-TOTAL			28.8			28.8	
1.6	SAFETY								
	FIRE EXTINQUISHER**	wall mounted; clear sight-lines; accessible						0.0	
	DE-FIBULATOR**	wall mounted; clear sight-lines; accessible						0.0	
		1.6 SUB-TOTAL						0.0	
		SUB TOTAL, NSM							
		Net to Gross Space Conversion Factor: 25%							
		SUB TOTAL, CGSM			844.8			853.8	
		Building Gross Up Conversion Factor: 25%							
		TOTAL ADMIN, BGSM			N/A				

Figure 2.3f: Parks Program Summary

PARKS

NO	NAME	DESCRIPTION - ADJUSTED (PER AMP1: PARKS SCHEMATIC DESIGN 2016)	EXISTING PROGRAM - AMP1 QTY.	EXISTING PROGRAM - AMP1 AREA/EA. SQ. M	EXISTING PROGRAM - AMP1 TOTAL AREA SQ. M	ADJUSTED PROGRAM QTY.	ADJUSTED PROGRAM AREA/EA. SQ. M	ADJUSTED PROGRAM TOTAL AREA SQ. M	COMMENTS
STAFF SUPPORT									
2.1	BRIEFING, TRAINING + LUNCH ROOM								
	TRAINING / MULTIPURPOSE ROOM	50 people; 1.8 sq. m per person	1.0	131.0	131.0	1.0	131.0	131.0	
	KITCHENETTE	Counter w/ sink, microwave oven - Wallmounted cabinets for malware storage - Fullsize refrigerator	1.0	15.0	15.0	1.0	15.0	15.0	
	STAFF LUNCH ROOM		1.0	29.0	29.0	1.0	29.0	29.0	
	BRIEFING - ALCOVES	Small alcove; standing space for 10 - 12 people; Located in Operations Workbays	3.0	23.3	70.0	3.0	23.3	70.0	
	CLOSET		1.0	1.0	1.0	1.0	1.0	1.0	
	WELLNESS ROOM	Rubber mats/flooring; Size per Roads Central District				1.0	64.0	64.0	
		2.1 SUB-TOTAL			246.0			310.0	
2.2	LOCKERS + CHANGE ROOMS								
	VEST - MALE	included in washroom area							
	WASHROOMS - MALE**		1.0	42.3	42.3	1.0	42.3	42.3	
	SHOWERS - MALE		2.0	3.2	6.4	2.0	3.2	6.4	
	VEST - FEMALE	included in washroom area							
	WASHROOMS - FEMALE**		1.0	36.7	36.7	1.0	36.7	36.7	
	SHOWERS - FEMALE		1.0	3.8	3.8	1.0	3.8	3.8	
	SHARED LOCKERS	24" x 24" X 72" H locker; full size + half size; benches; total of 90 full size lockers required	1.0	196.0	196.0	1.0	196.0	196.0	
	BARRIER FREE WASHROOM**		2.0	4.7	9.4	2.0	4.7	9.4	
	BARRIER FREE SHOWER**		2.0	3.5	7.0	2.0	3.5	7.0	
		2.2 SUB-TOTAL			301.6			301.6	
2.3	CLEANING								
	LAUNDRY AREA	1 commercial grade washer and 1 commercial grade dryer (220 VAC power supply required - Counter; Floor finish to be antiskid and easily cleaned	1.0	10.0	10.0	1.0	10.0	10.0	
	MUD ROOM	Grated walk-off mat; hose-down area; laundry dry rack; laundry sink; Floor finish to be antiskid and easily cleaned	1.0	11.0	11.0	1.0	11.0	11.0	
		2.3 SUB-TOTAL			21.0			21.0	
2.4	AUXILLARY / BUILDING SERVICES								
	JANITOR	Cart - Shelves for supplies storage - floor sink; Floor finish to be antiskid and easily cleaned	1.0	7.0	7.0	1.0	7.0	7.0	
		2.4 SUB-TOTAL			7.0			7.0	
		SUB TOTAL, NSM							
		Net to Gross Space Conversion Factor: 30%							
		SUB TOTAL, CGSM			**575.6**			**639.6**	
		Building Gross Up Conversion Factor: 25%							
		TOTAL STAFF SUPPORT, BGSM			**N/A**				
OPERATIONS SHOPS									
3.1	CENTRAL STORES								
	CENTRAL LOADING + RECEIVING	12' x 12' overhead door	1.0	28.0	28.0	1.0	28.0	28.0	
	STORAGE AREA	typical to oversized shelving	1.0	105.0	105.0	1.0	105.0	105.0	
	RECEPTION / VESTIBULE	reception counter; secure point; included in Storage Area	1.0	6.3	6.3	1.0	6.3	6.3	
	WORKSTATION/OFFICE	required to be a closed office due to dust and debris	1.0	6.7	6.7	1.0	6.7	6.7	
		3.1 SUB-TOTAL			146.0			146.0	
3.2	WORKBAYS	Optional vehicle storage during off-season							
	FABRICATION / REPAIR BAY (SM) **PLAYSPACES MAINTENANCE + SAFETY**	2 bays; 2 x 16.4' W x 16.4' H overhead door; Floor drain trench; oil interceptor; compressed air; water; power; overhead crane	1.0	187.0	187.0	1.0	187.0	187.0	Standard Workbay: 20.0 m x 6.0 m; Include material storage + tool crib in bay for standardization
	MATERIAL STORAGE	secure material storage	1.0	47.0	47.0	1.0	47.0	47.0	
	TOOL CRIB	secure tool storage	1.0	15.0	15.0	1.0	15.0	15.0	
	FABRICATION / REPAIR BAY (SM) **VEGETATION MANAGEMENT**	2 bays; 2 x 16.4' W x 16.4' H overhead door; Floor drain trench; oil interceptor; compressed air; water; power	1.0	185.0	185.0	1.0	185.0	185.0	Standard Workbay: 20.0 m x 6.0 m; Include material storage + tool crib in bay for standardization
	MATERIAL STORAGE	secure material storage	1.0	47.0	47.0	1.0	47.0	47.0	
	TOOL CRIB	secure tool storage	1.0	15.0	15.0	1.0	15.0	15.0	
	FABRICATION / REPAIR BAY (SM) **HORTICULTURE**	2 bays; 2 x 16.4' W x 16.4' H overhead door; Floor drain trench; oil interceptor; compressed air; water; power	1.0	185.0	185.0	1.0	185.0	185.0	Standard Workbay: 20.0 m x 6.0 m; Include material storage + tool crib in bay for standardization
	MATERIAL STORAGE	secure material storage	1.0	47.0	47.0	1.0	47.0	47.0	
	TOOL CRIB	secure tool storage	1.0	15.0	15.0	1.0	15.0	15.0	
	FABRICATION / REPAIR BAY (SM) **SPORTS FIELD**	2 bays; 2 x 16.4' W x 16.4' H overhead door; Floor drain trench; oil interceptor; compressed air; water; power	1.0	185.0	185.0	1.0	185.0	185.0	Standard Workbay: 20.0 m x 6.0 m; Include material storage + tool crib in bay for standardization
	MATERIAL STORAGE	secure material storage	1.0	47.0	47.0	1.0	47.0	47.0	
	TOOL CRIB	secure tool storage	1.0	15.0	15.0	1.0	15.0	15.0	

PARKS

NO	NAME	DESCRIPTION - ADJUSTED (PER AMP1: PARKS SCHEMATIC DESIGN 2016)	EXISTING PROGRAM - AMP1 QTY.	EXISTING PROGRAM - AMP1 AREA/EA. SQ. M	EXISTING PROGRAM - AMP1 TOTAL AREA SQ. M	ADJUSTED PROGRAM QTY.	ADJUSTED PROGRAM AREA/EA. SQ. M	ADJUSTED PROGRAM TOTAL AREA SQ. M	COMMENTS
	FABRICATION / REPAIR BAY (LG) **TURF**	2 bays; 2 x 16.4' W x 16.4' H overhead door; Floor drain trench; oil interceptor; compressed air; water; power; includes equipment/vehicle storage; Includes Vehicle storage year-round	1.0	266.0	266.0	1.0	266.0	266.0	Stantard Workbay: 20.0m x 6.0 m for standardization
	MATERIAL STORAGE	secure material storage	1.0	47.0	47.0	1.0	47.0	47.0	Turf requires additional storage area for standardization
	TOOL CRIB	secure tool storage	1.0	15.0	15.0	1.0	15.0	15.0	
	FABRICATION / REPAIR BAY (LG) **FORESTRY**	2 bays; 2 x 16.4' W x 16.4' H overhead door; Floor drain trench; oil interceptor; compressed air; water; power; includes equipment/vehicle storage; Includes Vehicle storage year-round	1.0	587.0	587.0	1.0	587.0	587.0	Double Workbay: 42.0m x 6.0 m;
	MATERIAL STORAGE	secure material storage	1.0	47.0	47.0	1.0	47.0	47.0	Forestry requires additional storage area for standardization
	TOOL CRIB	secure tool storage	1.0	15.0	15.0	1.0	15.0	15.0	
	CIRCULATION SPINE		1.0	204.0	204.0	1.0	204.0	204.0	
		3.2 SUB-TOTAL			2171.0			2171.0	
3.3	WORKSHOPS								
	WORKSHOP	floor drain; specialized ventilation; workbenches/ casework; secure storage (materials + tools); equipment; enclosed; 14.1' W x 11.5' H overhead exterior door; 3 x 10' x 10' interior doors; overhead 115 VAC power	1.0	112.0	112.0	1.0	112.0	112.0	
	MAINTENANCE SHOP	floor drain; interceptor; specialized ventilation; workbenches/ casework; secure storage (materials + toos); equipment; 14.1' W x 11.5' H overhead exterior door; 10' x 10' interior door; overhead 115 VAC power	1.0	54.7	54.7	1.0	54.7	54.7	
	PAINT SHOP	floor drain; interceptor; specialized ventilation; ventilated storage; spray booth; 10' x 10' interior overhead door	1.0	64.0	64.0	1.0	64.0	64.0	
		3.3 SUB-TOTAL			230.7			230.7	
3.4	STORAGE								
	OVERSIZED STORAGE	secure and enclosed	1.0	156.0	156.0	1.0	156.0	156.0	
	HAZARDOUS WASTE	secure; ventilated; exterior wall; enclosed							
		3.4 SUB-TOTAL			156.0			156.0	
3.5	SAFETY								
	EYE WASH/SHOWER STATION	open; clear sight lines	1.0	1.0	1.0	1.0	1.0	1.0	
	FIRE EXTINQUISHER	wall mounted; clear sight-lines; accessible							
	DE-FIBULATOR	wall mounted; clear sight-lines; accessible							
		3.5 SUB-TOTAL			1.0			1.0	
3.6	AUXILLARY / BUILDING SERVICES	Includes Mechanical, NAR, Electrical, Water Metre	1.0	112.0	112.0	1.0	112.0	112.0	
	JANITOR								
	MECHANICAL / WATER METER								
	ELECTRICAL ROOM								
	COMM. ROOM								
	WASHROOMS								
		3.6 SUB-TOTAL			112.0			112.0	
		SUB TOTAL, NSM							
		Net to Gross Space Conversion Factor: 20%							
		OPERATIONS SUB TOTAL, GSM			**2816.7**			**2816.7**	
		Building Gross Up Conversion Factor: 25%							
		TOTAL OPERATIONS SHOPS, BGSM							
		PARKS SUB-TOTAL, GSM			**4237.1**			**4310.1**	Includes services and circulation
		Building Gross-Up (exterior walls, circulation + service not already captured)			552.9			362.9	
		TOTAL PARKS BUILDING, BGSM			**4790.0**			**4673.0**	
		MAIN FLOOR GROSS			3870.0			3768.0	CNS removed
		SECOND FLOOR GROSS			920.0			905.0	
YARD									
5.1	EXTERIOR WORK AREA								
	FABRICATION	Included in other Yard Areas							
		5.1 SUB-TOTAL							
5.2	STAFF GATHERING								
	STAFF GATHERING	Paving stones or concrete surface	1.0	100.0	100.0	1.0	100.0	100.0	
	MUSTER	Included in circulation area							
	TRAINING	Included in circulation area							
		5.2 SUB-TOTAL			100.0			100.0	
5.3	AGGREGATE STORAGE								
	AGGREGATE BINS	Asphalt laydown area	4.0	110.0	440.0	4.0	110.0	440.0	
		5.3 SUB-TOTAL			440.0			440.0	
5.4	BULK STORAGE (OPEN)								
	PALLET/OPEN STORAGE	Asphalt laydown area	1.0	1220.0	1220.0	1.0	1220.0	1220.0	
	GARBAGE BINS	40 yard bins; asphalt area	2.0	40.0	80.0	2.0	40.0	80.0	
		5.4 SUB-TOTAL			1300.0			1300.0	
5.5	FUEL STATION								

PARKS

NO	NAME	DESCRIPTION - ADJUSTED (PER AMP1: PARKS SCHEMATIC DESIGN 2016)	EXISTING PROGRAM - AMP1 QTY.	EXISTING PROGRAM - AMP1 AREA/EA. SQ. M	EXISTING PROGRAM - AMP1 TOTAL AREA SQ. M	ADJUSTED PROGRAM QTY.	ADJUSTED PROGRAM AREA/EA. SQ. M	ADJUSTED PROGRAM TOTAL AREA SQ. M	COMMENTS
	FUEL PUMP	Temporary fuel station	1.0	110.0	110.0	1.0	110.0	110.0	
	SECURE SHED	Fuel station shed	1.0	30.0	30.0	1.0	30.0	30.0	
		5.5 SUB-TOTAL			140.0			140.0	
5.6	YARD SUPPORT / MISC. MATERIALS								
	DE-ICING				na			na	
	CALCIUM CHLORIDE				na			na	
		5.6 SUB-TOTAL							
5.7	COVERED STORAGE								
	COLD STORAGE	Includes covered fertiziler storage	1.0	340.0	340.0	1.0	340.0	340.0	
	COVERED STORAGE	Blade change: water, air compressor	1.0	200.0	200.0	1.0	200.0	200.0	
	SECURED COVERED STORAGE		1.0	50.0	50.0	1.0	50.0	50.0	
		5.7 SUB-TOTAL			590.0			590.0	
5.8	SECURE VEHILCE PARKING								
	STALL A - 4.5 m x 11 m	Oversized vehilces; asphalt parking; one stall c/w concrete curbs for herbicide containment	4.0	49.5	198.0	4.0	49.5	198.0	
	STALL B - 4.75 m x 8.8 m	Tractors, chippers, 1/2 ton, 1 ton, 2 ton	81.0	41.8	3385.8	81.0	41.8	3385.8	
	STALL C - 3.0 m x 5.5 m	Skid steer, stump grinder, trailers	11.0	16.5	181.5	11.0	16.5	181.5	
	STALL D - 5.0 m x 5.5 m	Mowers	10.0	27.5	275.0	10.0	27.5	275.0	
		5.8 SUB-TOTAL			4040.3			4040.3	
5.9	YARD CIRCULATION								
	ROADS - YARD CIRCULATION	Includes training area, exteiror work area + muster; gravel c/w concrete apron	1.0	7130.0	7130.0	1.0	7130.0	7130.0	
	ROADS - FORESTRY ENTRY		1.0	120.0	120.0	1.0	120.0	120.0	
	GARBAGE / RECYCLING BINS	Located in the yard	1.0	130.0	130.0	1.0	130.0	130.0	
		5.9 SUB-TOTAL			7380.0			7380.0	
		YARD SUB TOTAL, NSM			13990.3			13990.3	
LIGHT VEHICLE PARKING									
6.1	VISITOR PARKING	24 stalls (included in personal vehicle parking)							
6.2	PERSONAL VEHICLE PARKING	140 stalls + 5 barrier free stalls; includes 10 x motorcycle parking stalls	1.0	4480.0	4480.0	1.0	4269.4	4269.4	
6.3	BICYCLE PARKING / COVERED STORAGE		1.0	20.0	20.0	1.0	20.0	20.0	
		PUBLIC SUB TOTAL, NSM			4500.0			4289.4	
SITE GROSS UP									
7.1	SOFT SURFACE								
	LANDSCAPE / BUFFER		1.0	4800.0	4800.0	1.0	4800.0	4800.0	
7.2	HARD SURFACE								
	ROADS - SITE ENTRY	Shared Site Entry - Not Included	0.0	250.0	0.0	0.0	250.0	0.0	
	COURTYARD	Private couryard	1.0	180.0	180.0	1.0	180.0	180.0	
	FORECOURT + SIDEWALK		1.0	110.0	810.0	1.0	810.0	810.0	
	ELEC. TRANSFORMER				0.0			0.0	
		SITE GROSS-UP SUB-TOTAL			5790.0			5790.0	
		SITE TOTAL, GSM			24280.3			24069.7	
		TOTAL FOOTPRINT			28150.3			27837.7	
		SITE PARKS PROGRAM AREA			29070.3			28742.7	

NOTES:

* Size / configuration to be per the City of Edmonton Space Standards

** Size / configuration / quantity to be per the Alberta Building Code

*** Size / configuration / quantity to be per the City of Edmonton Zoning / Land Use Bylaw

2.4 FACILITY MAINTENANCE SERVICES (FMS)

INTRODUCTION

The FMS component program includes administration, support spaces and operational service bays with associated storage and auxiliary spaces to accommodate eight trade disciplines: Mechanical, Electrical, Metal, Carpentry, General, Painting, Roofing and Locksmithing. The secured service yard has both active and dormant functions. The active functions are to operate in an efficient manner between the operational service bays and the yard, without interference from the dormant functions. The yard includes service vehicle parking, garbage and recycling, and open yard bulk storage. Separate non-secured parking is required for visitor and staff.

WORK FLOW ANALYSIS

An analysis of existing workflow and FMS's staffing requirements was conducted and is summarized in Figure 2.4a. The workflows demonstrates the sequence of program usage for each staffing type. These workflows are intended to summarize how the operations facilities are currently utilized.

YEARLY STAFFING SUMMARY

Interviews of existing operations were conducted in order to understand FMS's staffing schedule with the results being summarized in Figure 2.4b. The interview revealed that FMS staffing schedule is constant throughout the year with the employees operating during a daytime shift on Monday through to Friday.

EXISTING FACILITY REVIEW

The design intentions from the AMPV1 (refer to Figure 2.4c) were utilized as a basis for the FMS functional needs assessment. The following were key desirable characteristics from AMPV1:

- direct connection between interior operations and the service yard
- edging the site with bulk storage
- at grade parking
- providing a strong urban frontage
- using landscaping elements to increase the experiential quality of the site and to hide heavy operation elements from the public.
- single, open, flexible, and secure yard

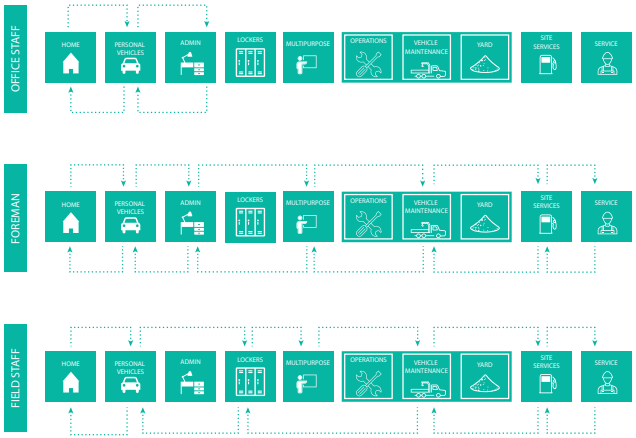
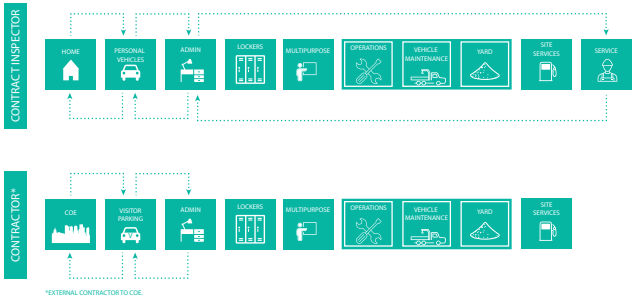


Figure 2.4a: FMS Work Flow Analysis

FMS													
DAY	SHIFT	# STAFF	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mon - Fri	7:30am - 4:00pm	79												
		Total	79											

Figure 2.4b: FMS Yearly Staffing Summary



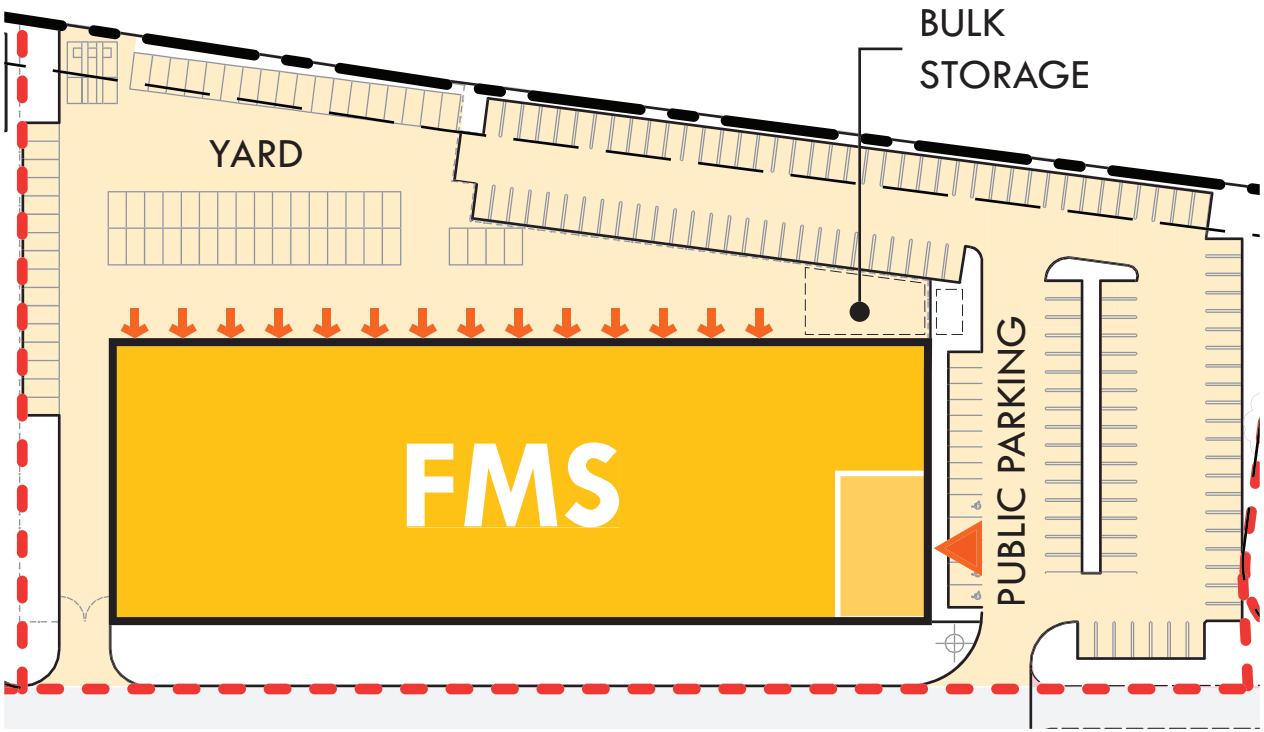


Figure 2.4c: FMS AMPV1 Site Plan

FUNCTIONAL ADJACENCIES: High-Level Adjacency Diagram

A high-level adjacency diagram was developed and describes the functional adjacencies between major program types (refer to Figure 2.4d). This adjacency diagram reflects the previously described workflows.

FUNCTIONAL ADJACENCIES: Detailed Adjacency Diagram

A detailed adjacency diagram was developed and provides an in-depth overview of adjacencies between the program types (refer to Figure 2.4e). This adjacency diagram illustrates the programming space types that were included in the previous AMPV1 dated March 8, 2016. These space types have been organized into programmatic groupings, and illustrate programmatic relationships based on the information obtained through the existing facility reviews and interviews held with the Operations Groups.

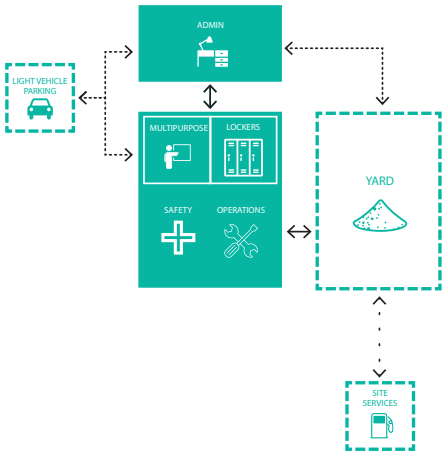


Figure 2.4d: FMS High-Level Adjacency Diagram

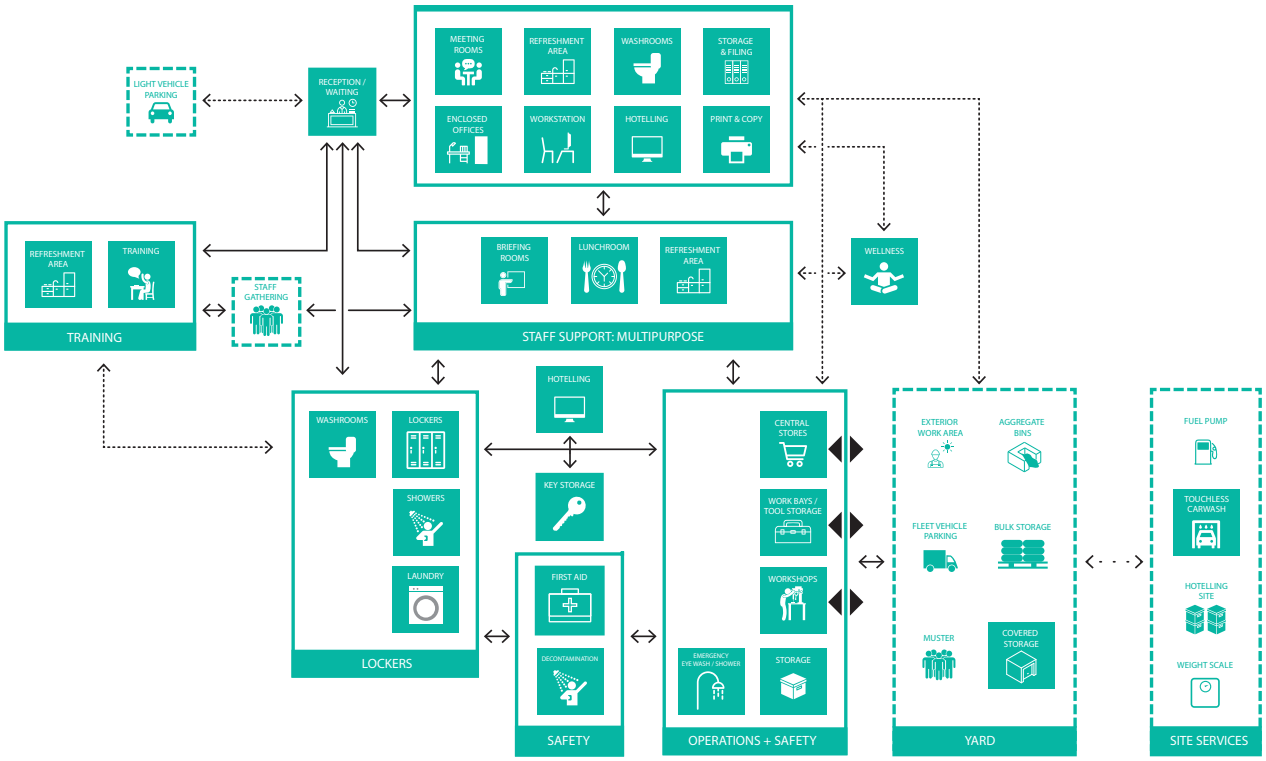
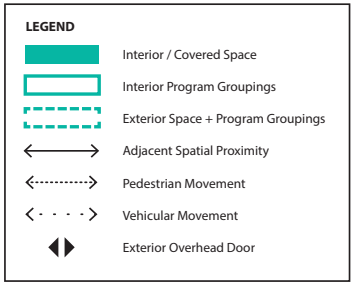


Figure 2.4e: FMS Detailed Adjacency Diagram



PROGRAM SUMMARY

The following Program Summary (refer to Figure 2.4f) has been based on the programming summarized in the previous AMPV1 dated March 8, 2016. During user group interviews conducted in March 2017, the FMS Operations Group representative reviewed and provided updated programming comments.

The adjusted program was modified from the existing program due to changes in current City Standards and Guidelines and based on subsequent information provided by the operations group. These Adjustments are included in the "Adjusted Program" columns, and are further clarified in the "Comments" column.

FACILITY MAINTENANCE SERVICES

NO.	NAME	DESCRIPTION AMP1: PARKS SCHEMATIC DESIGN 2016	EXISTING PROGRAM - AMP1 QTY.	EXISTING PROGRAM - AMP1 AREA/EA. SQ. M	EXISTING PROGRAM - AMP1 TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	ADJUSTED PROGRAM AREA/EA. SQ. M	ADJUSTED PROGRAM TOTAL AREA SQ. M	COMMENTS
ADMINISTRATION										
1.1	ENTRY + RECEPTION									
	ENTRANCE / VEST.		1.0	2.0	2.0		1.0	10.0	10.0	
	LOBBY/WAITING		1.0	9.0	9.0		1.0	15.0	15.0	
	RECEPTION DESK		1.0	6.0	6.0		1.0	6.0	6.0	
	1.1 SUB-TOTAL				17.0				31.0	
1.2	OFFICES*									
	GENERAL ADMIN									
	WORKSTATIONS - OPEN **MANAGER FMS / SUPERVISOR**	FMS Director? TBD	1.0	13.9	13.9	Supervisor	1.0	6.0	6.0	
	WORKSTATIONS - OPEN **ADMIN ASSISTANT**		1.0	6.0	6.0		1.0	6.0	6.0	
	WORKSTATIONS - OPEN **COORDINATOR / MANAGER**		1.0	9.2	9.2		1.0	6.0	6.0	
	WORKSTATIONS - OPEN **CLERK / ANALYST / DISPATCHER**	Open plan workstation with data drop for computer terminal, VOIP telephone, 1 lateral 4-drawer filing cabinet, task lighting	3.0	6.0	18.0	Open plan workstation with data drop for computer terminal, VOIP telephone, 1 lateral 4-drawer filing cabinet, task lighting	3.0	6.0	18.0	
	HOTELLING: TOUCHDOWN STATION		2.0	4.5	9.0		2.0	2.3	4.6	
	ADMIN POD									
	WORKSTATIONS - OPEN **SUPERVISOR / FORMEN**	1 workstation w/ computer terminal, VOIP telephone, 1 lateral 4-drawer file cabinet - Meeting area for up to 3 people	6.0	9.2	55.2	1 workstation w/ computer terminal, VOIP telephone, 1 lateral 4-drawer file cabinet - Meeting area for up to 3 people	6.0	6.0	36.0	
	WORKSTATIONS - OPEN **CLERK / ANALYST / DISPATCHER**	Open plan workstation with data drop for computer terminal, VOIP telephone, 1 lateral 4-drawer filing cabinet, task lighting	2.0	6.0	12.0	Open plan workstation with data drop for computer terminal, VOIP telephone, 1 lateral 4-drawer filing cabinet, task lighting	2.0	6.0	12.0	
	WORKSTATIONS - OPEN **PLANNER / ADMINISTRATOR / ANALYST / CONTRACT INSPECTOR**		16.0	6.0	96.0		16.0	6.0	96.0	
	HOTELLING: TOUCHDOWN STATION		4.0	4.5	18.0		4.0	2.3	9.2	
	ADMIN POD									
	WORKSTATIONS - OPEN	14.0 SQ. M per staff including internal circ and staff ammenities; Included per Owner direction during AMP1	32.0	14.0	448.0	14.0 SQ. M per staff including internal circ and staff ammenities; Included per Owner direction during AMP1	32.0	6.0	192.0	
	GROSS-UP	*To be applied to required amenity inclusions, such as meeting rooms or administration support spaces*				To be applied to required amenity inclusions, such as meeting rooms or administration support spaces			256.0	
	CREW TOUCHDOWN									
	CREW TOUCHDOWN STATIONS					Standing bench style preferred; Located along main circulation and adjacent to shops 3 ea per shop; assuming 7 shops	21.0	2.3	48.3	
	CREW MAIL BOXES					Millwork located along main circulation and adjacent to shops; 1 ea per shop; assuming 7 shops	7.0	1.8	12.6	
	KEY BOXES					Wall mounted key box located along main circulation and adjacent to shops; count / equipment type per Owner directive				
	1.2 SUB-TOTAL				237.3		68		434.1	Does not include workstation gross-up
1.3	MEETING ROOMS	1.8 sq. m per person				1.8 sq. m per person; acoutic attenuation				
	MEETING ROOM (SM)	8 people	2.0	16.0	32.0	8 people	2.0	14.5	29.0	
	MEETING ROOM (SM)	8 people; Layout table for drawings; hanging file racks	1.0	20.0	20.0	8 people; Layout table for drawings; hanging file racks	1.0	20.0	20.0	
	MEETING ROOM (LG)	Boardroom: 30 people; video conferencing technology	1.0	60.0	60.0	Boardroom: 30 people; video conferencing technology	1.0	54.0	54.0	
	KITCHENETTE	Counter c/w sink, mocrowave oven; wall-mounted cabinets for malware storage; full size refirdgerator	1.0	6.0	6.0	Counter c/w sink, mocrowave oven; wall-mounted cabinets for malware storage; full size refirdgerator	1.0	6.0	6.0	
	NOW ROOM*	small telephone room				small telephone room	4.0	3.0	12.0	
	1.3 SUB-TOTAL				118.0				121.0	
1.4	ADMIN SUPPORT									
	PRINT / COPY: BUSINESS CENTRE	Wall-mounted cabinets for supplies storage/mail slots - counter for sorting materials - 1 floor-mounted shared printer / scanner / facsimile machine - analog telephone station - charging stations for portable VHF radios	2.0	6.0	12.0	Wall-mounted cabinets for supplies storage/mail slots - counter for sorting materials - 1 floor-mounted shared printer / scanner / facsimile machine - analog telephone station - charging stations for portable VHF radios	2.0	6.0	12.0	
	RESOURCE ROOM / FILE STORAGE				0.0				0.0	
	STORAGE				0.0				0.0	
	REFRESHMENT AREA	appliances, sink, casework, seating	1.0	10.5	10.5	appliances, sink, casework, seating	1.0	10.5	10.5	
	REFRESHMENT AREA	coffee station	1.0	4.5	4.5	coffee station	1.0	4.5	4.5	
	WASHROOMS - MEN**		1.0	3.5	3.5		1.0	3.5	3.5	
	WASHROOMS - WOMEN**		1.0	3.5	3.5		1.0	3.5	3.5	
	WASHROOMS - UNISEX**		1.0	3.5	3.5		1.0	3.5	3.5	
	STAFF CLOSET				0.0				0.0	
	1.4 SUB-TOTAL				37.5				37.5	
1.6	SAFETY									
	FIRE EXTINQUISHER**	wall mounted; clear sight-lines; accessible							0.0	
	DE-FIBULATOR**	wall mounted; clear sight-lines; accessible							0.0	

Figure 2.4f: FMS Program Summary

FACILITY MAINTENANCE SERVICES

NO.	NAME	DESCRIPTION AMP1: PARKS SCHEMATIC DESIGN 2016	EXISTING PROGRAM - AMP1 QTY.	EXISTING PROGRAM - AMP1 AREA/EA. SQ. M	EXISTING PROGRAM - AMP1 TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	ADJUSTED PROGRAM AREA/EA. SQ. M	ADJUSTED PROGRAM TOTAL AREA SQ. M	COMMENTS
	1.6 SUB-TOTAL								0.0	
	SUB TOTAL, NSM				**409.8**				**623.4**	
		Net to Gross Space Conversion Factor: 25%			102.5				155.9	
	SUB TOTAL, CGSM				**960.3**				**1035.5**	
		Building Gross Up Conversion Factor: 25%			240.1				258.9	
	TOTAL ADMIN, BGSM				**1200.3**				**1294.4**	Includes workstation gross-up
STAFF SUPPORT*										
2.1	BRIEFING, TRAINING + LUNCH ROOM									
	TRAINING / MULTIPURPOSE ROOM	35 people c/w video conferecing, wall mount white boards, bulletin boards; 115 VAC duples outlets for flexible equipment; wall-mounted first aid kit and eyewash station	1.0	63.0	63.0	35 people c/w video conferecing, wall mount white boards, bulletin boards; 115 VAC duples outlets for flexible equipment; wall-mounted first aid kit and eyewash station; lunch room; hotelling stations; digital COE messaging (Chrome Box/LCD TVs); ceiling mounted projectors/screens; divisible partitioning; pin-up boards; wipeable walls	1.0	63.0	63.0	
	KITCHENETTE		1.0	10.5	10.5		1.0	10.5	10.5	
	STAFF LUNCH ROOM				0.0				0.0	
	BRIEFING ROOM	Small alcove located throughout cluster; standing space for 10 - 12 people; enclosed on three sides; one direct outdoor access; occasional small project use	3.0	21.0	63.0	Small enclosed alcove with close proximity to each workshop; visual connection desired; standing space for 10 - 12 people; one direct outdoor access; occasional small project use	3.0	21.0	63.0	
	WELLNESS ROOM					Rubber mats/flooring Size per Roads Central District	1.0	64.0	64.0	
	2.1 SUB-TOTAL				136.5				200.5	
2.2	LOCKERS + CHANGE ROOMS									
	VEST. - MALE		1.0	3.5	3.5		1.0	3.5	3.5	
	WASHROOMS - MALE**	4 wc; 4 urinals, 4 sinks; wall mounted mirror above sink; wall-mounted paper tower dispenser and/or hand dryer; soap dispenser; grease remover dispenser; garbage receptacle	1.0	17.5	17.5	4 wc; 4 urinals, 4 sinks; wall mounted mirror above sink; wall-mounted paper tower dispenser and/or hand dryer; soap dispenser; grease remover dispenser; garbage receptacle	1.0	17.5	17.5	
	SHOWERS - MALE		2.0	3.5	7.0	Barrier free	1.0	4.0	4.0	
	LOCKERS - MALE	53 full and 6 half-height lockers; 24" x 24" locker c/w interior partition; benches; garbage receptacle; controlled access; antiskid floors; metals corrosion resistant	1.0	28.4	28.4	53 full and 6 half-height lockers; 24" x 24" locker c/w interior partition; benches; garbage receptacle; controlled access; antiskid floors; metals corrosion resistant	1.0	28.4	28.4	
	VEST. - FEMALE		1.0	3.5	3.5		1.0	3.5	3.5	
	WASHROOMS - FEMALE**	4 wc; 4 sinks; wall mounted mirror above sink; wall-mounted paper tower dispenser and/or hand dryer; soap dispenser; grease remover dispenser; garbage receptacle	1.0	9.6	9.6	4 wc; 4 sinks; wall mounted mirror above sink; wall-mounted paper tower dispenser and/or hand dryer; soap dispenser; grease remover dispenser; garbage receptacle	1.0	9.6	9.6	
	SHOWERS - FEMALE		2.0	3.5	7.0	Barrier free	1.0	4.0	4.0	
	LOCKERS - FEMALE	23 full height lockers; 24" x 24" locker c/w interior partition; benches; garbage receptacle; controlled access; antiskid floors; metals corrosion resistant	1.0	11.4	11.4	23 full height lockers; 24" x 24" locker c/w interior partition; benches; garbage receptacle; controlled access; antiskid floors; metals corrosion resistant	1.0	11.4	11.4	
	BARRIER FREE WASHROOM + SHOWER**				0.0				0.0	
	2.2 SUB-TOTAL				87.9				81.9	
2.3	CLEANING									
	LAUNDRY AREA	washer and dryer machines; floor drain; water; power	1.0	9.6	9.6	washer and dryer machines; floor drain; water; power	1.0	9.6	9.6	
	MUD ROOM	Grated walk-off mat; hose-down area; laundry dry rack; laundry sink				Grated walk-off mat; hose-down area; laundry dry rack; laundry sink			0.0	
	2.3 SUB-TOTAL				9.6				9.6	
2.4	AUXILLARY / BUILDING SERVICES									
	JANITOR		1.0	6.1	6.1		1	5.0	5.0	
	FIRST AID ROOM		1.0	16.1	16.1		1	10.0	10.0	
	WATER FOUNDTAIN - WATER BOTTLE FILLER						2			
	2.4 SUB-TOTAL				22.2				15.0	
	SUB TOTAL, NSM				**256.2**				**307.0**	
		Net to Gross Space Conversion Factor: 30%			76.9				92.1	
	SUB TOTAL, CGSM				**333.1**				**399.1**	
		Building Gross Up Conversion Factor: 25%			83.3				99.8	
	TOTAL STAFF SUPPORT, BGSM				**416.3**				**498.8**	
OPERATIONS SHOPS										
3.1	CENTRAL STORES	Loading dock at grade - Marshalling area for items arriving on-site and departing off-site	1.0	185.8	185.8	Loading dock at grade - Marshalling area for items arriving on-site and departing off-site	1.0	185.8	185.8	
	CENTRAL LOADING + RECEIVING	12' x 12' overhead door				12' x 12' overhead door				
	STORAGE AREA	typical to oversized shelving				typical to oversized shelving				
	RECEPTION / VESTIBULE	reception counter; secure point				reception counter; secure point				
	WORKSTATION/OFFICE		1.0	6.0	6.0		1	6.0	6.0	
	3.1 SUB-TOTAL				191.8				191.8	

FACILITY MAINTENANCE SERVICES

NO.	NAME	DESCRIPTION AMP1: PARKS SCHEMATIC DESIGN 2016	EXISTING PROGRAM - AMP1 QTY.	EXISTING PROGRAM - AMP1 AREA/EA. SQ. M	EXISTING PROGRAM - AMP1 TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	ADJUSTED PROGRAM AREA/EA. SQ. M	ADJUSTED PROGRAM TOTAL AREA SQ. M	COMMENTS
3.3	WORKSHOPS									
	GENERAL SHOPS: Double Bay open shops, secure w chainlink fencing where required: - MECHANICAL (3 SHOPS - REFRIGERATION, PLUMBING, AIR HANDLING) - ELECTRICAL Double Bay enclosed shop: - CARPENTRY	14.2' W x 18' H overhead door; compressed air; water; power; specialized ventilation for dust/fumes; workbenches/ casework; secure storage (materials + toos); equipment; service area of 15 sq. m included in each shop for minor equipment repair, garages for parking, loading & servicing of FMS vehicles; Carpentry Drive Through: two overhead doors to enable vehicles to enter and exit the bay without reversing; CO detection system to automatically activate exhaust fans; Consider 115 VAC overhead drops; Each workshop to have space for one vehicle of up to 2-ton maximum chassis size; parking area to be equipped with floor drains outfitted with oil/grease trap	6.0	386.6	2319.6	16' W x 16' H overhead door; compressed air; water; power; specialized ventilation for dust/fumes; workbenches/ casework; secure storage (materials + toos); equipment; garages for parking, loading & servicing of FMS vehicles; Carpentry Drive Through desired: two overhead doors to enable vehicles to enter and exit the bay without reversing; CO detection system to automatically activate exhaust fans; Consider 115 VAC overhead drops; Each workshop to have space for one vehicle of up to 2-ton maximum chassis size; parking area to be equipped with floor trench outfitted with oil/grease trap; radiant heating desired; natural light desired	6.0	371.6	2229.6	Standard double workbay: 18.0 x 20.0 m (9.0 x 20.0 ea) based on 47 St Warehouse Precedent; Include materials storage and tool cribs in each bay for standardization
	MATERIAL STORAGE	secure material storage	6.0	185.8	1114.8	secure material storage	6.0	185.8	1114.8	
	TOOL CRIB	secure tool storage	6.0	16.7	100.2	secure tool storage	6.0	16.7	100.2	
	PAINT SHOP		1.0	371.6	371.6	16' W x 16' H overhead door; compressed air; water; power; specialized ventilation for dust/fumes; workbenches/ casework; secure storage (materials + toos); equipment; CO detection system to automatically activate exhaust fans; Consider 115 VAC overhead drops; floor drains outfitted with oil/grease trap; radiant heating desired 2/3 spil of area to provide enclosed preparation space + enclosed fabrication space c/w spray booth; 10' x 10' OH Doors or double swing doors b/w fabrication + interior bays/aisel and fabrication + finishing	1.0	371.6	371.6	
	ROOF SHOP	14.2' W x 18' H overhead door; 115 VAC power; floor drain/ trench; oil interceptor; compressed air; water; powerspecialized ventilation for dust/fumes; workbenches/ casework; secure storage (materials + tools); equipment; service area of 15 sq. m included in each shop for minor equipment repair	1.0	183.0	183.0	16' W x 16' H overhead door; 115 VAC power; floor drain/ trench; oil interceptor; compressed air; water; power; specialized ventilation for dust/fumes; workbenches/ casework; secure storage (materials + tools); equipment; service area of 15 sq. m included in each shop for minor equipment repair	1	183.0	183.0	Standard workbay: 9.0 x 20.0 m based on 47 ST Warehouse Precedent; include material storage in bay
	ROOF SHOP - STORAGE	Dedicated to each shop - Assigned at 50% of net shop area	1.0	84.0	84.0	Dedicated to each shop - Assigned at 50% of net shop area	1.0	84.0	84.0	
	LOCKSMITH SHOP	Workbench, storage cabinets, and computer workstation; service area of 15 sq. m included in each shop for minor equipment repair	1.0	140.0	140.0	Workbench, storage cabinets, and computer workstation; enclosed shop	1.0	140.0	140.0	
		3.3 SUB-TOTAL			4313.2				4223.2	
3.4	STORAGE									
	HAZARDOUS MATERIALS STORAGE	Secured room - Vented to outside - Cool storage and dry and liquid chemicals	1.0	20.0	20.0	Secured room - Vented to outside - Cool storage and dry and liquid chemicals	1.0	20.0	20.0	
	FLAMMABLE STORES	Locked and ventilated storage for flammable materials such as paint	1.0	6.0	6.0	Locked and ventilated storage for flammable materials such as paint	1.0	6.0	6.0	
		3.4 SUB-TOTAL			26.0				26.0	
3.5	SAFETY**									
	EYE WASH/SHOWER STATION	open; clear sight lines				open; clear sight lines	3	1.0	3.0	
	FIRE EXTINQUISHER	wall mounted; clear sight-lines; accessible				wall mounted; clear sight-lines; accessible			0.0	
	DE-FIBULATOR	wall mounted; clear sight-lines; accessible				wall mounted; clear sight-lines; accessible			0.0	
		3.5 SUB-TOTAL							3.0	
		SUB TOTAL, NSM			**4531.0**				**4444.0**	
		Net to Gross Space Conversion Factor: 20%			906.2				888.8	
		SUB TOTAL, CGSM			**5437.2**				**5332.8**	
		Building Gross Up Conversion Factor: 25%			1359.3				1333.2	
		TOTAL OPERATIONS SHOPS, BGSM			**6796.5**				**6666.0**	
		TOTAL FMS FACILITY, BGSM			**8413.1**				**8459.2**	
		MAIN FLOOR			7212.8				7164.8	Operations + Staff Support
		SECOND FLOOR			1200.3				1294.4	Admin
YARD										
5.2	STAFF GATHERING									
	STAFF GATHERING						1.0	100.0	100.0	
	MUSTER								0.0	
	TRAINING								0.0	
		5.2 SUB-TOTAL							100.0	
5.4	BULK STORAGE (OPEN)									

FACILITY MAINTENANCE SERVICES

NO.	NAME	DESCRIPTION AMP1: PARKS SCHEMATIC DESIGN 2016	EXISTING PROGRAM - AMP1 QTY.	EXISTING PROGRAM - AMP1 AREA/EA. SQ. M	EXISTING PROGRAM - AMP1 TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	ADJUSTED PROGRAM AREA/EA. SQ. M	ADJUSTED PROGRAM TOTAL AREA SQ. M	COMMENTS
		5.7 SUB-TOTAL			220.0				220.0	
5.8	SECURE VEHILCE PARKING		1.0	4753.0	4753.0		1.0	4753.0	4753.0	Includes service vehicle parking, garbage and recycling, and circulation
	STALL A - 3m x 6m	over-sized stall for service vans	70.0			over-sized stall for service vans	70.0			
		5.8 SUB-TOTAL			4753.0				4753.0	
		YARD SUB TOTAL, NSM			4973.0				5073.0	
PUBLIC										
6.1	LIGHT VEHILCE PARKING									
	VISITOR PARKING	Regular Stall 2.6m x 5.5m	9.0			Regular Stall 2.6m x 5.5m	9.0	23.4	210.6	
	PERSONAL VEHICLE PARKING	Large Stall 3.0m x 6.0m	127.0			Regular Stall 2.6m x 5.5m; consider including 3.0 x 6.0 m although locate farthest from entry	127.0	23.4	2971.8	
	BARRIER FREE PARKING	3.7m x 5.5m	5.0			3.7m x 5.5m	5.0	33.3	166.5	
	BICYCLE PARKING / COVERED STORAGE									Included in Site Gross-Up
		Sub Total							3348.9	
	PERSONAL VEHICLE PARKING - HEADQUARTERS ADMIN STAFF					Regular Stall 2.6m x 5.5m	34.0	23.4	795.6	
		PUBLIC SUB TOTAL, NSM			5582.0				4144.5	
SITE GROSS UP										
7.1	SOFT SURFACE (25%)									
	LANDSCAPE / BUFFER				2560.0				2304.4	
7.2	HARD SURFACE (35%)	Included in parking area								
	ROADS + SIDEWALKS								3226.1	
		SITE GROSS-UP SUB-TOTAL			2560.0				5530.5	
		SITE TOTAL, GSM			13115.0				14748.0	
		TOTAL FOOTPRINT			20327.8				21912.8	
		SITE FMS PROGRAM AREA			21528.1				23207.2	

NOTES:

75% increase has been added to all Staff Support for existing program areas per client direction during AMP1

* Size / configuration to be per the City of Edmonton Space Standards

** Size / configuration / quantity to be per the Alberta Building Code

*** Size / configuration / quantity to be per the City of Edmonton Zoning / Land Use Bylaw

FMS ADMIN HEADQUARTERS										
Offices + Admin Support										
14.0 sq m per person*		Includes circulation and amenities	34.0	14.0	476.0					
1.1	Reception / Lobby / Waiting									
	Vestibule						1.0	5.0	5.0	
	Waiting						1.0	5.0	5.0	
	Reception Desk						1.0	6.0	6.0	
1.2	Offices*									
	Workstations					Director, Supervisor, Clerk, etc.; staff roles + counts breakdown to be provided by Owner	15.0	6.0	90.0	Adjusted to 15 per FMS Interview, May 27. 2017
	Hotelling					Internal + external remote staff	3.0	2.3	6.9	
1.3	Meeting Rooms*					1.8 sq. m per person				
	Meeting Room - Small					4 - 6 people	1.0	10.8	10.8	
	Board Room					10 - 12 people	1.0	21.6	21.6	
	Now Room					Small telephone room	2.0	3.0	6.0	
1.4	Admin Support									
	Printing / Copy						1.0	5.0	5.0	
	File Storage						1.0	5.0	5.0	
	Storage						1.0	5.0	5.0	
	Janitor						1.0	4.0	4.0	
	Washroom - Barrier free					Unisex	1.0	5.0	5.0	
	Washroom - Barrier free					Unisex	1.0	5.0	5.0	
	Refreshment Area						1.0	7.0	7.0	
	Staff Closet						1.0	2.0	2.0	
	HQ Sub-Total								189.3	
	Net Circulation Gross-Up (25%)					Internal circulation + interior walls			47.3	
									236.6	
	Building Gross-Up (25%)				119.0	Building services (Mech, elec, comm) + exterior walls			59.2	
		TOTAL FMS HQ BGSM			595.0				532.4	Can be located on a second floor

2.5 ROADWAY MAINTENANCE (ROADS)

INTRODUCTION

The Roads component includes administration offices, support spaces, and operational bays. Both open and closed workstations are required along with hotelling workstations where staff members and visitors can dynamically utilize these spaces on a temporary use basis. The workshops must accommodate wood working, painting, and general maintenance. A substantial amount of storage bays are required for large equipment and must be able to accommodate vehicles up to 3 tons in weight. The yard includes aggregate bins, sander racks and a 1,300 ton capacity salt dome. Covered storage is also required for sand, hazardous materials, flammable materials, and cold storage. The salt pile and salt dome capacity is to be confirmed during Schematic Design along with the salt dome foundation height and additional required equipment. The active functions are to operate in an efficient manner between the operational service bays and the yard, without interference from the dormant functions.

WORK FLOW ANALYSIS

An analysis of existing workflow and Road's staffing requirements was conducted and is summarized in Figure 2.5a. The workflows demonstrates the sequence of program usage for each staffing type. These workflows are intended to summarize how the operations facilities are currently utilized.

YEARLY STAFFING SUMMARY

Interviews with existing operations staff were conducted in order to understand Road's staffing schedule with the results being summarized in Figure 2.5b. The interviews revealed that from January to the end of May the greatest amount of employees were required with approximately 15% less staff required from June to October and 50% less in November and December. In the winter months there is 24/7 rotating shifts and during the warmer months the peak time of day occurs between 7:00am and 3:00pm.

EXISTING FACILITY REVIEW

The following facilities were reviewed and visited:

- Kennedale Roadway Maintenance Facility, 13003 56 St (refer to Figure 2.5c).
- Southwest District Operations Roadway Maintenance Yard (refer to Figure 2.5d), 6609 Gateway Boulevard (noted by Roadway Maintenance staff to be the best representation of what is needed for a future facility operation group liked the existing facilities)
- Roadway Maintenance Central District

The facility reviews resulted in the following key desirable characteristics:

- single secure entry into the yard
- double loaded operations building with year-round storage for Fleet vehicles

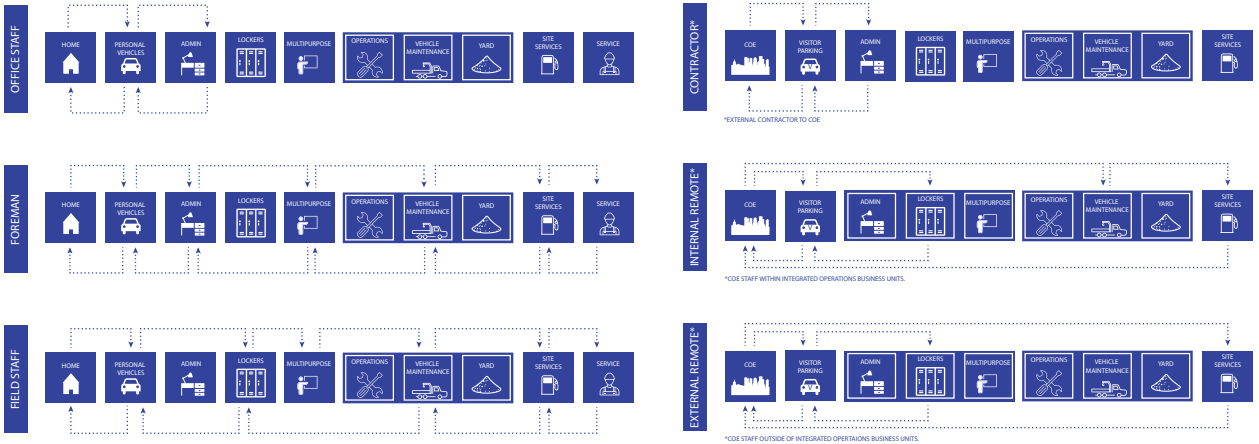


Figure 2.5a: Roads Work Flow Analysis

ROADS

DAY	SHIFT	# STAFF	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mon - Sun	Rotating shifts: 24/7	48												
Mon - Fri	7:00am - 3:00pm	42												
Mon - Fri	11:00pm - 7:00am	4												
Mon - Fri	7:00am - 3:00pm	50												
Mon - Fri	3:00pm - 11:00pm	12												
Mon - Fri	11:00pm - 7:00am	30												
Mon - Fri	Rotating: 7:00am - 10pm	10												
Mon - Fri	7:00am - 3:00pm	70												
	Total		94				125				84			48

Figure 2.5b: Roads Yearly Staffing Summary

Figure 2.5c: Kennedale Roadway Maintenance Facility

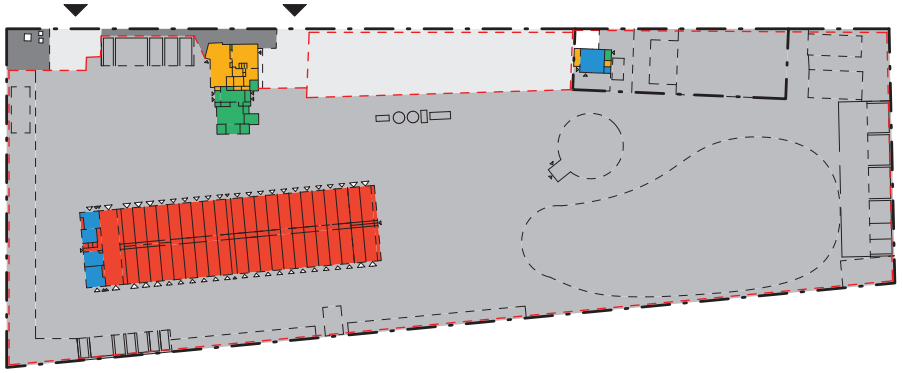


Figure 2.5d: Southwest District Operations Roadway Maintenance Yard

HIGH LEVEL SPACE TYPES

- LIGHT VEHICLE PARKING
- ADMINISTRATION
- STAFF SUPPORT
- OPERATIONS
- VEHICLE MAINTENANCE + STORAGE
- YARD
- SITE GROSS-UP

FUNCTIONAL ADJACENCIES: High-Level Adjacency Diagram

A high-level adjacency diagram was developed and describes the functional adjacencies between major program types (refer to Figure 2.5e). This adjacency diagram reflects the previously described workflows.

FUNCTIONAL ADJACENCIES: Detailed Adjacency Diagram

A detailed adjacency diagram was developed and provides an in-depth overview of adjacencies between the program types (refer to Figure 2.5f). This adjacency diagram illustrates the programming space types identified within the existing Roadway Maintenance and Pavement operations located in the SW District Operations Roadway Maintenance Yard and Kennedale Roadway Maintenance Facility . These spaces types have been organized into programmatic groupings, and illustrate programmatic relationships based on the information obtained through the existing facility reviews and interviews held with the Operations Groups.

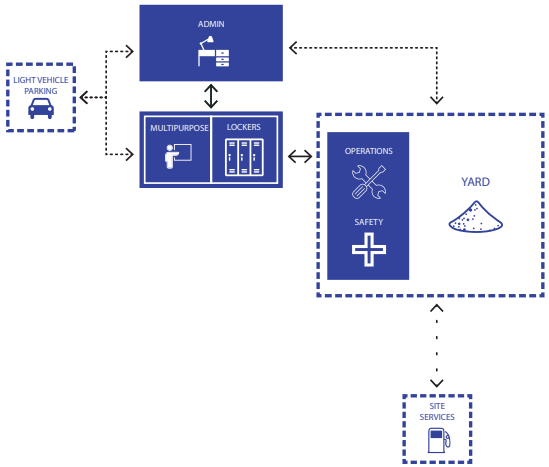


Figure 2.5e: High-Level Adjacency Diagram

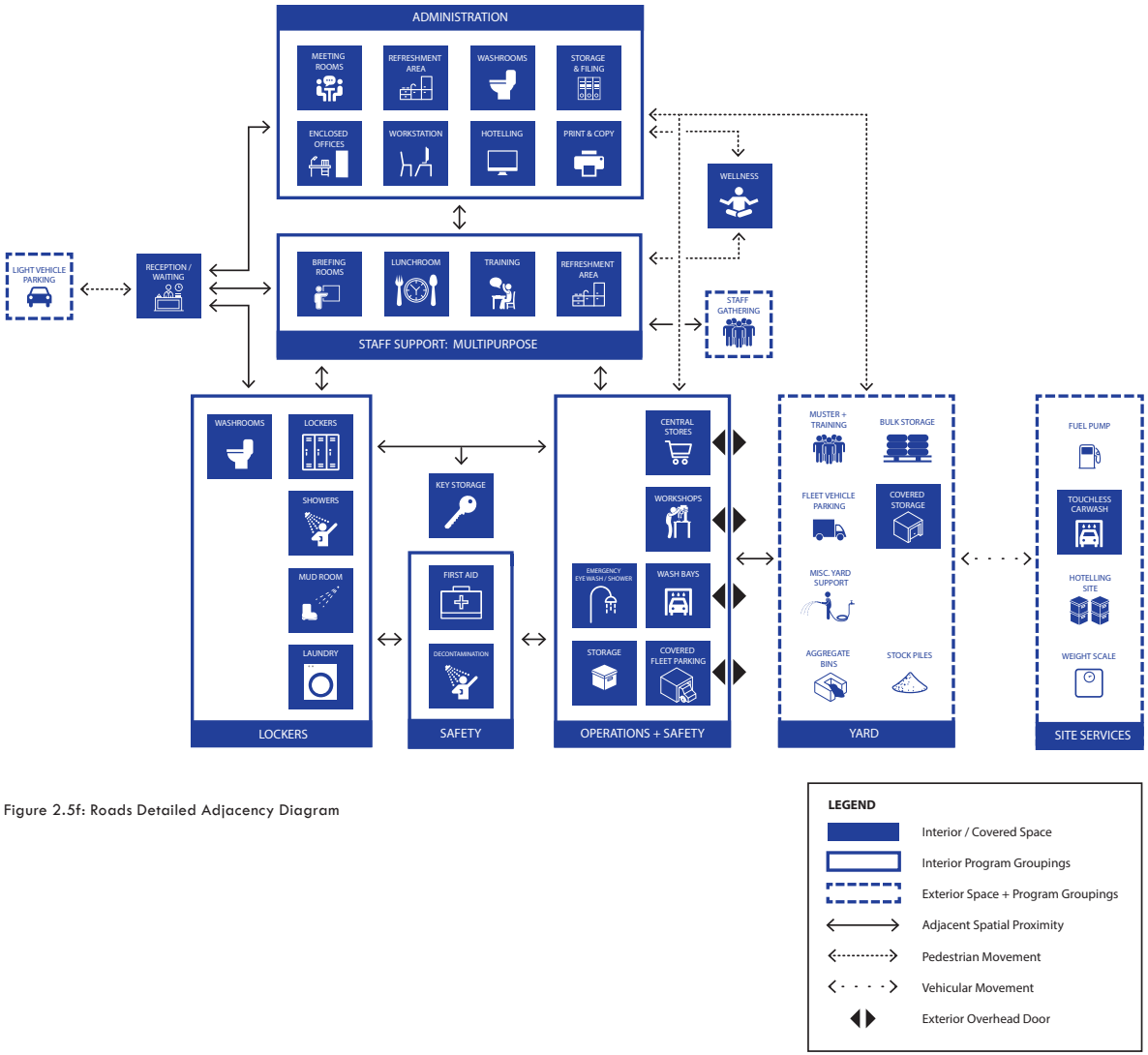


Figure 2.5f: Roads Detailed Adjacency Diagram

PROGRAM SUMMARY

The following Program Summary (refer to Figure 2.5g) has been based on the existing Roadway Maintenance and Pavement operations located in the SW District Operations Roadway Maintenance Yard and Kennedale Roadway Maintenance (NE District) Yard.

The adjusted program was modified from the existing program due to changes in current City Standards and Guidelines and based on subsequent information provided by the operations group. These Adjustments are included in the "Adjusted Program columns, and are further clarified in the "Comments" column.

ROADS

NO.	NAME	DESCRIPTION - SW DISTRICT	EXISTING PROGRAM - SW DISTRICT * QTY.	EXISTING PROGRAM - SW DISTRICT * AREA/EA. SQ. M	EXISTING PROGRAM - SW DISTRICT * TOTAL AREA SQ. M	DESCRIPTION - KENNEDALE	EXISTING PROGRAM - KENNEDALE (NE DISTRICT) * QTY.	EXISTING PROGRAM - KENNEDALE (NE DISTRICT) * AREA/EA. SQ. M	EXISTING PROGRAM - KENNEDALE (NE DISTRICT) * TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	ADJUSTED PROGRAM AREA/EA. SQ. M	ADJUSTED PROGRAM TOTAL AREA SQ. M	COMMENTS
ADMINISTRATION														
1.1	ENTRY + RECEPTION													
	ENTRANCE / VEST.	Access from public on one side and into yard from both vestibules; boot wash in each vest.	2.0	12.5	25.0	Visitor / public / staff entrance	1.0	3.8	3.8		2	5.0	10.0	
	ENTRANCE HALL / LOBBY	Includes lobby / waiting and circulation for Field Staff	1.0	56.0	56.0	Access to reception counter	1.0	9.5	9.5		1	20.0	20.0	
	RECEPTION DESK	Included in foremen's work area	1.0	0.0	0.0	Serviced from open working area	1.0	6.8	6.8		1	6.0	6.0	
	RECEPTION DESK	Included in foremen's work area	1.0	0.0	0.0	Pavement Management Addition	1.0	11.7	11.7					
		1.1 SUB-TOTAL			81.0	**1.1 SUB-TOTAL**			31.8				36.0	
1.2.1	ROADS OFFICES					Located in original Build								
	WORKSTATIONS - CLOSED	General Supervisor	1.0	28.2	28.2	General Supervisor	1.0	24.4	24.4		1	6.0	6.0	
	WORKSTATIONS - CLOSED	Roads Maintenance Supervisor	1.0	16.5	16.5	Roads Maintenance Supervisor	1.0	17.7	17.7		1	6.0	6.0	
	WORKSTATIONS - CLOSED	2 Inspectors	1.0	25.9	25.9	2 Inspectors	1.0	16.6	16.6		2	6.0	12.0	
	WORKSTATIONS - CLOSED		1.0	16.9	16.9	RM Tech	1.0	15.5	15.5		1	6.0	6.0	
	WORKSTATIONS - OPEN	Foremen area; includes reception desk	8.0		94.4	Foremen area; includes reception desk	8.0		81.0		8	6.0	48.0	
	HOTELLING	Included in foremen's workstations			0.0	Included in foremen's work area	2.0				2	2.3	4.6	
	ROADS OFFICES SUB-TOTAL	**1.2.1 SUB-TOTAL**									15		82.6	
1.2.2	PAVEMENT MGMT OFFICES					Pavement Management Addition								Pavement Management will be a centralized service that should be considered for movement to a new Integrated Site per the City's direction
	WORKSTATIONS - OPEN					Foremen area			127.9					
						4 workstations					4	6.0	24.0	
	WORKSTATIONS - OPEN					12 touchdowns					12	2.3	27.6	
	WORKSTATION - CLOSED					Office	1.0	13.1	13.1		1	6.0	6.0	
	WORKSTATION - CLOSED					RMS Supervisor	1.0	13.2	13.2		1	6.0	6.0	
	WORKSTATION - CLOSED					Supervisor	1.0	19.3	19.3		1	6.0	6.0	
	WORKSTATIONS - OPEN					RM Techs - 6 workstations			78.6		6	2.3	13.8	
	PM OFFICES SUB-TOTAL	**1.2.2 SUB-TOTAL**			181.9	**1.2 SUB-TOTAL**			407.3		25		83.4	
1.3	MEETING ROOMS					Included in Refreshment Area				1.8 sq. m per person				
	MEETING ROOM (SM)									8-10 people				
	MEETING ROOM (M)									18 - 20 people	1	36.0	36.0	
	MEETING ROOM (LG)					Pavement Management Addition Undersized Boardroom	1.0	28.2	28.2	30 people				
	NOW ROOM*		0.0	0.0	0.0					small unbookable telephone room	2	3.0	6.0	Consider additional Now Rooms if PM Offices are included
		1.3 SUB-TOTAL			0.0	**1.3 SUB-TOTAL**			28.2				42.0	
1.4	ADMIN SUPPORT													
	PRINT / COPY	Included in foremen's area / dedicated offices				Included in foremen's area / dedicated offices					1	10.0	10.0	
	RESOURCE ROOM / FILE STORAGE		1.0	7.1	7.1	included in foremen's area / dedicated offices					1	8.0	8.0	
	STORAGE		1.0	4.8	4.8		1.0	8.2	8.2		1	7.0	7.0	
	REFRESHMENT AREA	appliances, sink, casework, seating	1.0	8.3	8.3	appliances, sink, casework, seating	1.0	13.5	13.5		1	13.0	13.0	
	REFRESHMENT AREA					Pavement Management Addition	1.0	12.7	12.7					
	WASHROOMS**	No separate washrooms provided; included in lockers	0.0	0.0	0.0	No separate washrooms provided; included in lockers					2	6.0	12.0	
	STAFF CLOSET		0.0	0.0	0.0						1	2.0	2.0	
		1.4 SUB-TOTAL			20.2	**1.4 SUB-TOTAL**			34.4				52.0	
1.5	AUXILLARY / BUILDING SERVICES													Services are included in gross-up area
	JANITOR	1 Jan. off main hall	1.0	5.0	5.0	1 Jan. off main circulation								
	ELECTRICAL ROOM		1.0	6.0	6.0									
	COMM. ROOM / SERVER ROOM		1.0	3.0	3.0									
	A/V ROOM		1.0	2.0	2.0									
	MECHANICAL ROOM		1.0	17.0	17.0									
	CIRCULATION	Included in other spaces	0.0	0.0	0.0	Included in other spaces								
		1.5 SUB-TOTAL			33.0	**1.5 SUB-TOTAL**			0.0				0.0	
1.6	SAFETY													
	FIRE EXTINQUISHER**		0.0	0.0	0.0					wall mounted; clear sight-lines; accessible				
	DE-FIBULATOR**		0.0	0.0	0.0					wall mounted; clear sight-lines; accessible				
		1.6 SUB-TOTAL			0.0	**1.6 SUB-TOTAL**			0.0				0.0	
		SUB TOTAL, NSM				**SUB TOTAL, NSM**							213.4	
		Net to Gross Space Conversion Factor: 25%				Net to Gross Space Conversion Factor: 25%							53.4	Circulation
		SUB TOTAL, GSM				**SUB TOTAL, GSM**							266.8	
		Building Gross Up Conversion Factor: 25%				Building Gross Up Conversion Factor: 25%							66.7	Building services + exterior walls gross-up
		TOTAL ADMIN, BGSM			316.1	**TOTAL ADMIN, BGSM**			501.7				333.4	

Figure 2.5g: Roads Program Summary

ROADS

NO.	NAME	DESCRIPTION - SW DISTRICT	EXISTING PROGRAM - SW DISTRICT * QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	DESCRIPTION - KENNEDALE	EXISTING PROGRAM - KENNEDALE (NE DISTRICT) * QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
STAFF SUPPORT														
2.1	BRIEFING, TRAINING + LUNCH ROOM													
	BRIFING / TRAINING / LUNCH					Original Build				Original build				
	MULTIPURPOSE ROOM	briefing, lunch, training; includes vehilce key board, movable table and chairs, casework kitchentte, vending machines	1.0	165.0	165.0	briefing, lunch, training; including movable table and chairs, casework kitchentte, vending machines	1.0	137.8	137.8	125 (peak) people; 1.8 sq. m per person; partitionable into smaller spaces; vending machines (3+); consider cafeteria service; resilient epoxy sealed flooring c/w varigated texture (hide asphalt)	1	225.0	225.0	
	KITCHENETTE	located in multi-purpose room	1.0	13.0	13.0	located in multi-purpose room				Located within multipurpose room; lower casework; 2 full size fridges; double basin sinks; ice maker; microwaves; stove; water-filling taps	1	15.0	15.0	
	FIELD STAFF LUNCH ROOM	included in multipurpose room			0.0	included in multipurpose room								
	BRIEFING ROOM	included in multipurpose room			0.0	included in multipurpose room				Small alcove; standing space for 10 - 12 people				
	STORAGE	located in multi-purpose room	1.0	2.1	2.1	located in multi-purpose room				Secure storage for vending machine refreshements	1	6.0	6.0	
	STORAGE	located in multi-purpose room	1.0	3.5	3.5	located in multi-purpose room				Storage for tables + chairs	1	10.0	10.0	
	STORAGE	accessed of main hall	1.0	4.5	4.5	secure storage for training purposes	1.0	11.3	11.3					
	BRIFING / TRAINING / LUNCH					Pavement Management Administration Addition				Original build				
	TRAINING / LUNCH ROOM					divisible into three c/w sliding partitions	1.0	313.4	313.4					
	WELLNESS ROOM													
	WELLNESS ROOM									Rubber mats, mirrors, equipment, daylighting Area per Central District	1	64.0	64.0	
		2.1 SUB-TOTAL			188.1	**2.1 SUB-TOTAL**			462.5				320.0	
2.2	LOCKERS + CHANGE ROOMS													
	MALE - LOCKERS + CHANGE ROOMS					Original build								
	VEST. - MALE		1.0	6.1	6.1		1.0	6.6	6.6		1	6.0	6.0	
	WASHROOMS - MALE**		1.0	35.0	35.0		1.0	31.6	31.6				35.0	
	SHOWERS - MALE		3.0	2.5	7.5		1.0	13.8	13.8		2	2.0	4.0	
	SHOWERS - MALE									Barrier free	1	4.0	4.0	
	LOCKERS - MALE	90 full size; 50 half size	1.0	106.4	106.4	full size lockers c/w separate central bench	1.0	88.6	88.6	200 1.5 lockers = 300 full size 24" x 24" x 72" H locker floor mounted c/w interior partition; central aisle benches	300	1.85	555.0	
	MALE - LOCKERS + CHANGE ROOMS					Pavement Management Administration Addition								
	SHOWERS - MALE					single shower unit: 1800 D x 900 W c/w shower curtain, bench + door barrier free shower unit: 1550 W x 1900 D including barrier free grab bar and seat	1.0	36.6	36.6	single shower unit: 1800 D x 900 W c/w shower curtain, bench + door barrier free shower unit: 1550 W x 1900 D including barrier free grab bar and seat				
	LOCKERS - MALE					274 lockers c/w integral bench (18" x 18")	1.0	230.1	230.1					
	BARRIER FREE WR					2 washrooms	2.0	4.3	8.5					
	WASHROOMS - MEN						1.0	14.4	14.4					
	FEMALE - LOCKERS + CHANGE ROOMS					Original build								
	VEST. - FEMALE		1.0	5.6	5.6		1.0	5.6	5.6		1	6.0	6.0	
	WASHROOMS - FEMALE**		1.0	18.0	18.0		1.0	12.2	12.2				18.0	
	SHOWERS - FEMALE		2.0	2.0	4.0		1.0	6.4	6.4		1	2.0	2.0	
	SHOWERS - FEMALE									Barrier free	1	4.0	4.0	
	LOCKERS - FEMALE		1.0	16.5	16.5		1.0	15.4	15.4	50 1.5 lockers = 75 full size 24" x 24" x 72" H locker floor mounted c/w interior partition; central aisle benches	75	1.85	138.8	
	BARRIER FREE WASHROOM**	in washroom areas	2.0	0.0	0.0									
		2.2 SUB-TOTAL			199.1	**2.2 SUB-TOTAL**			469.8				772.8	
2.3	CLEANING + SAFETY													
	DECONTAMINATION SHOWER									Enclosed unisex shower; adjacent to Operations / Speciality Vehicle Bays	1	2.0	2.0	
	DECONTAMINATION SHOWER - BARRIER FREE									Enclosed unisex barrier free shower; adjacent to Operations / Speciality Vehicle Bays	1	4.0	4.0	
	LAUNDRY AREA		0.0	0.0	0.0	Pavement Management - Included in PM Shop; washer, dryer, wall mounted sink, paper tower, wall mounted eye wash				washer and dryer machines; floor drain; water; power	1	5.0	5.0	
	MUD ROOM	Boot wash included in vestibules	0.0	0.0	0.0					Grated walk-off mat; hose-down area; laundry dry rack; laundry sink	1	5.0	5.0	
		2.3 SUB-TOTAL			0.0	**2.3 SUB-TOTAL**			0.0				16.0	
2.4	AUXILLARY / BUILDING SERVICES													
	STAFF VESTIBULE		0.0	0.0	0.0		1.0	3.3	3.3		1	5.0	5.0	
	STAFF VESTIBULE					Pavement Management Addition	1.0	5.6	5.6					
	ENTRY VESTIBULE					Pavement Management Addition	1.0	13.7	13.7					
	MECH / ELEC		0.0	0.0	0.0		1.0	37.0	37.0					

ROADS

NO.	NAME	DESCRIPTION - SW DISTRICT	EXISTING PROGRAM - SW DISTRICT *			DESCRIPTION - KENNEDALE	EXISTING PROGRAM - KENNEDALE (NE DISTRICT) *			DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM			COMMENTS
			QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M		QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M		QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	
	VEHICLE KEY BOARD		0.0	0.0	0.0	includes vehicle key board	1.0	23.8	23.8	Capacity to be determined by owner; Electronic option to be considered; located central / adjacent to multipurpose room	1	5.0	5.0	
	CIRCULATION					Pavement Management Addition	1.0	127.7	127.7					
	JANITOR		0.0	0.0	0.0		1.0	2.8	2.8		1	5.0	5.0	
	JANITOR					Pavement Management Addition	1.0	5.1	5.1					
	ROOF ACCESS					Pavement Management Addition	1.0	20.5	20.5					
	SHAFT					Pavement Management Addition	1.0	3.6	3.6					
		2.4 SUB-TOTAL			0.0	2.4 SUB-TOTAL			243.1				15.0	
		SUB TOTAL, NSM				SUB TOTAL, NSM							1123.8	
		Net to Gross Space Conversion Factor: 30%				Net to Gross Space Conversion Factor: 30%							337.1	Circulation
		SUB TOTAL, CGSM				SUB TOTAL, CGSM							1460.9	
		Building Gross Up Conversion Factor: 25%				Building Gross Up Conversion Factor: 25%							365.2	Building services + exterior walls gross-up
		TOTAL STAFF SUPPORT, BGSM			387.2	TOTAL STAFF SUPPORT, BGSM			1175.4				1826.1	
		TOTAL ADMIN BUILDING, BGSM			703.3	TOTAL ADMIN BUILDING, BGSM			1677.1				2159.5	
OPERATIONS SHOPS														
3.1	CENTRAL STORES						1.0	101.3	101.3	Enclosed + secure				
	CENTRAL LOADING + RECEIVING	includes storage	1.0	54.0	54.0	included in Central Stores				***OH Door: 16' x 16'***	1	48.0	48.0	
	STORAGE AREA	secure chain-link storage area	1.0	38.0	38.0	included in Central Stores				storage shelving + oversized pallet racking; floor drain	1	38.0	38.0	
	RECEPTION / VESTIBULE		0.0	0.0	0.0					reception counter; secure point			0.0	
	WORKSTATION/OFFICE	included in loading + receiving area	1.0	0.0	0.0	included in Central Stores				typical workstation enclosed within Central Stores	1	6.0	6.0	
		3.1 SUB-TOTAL			92.0	3.1 SUB-TOTAL			101.3				92.0	
3.3	WORKSHOPS													
	CARPENTRY	7.7 m W x 15 m L enclosed bay	1.0	121.0	121.0	Roads Management: 11.3 m L x 6.4 m W enclosed bay; 10.5 ft W OH Door	1.0	75.9	75.9	***2 ea. 12' x 12' overhead door for access to yard + access to interior; enclosed w solid walls such as sealed concrete/CMU or other easily maintanable finish; floor drain; water line(s) c/w valved quick connects; compressed air; specialized ventilation located on exterior wall; workbenches/ casework; floor mounted / workbench mounted equipment***	1	100.0	100.0	
	CARPENTRY - SECURE MATERIALS / TOOL STORAGE									***Adjacent to Carpentry Shop; ideally enclosed with solid walls; secure access;***	1	20.0	20.0	
	PAINT SHOP					Roads Management: 13.9 m L x 6.4m W enclosed bay; 10.5 ft W OH Door	1.0	89.0	89.0					
	GENERAL SHOP					PM Shop; 7.4 m W x 10.7 m L enclosed bay; 14.5 W x 16ft. H OH Door	1.0	92.0	92.0					
		3.3 SUB-TOTAL			121.0	3.3 SUB-TOTAL			256.9				120.0	
3.5	SAFETY													
	FIRST AID										1	10.0	10.0	
	EYE WASH/SHOWER STATION**									open; clear sight lines	1	1.0	1.0	
	FIRE EXTINQUISHER**									wall mounted; clear sight-lines; accessible				
	DE-FIBULATOR**									wall mounted; clear sight-lines; accessible				
		3.5 SUB-TOTAL				3.5 SUB-TOTAL							11.0	
3.6	AUXILLARY / BUILDING SERVICES													
	JANITOR										1	5.0	5.0	
	MECHANICAL / WATER METER					Services Room (TBD)	1.0	8.4	8.4					
	ELECTRICAL ROOM					PM Garage - Electrical Closet	1.0	5.0	5.0					
	COMM. ROOM													
	WASHROOMS**						1.0	3.4	3.4					
	CIRCULATION						1.0	14.9	14.9					
		3.6 SUB-TOTAL				3.6 SUB-TOTAL			31.7				5.0	
		SUB TOTAL, NSM				SUB TOTAL, NSM							228.0	
		Net to Gross Space Conversion Factor: 20%				Net to Gross Space Conversion Factor: 20%								Circulation included in spaces
		SUB TOTAL, CGSM				SUB TOTAL, CGSM							228.0	
		Building Gross Up Conversion Factor: 25%				Building Gross Up Conversion Factor: 25%							57.0	Building services + exterior walls gross-up
		TOTAL OPERATIONS SHOPS, BGSM			213.0	TOTAL OPERATIONS SHOPS, BGSM			389.9				285.0	
VEHICLE STORAGE														
4.1	WASHBAY													

ROADS

NO.	NAME	DESCRIPTION - SW DISTRICT	EXISTING PROGRAM - SW DISTRICT *			DESCRIPTION - KENNEDALE	EXISTING PROGRAM - KENNEDALE (NE DISTRICT) *			DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM			COMMENTS
			QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M		QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M		QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	
	WASHBAY	one long bay with drive-through capability	1.0	246.0	246.0	Roads Management: one long bay with drive-through capability	1.0	234.1	234.1	16' x 16' overhead doors; drive-through capability; chlorinated oversized water line(s) c/w valved quick connects; oversized water hose(s) c/w wall mounted storage hook(s); drainage trench c/w oil interceptor; mezzanine cat-walk both sides c/w stairs; compressed air; enclosed w solid walls resistant to water damage	1.0	250.0	250.0	
	VACUUM EQUIPMENT	included in material storage	1.0	0.0	0.0					Outside of wasbay proper; 1 per side of washbay desired	2.0	1.0	2.0	
	EQUIPMENT ROOM									Locate on a mezz or at grade equipment room Enclosed w solid walls Requires concrete equipment pad	1.0	15.0	15.0	
	WASHBAY					PM Washbay - drive in / back out; 14.5 w OH Door; includes catwalk single side	1.0	104.3	104.3					
		4.1 SUB-TOTAL			246.0	**4.1 SUB-TOTAL**			338.4				267.0	
4.2	LIGHT MAINTENANCE / COVERED FLEET PARK	Euipment Allocation (Per SW District, 2017): Sweepers 4; Skid steers 1; Walk ploughs 7; Belt loader 2; Pothole truck 2; Grader 4; Snow blower 1; Zipper 1; Sanders/plows 28; Loaders 2; Flusher 2; Patch kat 2 Total: 56												
4.2.1	ROADS MANAGEMENT VEHICLE BAYS					ROADS MANAGEMENT								
	VEHICLE MAINTENANCE - LIGHT	16.165 m L x 5 m W bay size; 16' x 14' W overhead door; drive-through capability; multifunctional to store large vehicles/equipment; includes 2 dedicated blade-change bays w/ ramps	8.0	80.6	644.8	13.2 L x 5.3 W bay size; drive in / drive out; dedicated blade change; compressed air; 14.5'W x 16' H OH Door	3.0	67.3	202.0	Vehicle repair and maintenance;16' x 16' overhead door; drive-in/back-out desired; drainage trench c/w oil interceptor; roll-up u.s. structure mounted power + compressed air; 2 dedicated blade change ramps; water line(s) c/w valved quick connects; heated / tempered	8.0	80.6	644.8	Standardized bay size: 20.0 x 6.0 m
	VEHICLE MAINTENANCE - RMW SHOP					15.4 L x 7.25 W bay size; drive through capability; water; 14.5'W x 14' H OH Door; cw internal circulation	4.0	111.4	445.4					Standardized drive through bay size: 42.0 x 6
	LARGE EQUIPMENT STORAGE BAY 2 ton + greater	15 m L x 5 m W bay size; 16' x 14' W overhead door; four with drive-through capability; remainder drive in/back-out;	30.0	75.5	2,266.0	14.1 L x 5.3 W bay size; drive in / drive out capability; 14.5' W x 16' H OH Door	5.0	72.2	361.0	Vehicle repair and maintenance;16' x 16' overhead door; drive-in/back-out desired; drainage trench c/w oil interceptor; roll-up u.s. structure mounted power + compressed air; water line(s) c/w valved quick connects; heated / tempered	30.0	75.5	2265.0	Standardized bay size: 20.0 x 6.0 m; for standardization, consider reducing no of bays due to increase in area for storage; equipment layout plan required to confirm required bays
	LARGE EQUIPMENT STORAGE BAY 2 ton + greater	16.165 m L x 5 m W bay size; 16' x 14' W overhead door; drive-through capability	4.0	80.8	323.0	13.2 L x 5.3 W bay size; drive in / drive out capability; 14.5' W x 16' H OH Door	2.0	68.0	135.9	Vehicle repair and maintenance;16' x 16' overhead door; drive-in/back-out desired; drainage trench c/w oil interceptor; roll-up u.s. structure mounted power + compressed air; water line(s) c/w valved quick connects; heated / tempered	4.0	80.8	323.2	Standardized drive through bay size: 42.0 x 6
	LARGE EQUIPMENT STORAGE BAY 2 ton + greater					13.2 L x 5 W bay size; drive in / drive out capability; 14.5' W x 14' H OH Door	8.0	67.3	538.0					
	LARGE EQUIPMENT STORAGE BAY 2 ton + greater					14.1 L x 5 W bay size; drive in / drive out capability; 14.5' W x 14' H OH Door	8.0	71.8	574.0					
	CIRCULATION - SERVICES SPINE	2m wide raised concrete walk-way aligned down centre of Vehlce Storage Building	1.0	238.0	238.0	3.5m wide raised concrete walk-way aligned down centre of Vehlce Storage Building	1.0	271.4	271.4	2m raised concrete walk-way aligned down centre of Vehicle Storage Building; water, compressed air, power, etc. located central for access to bay on either side	1.0	238.0	238.0	
	FLEET VEHICLE PARKING 1/2 ton - 1 ton	all fleet vehilces are stored in oversized storage bays				included in yard circulation / storage areas								
4.2.2	PAVEMENT MANAGEMENT GARAGE					PAVEMENT MANAGEMENT GARAGE								
	LARGE EQUIPMENT STORAGE BAY 2 ton + greater					14.125m L x 6.1 m W bay size; drive in / drive out; 14.6' W x 14' H OH Doors	8.0	173.6	1389.0					
4.2.3	AUXILLARY BAY													
	SECURE STORAGE BAY									Secure storage (enclosed w chain link fence) for materials, vehicles, equipment; 16' x 16' overhead door; drive-in/back-out desired; drainage trench c/w oil interceptor; roll-up u.s. structure mounted power + compressed air; water line(s) c/w valved quick connects; heated / tempered	1.0	80.0	80.0	Standardized bay size: 20.0 x 6.0 m
4.2.4	BRIDGES BAY													
	SECURE STORAGE BAY									Secure storage (enclosed w chain link fence) for 40' (12m) long specialty vehicle; min length of bay to be 13.5 M; 16' x 16' overhead door; drive-in/back-out desired; drainage trench c/w oil interceptor; roll-up u.s. structure mounted power + compressed air; water line(s) c/w valved quick connects; heated / tempered	1.0	80.0	80.0	Standardized bay size: 20.0 x 6.0 m
4.2.5	STORAGE										45			

ROADS

NO.	NAME	DESCRIPTION - SW DISTRICT	EXISTING PROGRAM - SW DISTRICT * QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	DESCRIPTION - KENNEDALE	EXISTING PROGRAM - KENNEDALE (NE DISTRICT) * QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
	MATERIAL STORAGE		1.0	50.0	50.0						1.0	50.0	50.0	For standardization, materials / tool storage included in bays
	MATERIAL STORAGE	pallet storage (blades); secure wire-mesh cabinets	1.0	58.0	58.0	included in bays					1.0	30.0	30.0	
	TOOL CRIB	included in material storage			0.0	included in bays					45.0	10.0	450.0	
		4.2 SUB-TOTAL			3,471.8	**4.2 SUB-TOTAL**			3916.7				3631.0	
4.3	SAFETY													
	EYE WASH / SHOWER STATION**				0.0					open; clear sight lines	2.0	1.0	2.0	
	FIRE EXTINQUISHER**				0.0					wall mounted; clear sight-lines; accessible				
	DE-FIBULATOR**				0.0					wall mounted; clear sight-lines; accessible				
		4.3 SUB-TOTAL				**4.3 SUB-TOTAL**			0.0				2.0	
4.4	AUXILLARY / BUILDING SERVICES													
	JANITOR		1.0	2.0	2.0									
	SERVICES	mechanical, electrical, etc. on mezzanine level	1.0	133.0	133.0									
	ELECTRICAL ROOM		0.0	0.0	0.0									
	COMM. ROOM / N.A.R. ROOM		0.0	0.0	0.0									
	WASHROOMS**		3.0		13.0		1.0	8.0	8.0					
	CIRCULATION		1.0	40.0	40.0									
		4.4 SUB-TOTAL			188.0	**4.4 SUB-TOTAL**			8.0				0.0	
		SUB TOTAL, NSM				**SUB TOTAL, NSM**							**3900.0**	
		Net to Gross Space Conversion Factor: 20%				Net to Gross Space Conversion Factor: 20%								Circulation included in spaces
		SUB TOTAL, CGSM				**SUB TOTAL, CGSM**							**3900.0**	
		Building Gross Up Conversion Factor: 25%				Building Gross Up Conversion Factor: 25%							975.0	Building services + exterior walls gross-up
					3,905.8				**4263.1**	**TOTAL VEHICLE MAINTENANCE + STORAGE, BGSM**			**4875.0**	
					4,118.8				**4,653.0**	**TOTAL VEHILCE STORAGE/OPERATIONS SHOP, BGSM**			**5,160.0**	
YARD														
5.1	EXTERIOR WORK AREA													
	FABRICATION													
	KNOCK-OFF RACK													
	BLADE CHANGE													
		5.1 SUB-TOTAL				**5.1 SUB-TOTAL**			0.0					
5.2	STAFF GATHERING													
	STAFF GATHERING						1.0	121.0	121.0					
	MUSTER													
	TRAINING													
		5.2 SUB-TOTAL				**5.2 SUB-TOTAL**			121.0					
5.3	CIRCULATION					includes training, fabrication area and fleet parking	1.0	18371.0	18371.0					
		YARD SUB-TOTAL			**23,340.0**	**YARD SUB-TOTAL**			**18,492.0**				**23,077.2**	includes yard circulation, exterior work area staff gathering + exterior fleet parking (1/2 ton to 1 ton trucks, equipment, etc.)
5.4	AGGREGATE STORAGE													
	AGGREGATE BINS	20mm gravel, pea gravel, pap, garbage, applicances, sweepings, oil mix, black dirt, haz waste, sand boxes, 25 mm recycled/broken concrete, EZ street, masonry sand, red shale rock			1,565.0		1.0	1671.0	1671.0	***20 mm gravel, pap, garbage/appliances, sweepings + oil mix are most important agreegate bins; 40 ft (12.2m) loading clearance is required; bin size: 10.2 m deep x width varies; oil mix bin size: 10.2 m deep x 23 m wide***			1565.0	
	STOCK PILE - SAND	Sand pile			6,629.0	Sand pile	1.0	1270.0	1270.0	Covered (i.e. sprung or canvas structure);	1.0	250.0	250.0	Capacity to be confirmed during Schematic Design
	SALT DOME				660.0		1.0	621.0	621.0	Enclosed structure; 1,300 ton capacity	1.0	250.0	250.0	Capacity to be confirmed during Schematic Design
		5.3 SUB-TOTAL			8,854.0	**SUB-TOTAL**			3562.0				2065.0	
5.5	BULK STORAGE (OPEN)													
	PALLET/OPEN STORAGE	general storage, iron, lay-down area, fleet parking; signage storage			2,434.0	general storage, iron, lay-down area, fleet parking; signage storage	1.0	3679.0	3679.0				2434.0	
	SECURE STORAGE	secured within yard				secured within yard								
	OVERSIZED RACK STORAGE	138 m of estimated length	37.0	13.0	481.0		1.0	812.0	812.0		37.0	13.0	481.0	
		5.4 SUB-TOTAL			2,915.0	**SUB-TOTAL**			4491.0				2915.0	
5.6	FUEL STATION													
	DIESEL PUMP	included in yard sub-total	1.0		0.0									
	UNLEADED PUMP				0.0									
		5.5 SUB-TOTAL			0.0	**SUB-TOTAL**			0.0				0.0	
5.7	YARD SUPPORT / MISC. MATERIALS AND/OR EQUIPMENT													

ROADS

NO.	NAME	DESCRIPTION - SW DISTRICT	EXISTING PROGRAM - SW DISTRICT *			DESCRIPTION - KENNEDALE	EXISTING PROGRAM - KENNEDALE (NE DISTRICT) *			DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM			COMMENTS
			QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M		QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M		QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	
	DE-ICING/CALCIUM CHORLIDE - EQUIPMENT	included in yard sub-total	2.0		0.0	Containment Compound	1.0	46.8	46.8		1.0	46.8	46.8	
	DE-ICING BAYS					6m W x 16.8m L; exterior concrete pad c/w drainage; adjacent to de-icing equipment	2.0	102.5	205.0		2.0	102.5	205.0	
	DE-ICING EQUIPMENT	included in yard sub-total	1.0		0.0								0.0	
	BLUE USED OIL TANK		1.0		5.0						1.0		5.0	
	CONTAINMENT STORAGE AREA		1.0		6.0						1.0		6.0	
		5.6 SUB-TOTAL			11.0	**5.6 SUB-TOTAL**			251.8				262.8	
5.8	COVERED STORAGE													
	SHED	storage shed	1.0		96.0	Cold storage shed	1.0	85.0	85.0				96.0	
	SHED	fabrication / materials storage	1.0		207.0	Cold storage shed	1.0	37.0	37.0				207.0	
	COVERED STORAGE					Dry sand storage	1.0	95.0	95.0					
	HAZARDOUS STORAGE - SHED		1.0		21.0								21.0	
	FLAMMABLE STORAGE		1.0		6.0						1.0		6.0	
		5.7 SUB-TOTAL			330.0	**SUB-TOTAL**			217.0				330.0	
5.9	SECURE FLEET PARKING	included in yard sub-total and pallet / open storage				some fleet parking included in bulk storage and circulation								
	Stall Type C: 3 m x 6 m (City Fleet Trucks)	Typically parked outside	6.0		0.0						6.0			
	Equipment Parking	Typically parked inside buidling	56.0		0.0						56.0			
					0.0									
		5.8 SUB-TOTAL			0.0	**SUB-TOTAL**			6611.1				0.0	
		YARD SUB TOTAL, NSM			**35,450.0**	**YARD SUB TOTAL, NSM**			**33624.9**				**28,650.0**	
LIGHT VEHICLE PARKING* **														
6.1	VISITOR PARKING	includes visitor site access and circulation	6.0		445.0		1.0	83.0	83.0		6.0		445.0	
6.2	PERSONAL VEHICLE PARKING	includes circulation; secured w access gate	78.0		3,158.4		1.0	4528.0	4528.0		78.0		3158.0	Staff, GS, Tech, Inspector
6.3	BICYCLE PARKING / COVERED STORAGE		10.0				1.0	28.9	28.9		10.0			
		PUBLIC SUB TOTAL, NSM			**3,603.4**	**LIGHT VEHICLE PARKING SUB TOTAL, NSM**			**4639.9**				**3603.0**	
SITE GROSS UP														
7.1	SOFT SURFACE													
	LANDSCAPE / BUFFER***				687.0		1.0	6595.0	6595.0				687.0	
7.2	HARD SURFACE													
	ROADS	includes yard entry and sidewalks; all other roadways included in Yard Sub-Total			389.0		1.0	1371.0	1371.0				389.0	Most circulation is within yard area, included in Yard Area Sub-Total 5.3
	SIDEWALKS						1.0	260.0	260.0					Area included in Yard Area Sub-Total 5.3
	GARBAGE / RECYCLING BINS	included in yard sub-total				included in yard sub-total								Area included in Yard Area Sub-Total 5.3
	ELEC. TRANSFORMER / ATCO BUILDING				15.0								15.0	
		SITE GROSS-UP SUB-TOTAL			**1,091.0**	**SITE GROSS-UP SUB-TOTAL**			**8226.0**				**1091.0**	
		SITE TOTAL, GSM			**40,144.4**	**SITE TOTAL, GSM**			**46,490.8**				**33,344.0**	
		TOTAL ROADS - SW DISTRICT AREA			**44,966.5**	**TOTAL ROADS - NE DISTRICT AREA**			**52,820.9**				**40,663.5**	

NOTES:

Existing Areas: All existing program values are dervied from scaled PDFs provided by the Owner. There may be inaccuracies from scaled drawings. Building Gross-Up (foot print of walls and circulation) is included in areas UNO.

* Size / configuration to be per the City of Edmonton Space Standards

** Size / configuration / quantity to be per the Alberta Building Code

*** Size / configuration / quantity to be per the City of Edmonton Zoning / Land Use Bylaw

2.6 MUNICIPAL FLEET MAINTENANCE (FLEET)

INTRODUCTION

The Fleet component requires light vehicle and heavy vehicle bays with overhead cranes over a portion of the bays. A central store for necessary parts and equipment and workshops for welding, small engine repair and oil changes are to be located in an efficient manner to provide fluid access from the operation bays and yard. Fleet parking is required for both City vehicles and non-City client vehicles with the client vehicle parking not being located within the secure yard. The other predominant use of Fleet's site will be City fleet vehicles accessing the fueling station, maintenance facility and car wash. The largest vehicle to access the site will be a B-Train fuel truck. The fuel truck is required to pull through the site without the need to back up. The workbays are required to have a drive through aisle between the double loaded bays and be suitable for running repairs, preventative maintenance, and accident repairs.

WORK FLOW ANALYSIS

An analysis of existing workflow and Fleet's staffing requirements was conducted and is summarized in Figure 2.6a. The workflows demonstrates the sequence of program usage for each staffing type. These workflows are intended to summarize how the operations facilities are currently utilized.

YEARLY STAFFING SUMMARY

Interviews with existing operations staff were conducted in order to understand Fleet's staffing schedule with the results being summarized in Figure 2.6b. The interviews revealed that Fleet staffing schedule is constant throughout the year with the employees operating 24/7.

EXISTING FACILITY REVIEW

The design intentions from both the AMPV1 (refer to Figure 2.6c) and Fleet Operations Westwood Facility (refer to Figure 2.6d and 2.6e) were utilized as a basis for the Fleet's functional needs assessment. The following were key desirable characteristics from AMPV1 and the Westwood Facility:

- fuel trucks being able to pull through the site without the need to back up
- meeting circulation and truck turning requirements without the need to back up
- large overhead cranes for light and heavy maintenance bays
- internal drive through aisle with large high-speed overhead doors

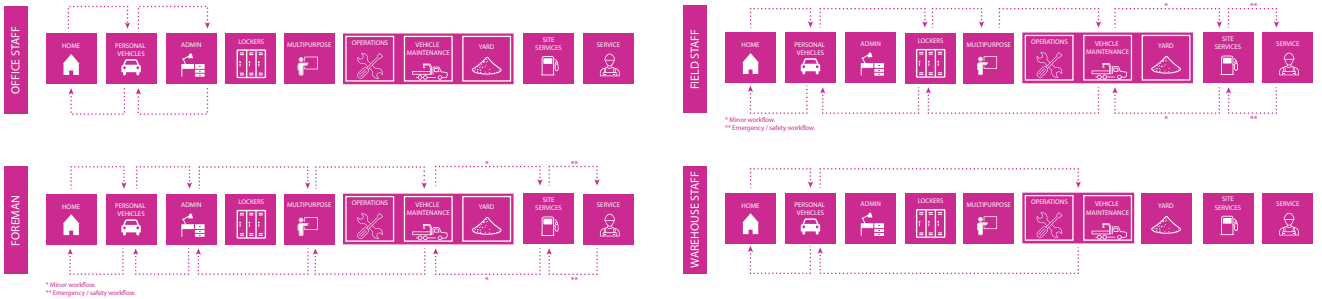


Figure 2.6a: Fleet Work Flow Analysis

FLEET

DAY	SHIFT	# STAFF	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Sun - Sat	6:00 AM - 4:00 PM													
Sun - Sat	6:00 AM - 4:00 PM													
Sun - Sat	2:00 PM - 12:00 AM													
Sun - Sat	9:00 PM - 7:00 AM													
		Total	42											

Figure 2.6b: Fleet Yearly Staffing Summary

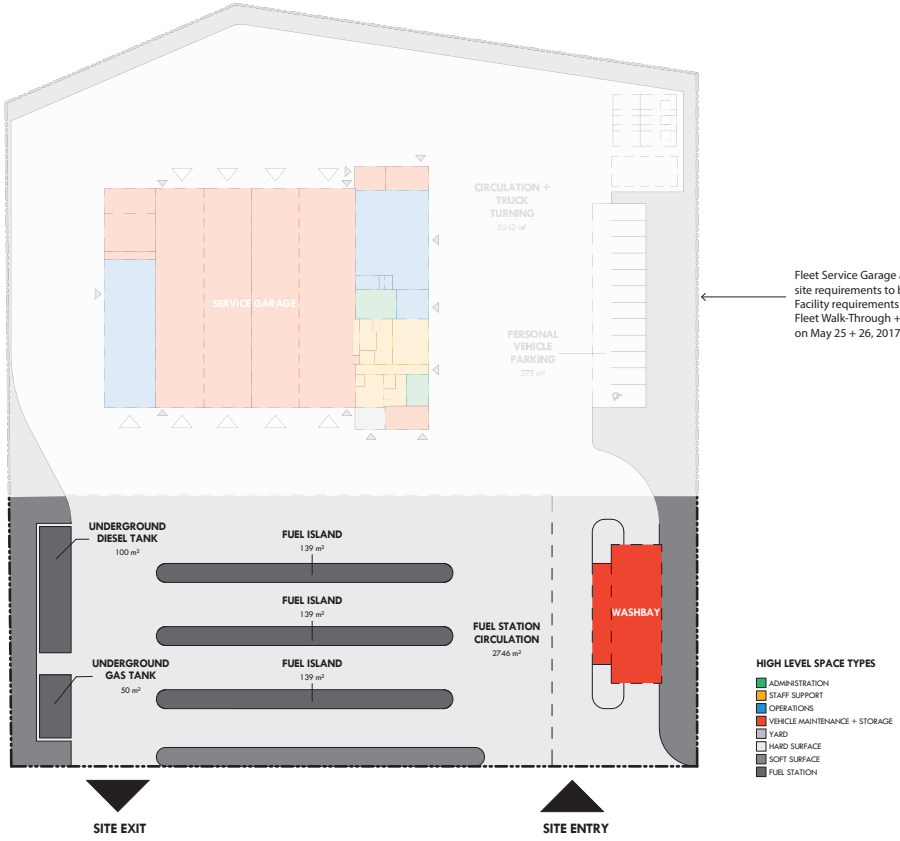


Figure 2.6c: Fleet AMPV1 Schematic Design Site Plan

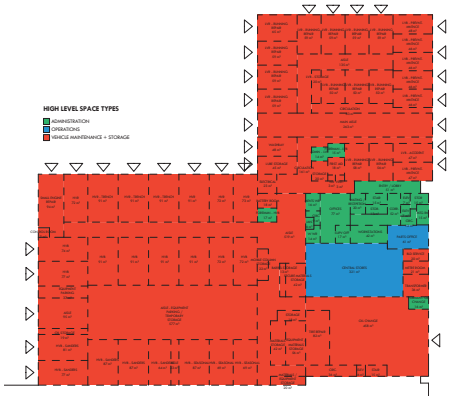


Figure 2.6d: Fleet Facility Westwood Main Floor

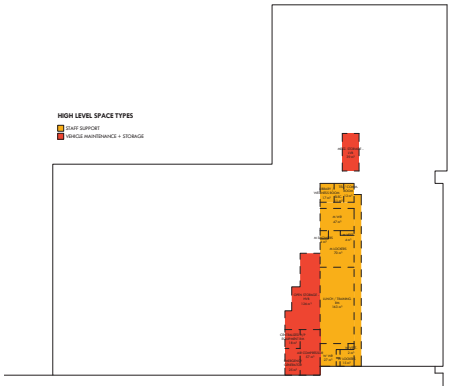


Figure 2.6e: Fleet Facility Westwood Second Floor

FUNCTIONAL ADJACENCIES: High-Level Adjacency Diagram

A high-level adjacency diagram was developed and describes the functional adjacencies between major program types (refer to Figure 2.6f). This adjacency diagram reflects the previously described workflows.

FUNCTIONAL ADJACENCIES: Detailed Adjacency Diagram

A detailed adjacency diagram was developed and provides an in-depth overview of adjacencies between the program types (refer to Figure 2.6g). This adjacency diagram illustrates the adjacencies required per the Fleet Operations Group facility review and subsequent user group meetings. The diagram also demonstrates the programming space types that were included in the previous AMPV1 dated March 8, 2016. These space types have been organized into programmatic groupings, and illustrate programmatic relationships based on the information obtained through the existing facility reviews and interviews held with the Operations Groups.

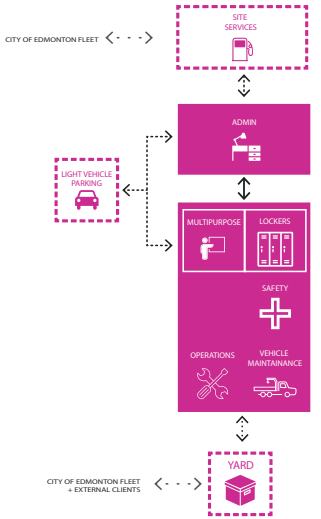


Figure 2.6f: Fleet High-Level Adjacency Diagram

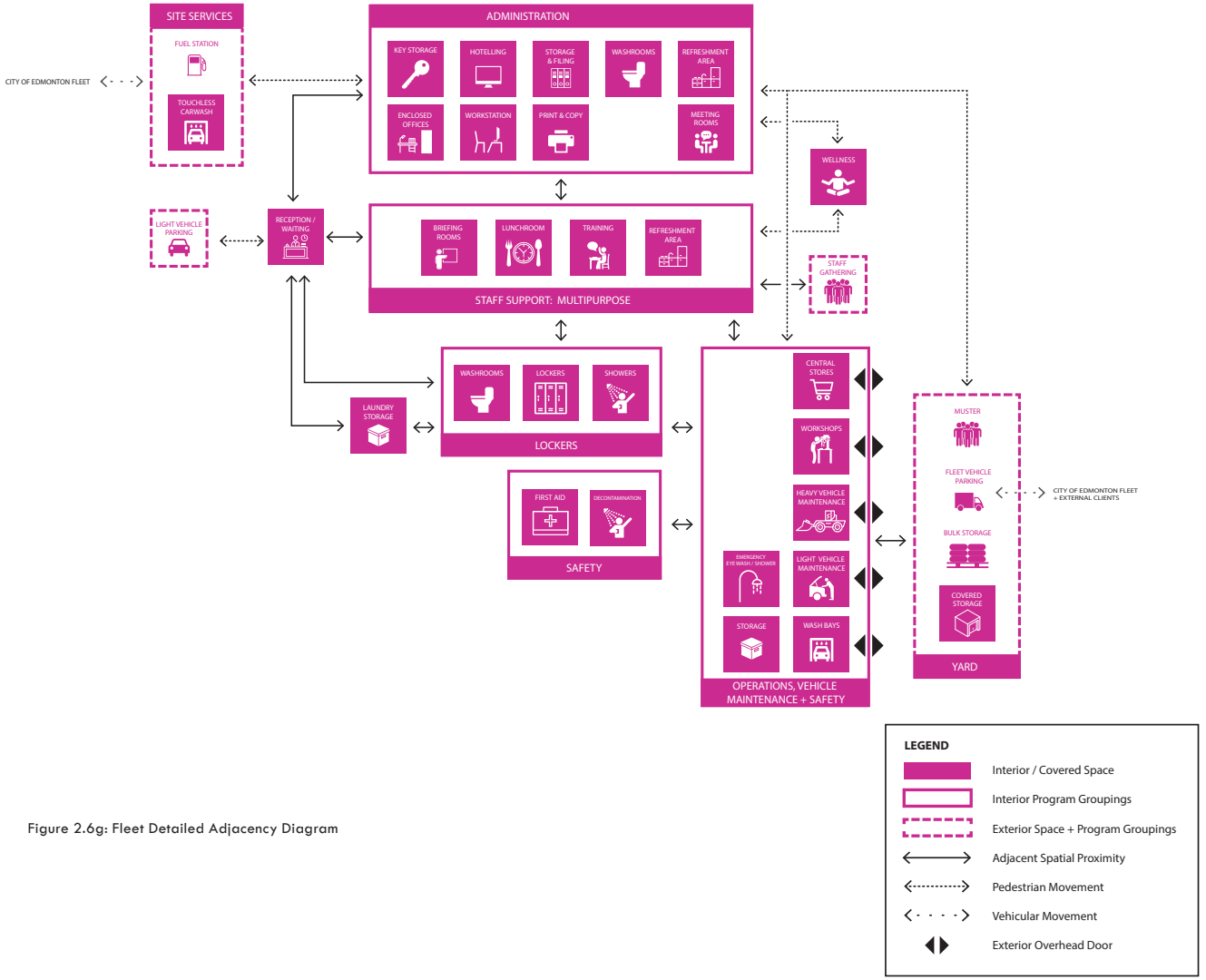


Figure 2.6g: Fleet Detailed Adjacency Diagram

PROGRAM SUMMARY

The following Program Summary (refer to Figure 2.6h) has been based on the programming summarized in the previous Ambleside Integrated Site Master Plan Report dated March 8, 2016 and the review of the Fleet Operations Westwood Facility.

The adjusted program was modified from the existing program due to changes in current City Standards and Guidelines and based on subsequent information provided by the Owner Group and the Fleet Operations Group representative. These Adjustments are included in the "Adjusted Program columns, and are further clarified in the "Comments" column.

FLEET

NO	NAME	DESCRIPTION - EXISTING	EXISTING PROGRAM - WESTWOOD (UNO) QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
ADMINISTRATION										
1.1	ENTRY + RECEPTION									
	ENTRANCE / VEST.		1.0	51.0	51.0		1	15.0	15.0	
	LOBBY/WAITING		1.0	20.0	20.0		1	20.0	20.0	
	RECEPTION DESK	Included in Offices area			0.0		1	10.0	10.0	
		1.1 SUB-TOTAL			71.0				45.0	
1.2	OFFICES*									
	SUPERVISOR		1.0	17.0	17.0	Workstation	1	6.0	6.0	
	CONTRACT ADMINISTRATOR					Workstation	1	6.0	6.0	
	OPEN OFFICE	Administration; including service counter	1.0	77.0	77.0	Workstation				
	WORKSTATIONS		1.0	42.0	42.0					
	CLERK					Workstation	3	6.0	18.0	
	DISPATCH					Workstation	1	6.0	6.0	
	FOREMAN - LVB	Light Vehicle Bay - located in LVB	1.0	15.0	15.0	Workstation	1	6.0	6.0	
	CLERK	Light Vehicle Bay - located in LVB	1.0	14.0	14.0	Workstation	1	6.0	6.0	
	FOREMAN - HVB	Heavy Vehilce Bay - located in HVB	1.0	17.0	17.0	Workstation	3	6.0	18.0	
	FOREMAN - Oil Change	Oil Change	1.0	16.0	16.0	Workstation	1	6.0	6.0	
		Staff Count Sub-total			198.0		12			
	HOTELLING				0.0	Hotelling station; include in office area for Foreman touchdown	2	2.3	4.6	
		1.2 SUB-TOTAL			396.0		14		76.6	
1.3	MEETING ROOMS					1.8 sq. m per person				
	MEETING ROOM (SM)		1.0	15.0	15.0					
	MEETING ROOM (SM)				0.0	Meeting Room - 8-10 people	1	18.0	18.0	
	MEETING ROOM (LG)				0.0	Boardroom - 30 people	1	54.0	54.0	
	NOW ROOM*				0.0	small telephone room; include throughout office area	2	3.0	6.0	
		1.3 SUB-TOTAL			15.0				78.0	
1.4	ADMIN SUPPORT									
	PRINT / COPY	Included in admin					1	10.0	15.0	
	RESOURCE ROOM / FILE STORAGE	Included in admin					1	10.0	10.0	
	STORAGE		1.0	15.0	15.0		1	15.0	15.0	
	STORAGE		1.0	13.0	13.0		1	13.0	13.0	
	REFRESHMENT AREA	Shared with lunch room				appliances, sink, casework, seating	1	15.0	15.0	
	WASHROOMS - MENS		1.0	16.0	16.0		1	16.0	16.0	
	WASHROOMS - WOMENS		1.0	14.0	14.0		1	14.0	14.0	
	STAFF CLOSET						1	2.0	2.0	
	CIRCULATION		1.0	64.0	64.0					
		1.4 SUB-TOTAL			122.0				100.0	
		SUB TOTAL, NSM							299.4	
		Net to Gross Space Conversion Factor: 25%							74.9	Circulation
		SUB TOTAL, CGSM							374.5	
		Building Gross Up Conversion Factor: 25%							93.6	Building services / exterior walls
		TOTAL ADMIN, BGSM			604.0				468.1	
STAFF SUPPORT										
2.1	BRIEFING, TRAINING + LUNCH ROOM	Located on second floor								
	TRAINING / MULTIPURPOSE ROOM	A little tight	1.0	163.0	163.0	Resilient flooring	1	180.0	180.0	
	KITCHENETTE	included in training			0.0				0.0	
	STAFF LUNCH ROOM	included in training			0.0				0.0	
	BRIEFING ROOM	included in training			0.0	Small alcove; standing space for 10 - 12 people			0.0	
	LIBRARY / QUITE RM		1.0	17.0	17.0	C/w shelving + resilient flooring	1	20.0	20.0	
	WELLNESS ROOM					Rubber mats/flooring Size per Roads Central District	1	64.0	64.0	
		2.1 SUB-TOTAL			180.0				264.0	
2.2	LOCKERS + CHANGE ROOMS	Located on second floor				1.85 sq. m per locker				
	MEN'S WASHROOMS - VEST		1.0	4.0	4.0		1	4.0	4.0	
	WASHROOMS - MALE**		1.0	47.0	47.0		1	47.0	47.0	
	SHOWERS - MALE		1.0	4.0	4.0	Barrier free	1	4.0	4.0	
	LOCKERS - MALE		1.0	70.0	70.0	24" x 24" x 72" locker c/w interior partition; 1 per mechanic staff; benches	32	1.85	59.2	85% / 15% split for M / F
	WOMEN'S WASHROOMS - VEST		1.0	2.0	2.0		1	4.0	4.0	
	WASHROOMS - FEMALE**		1.0	27.0	27.0		1	27.0	27.0	
	SHOWERS - FEMALE		2.0	2.0	4.0	Barrier free	1	4.0	4.0	
	LOCKERS - FEMALE		1.0	15.0	15.0	24" x 24" x 72" locker c/w interior partition; 1 per mechanic staff; benches	10	1.85	18.5	85% / 15% split for M / F
	BARRIER FREE WASHROOM + SHOWER**									
		2.2 SUB-TOTAL			173.0				167.7	

Figure 2.6h: Fleet Program Summary

FLEET

NO	NAME	DESCRIPTION - EXISTING	EXISTING PROGRAM - WESTWOOD (UNO) QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
2.3	CLEANING									
	DECONTAMINATION SHOWER					2 in heavy bays; 1 in light bays	3	2.0	6.0	
	DECONTAMINATION SHOWER - BARRIER FREE						1	3.0	3.0	
	LAUNDRY STORAGE	Laundry picked up and delivered by Canadian Linen				storage area for laundry receiving/pick-up	1	10.0	10.0	
	2.3 SUB-TOTAL								19.0	
2.4	AUXILLARY / BUILDING SERVICES									
	JANITOR		1.0	6.0	6.0		1	6.0	6.0	
	ELECTRICAL ROOM		1.0	11.0	11.0					Included in building gross-up
	TELEPHONE/ COMM ROOM		1.0	12.0	12.0					Included in building gross-up
	CIRCULATION	Includes corridor, stairs	1.0	91.0	91.0					Included in net gross-up
	2.4 SUB-TOTAL				120.0				6.0	
	SUB TOTAL, NSM								**456.7**	
		Net to Gross Space Conversion Factor: 25%							114.2	Circulation
	SUB TOTAL, CGSM								**570.9**	
		Building Gross Up Conversion Factor: 15%							85.6	Building services / exterior walls
	TOTAL STAFF SUPPORT, BGSM				**473.0**				**656.5**	
OPERATIONS SHOPS										
3.1	PARTS - CENTRAL STORES	Double exterior doors; exterior access	1.0	321.0	321.0					
	CENTRAL LOADING + RECEIVING						1	25.0	25.0	
	STORAGE AREA	Includes loading + receiving					1	343.0	343.0	
	VESTIBULE / WAITING						1	6.0	6.0	
	RECEPTION DESK	Counter					1	2.0	2.0	
	WORKSTATION/OFFICE		1.0	61.0	61.0		1	6.0	6.0	
	3.1 SUB-TOTAL				382.0	3.1 SUB-TOTAL			382.0	
3.3	WORKSHOPS									
	WELDING SHOP	Fabrication shop provides machining services city-wide; Fab shop not be duplicated; however, typically 1 welding bay is provided per district				1 double bay required (2 ea: 6000 W x 9800 D) OH Door: 12' W x 14' H Enclosed bay Floor trench c/w interceptor Compressed air	2	59.0	118.0	
	SMALL ENGINE REPAIR	Small engine repair provides services city-wide; however, this is currently undersized;	1.0	94.0	94.0	1 bay required (6000 W x 9800 D) OH Door: 12' W x 14' H Enclosed bay Floor trench c/w interceptor Compressed Air	1	59.0	59.0	
	OIL CHANGE	Currently 1 OH Door provided; 2 required	1.0	458.0	458.0	1 bay required (6000 W x 9800 D) OH Door: 12' W x 14' H Enclosed bay Floor trench c/w interceptor Compressed Air	2	59.0	118.0	
	3.3 SUB-TOTAL				552.0				295.0	
	SUB TOTAL, NSM								**677.0**	
		Net to Gross Space Conversion Factor: 15%							101.6	Circulation; note that most internal circulation is provided in each space which allows factor to be lower
	SUB TOTAL, CGSM								**778.4**	
		Building Gross Up Conversion Factor: 10%							77.9	Building services / exterior walls
	TOTAL OPERATIONS SHOPS, BGSM				**934.0**				**856.4**	
VEHICLE MAINTENANCE + STORAGE										
4.1	WASHBAY - INTERNAL					Located in Fleet Maintenance Facility				
	WASHBAY	1 washbay located in LVBs OH Door: 12' W x 12' H	1.0	48.0	48.0	OH Door: 16' x 16' typ. Drive through capability or drive in/back out is acceptable Trench + interceptor Compressed Air Water hose per pressure washer specifications Enclosed w concrete / CMU sealed walls Bay size: 4700 W x 9900 D	1.0	48.0	48.0	
	PRESSURE WASHER EQUIPMENT ROOM					Locate on a mezz or at grade equipment room Enclosed Requires concrete equipment pad	1.0	15.0	15.0	
	VACUUM EQUIPMENT					Outside of wasbay proper	1.0	2.0	2.0	
	4.1 SUB-TOTAL				48.0				65.0	
4.2.1	VEHICLE WORKBAYS - LIGHT	**Vehicle Hoists:** Mobile vehicle hoist brand @ Westwood: Rotary Lift				**Exhaust System Types:** 1. exhaust grilles located along exterior walls at each overhead door @ floor level; 1 duct per bay 2. mobile ventilation system c/w retractable / flexible ducting mounted to u.s. structure; min 1 per central bay (if not located on exterior wall) **Drainage:** Trenches c/w sumps/interceptors				**Vehicle Hoists:** Recommended hoists per bays: 30% in floor hoist and 70% mobile column hoists Mobile column hoists require pull-down power and capacity for a Ford F550; no floor receptacles

FLEET

NO	NAME	DESCRIPTION - EXISTING	EXISTING PROGRAM - WESTWOOD (UNO) QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
	RUNNING REPAIR	OH Door: 12' W x 12' H (Drive in / back out) Bay size typ: 9900 D x 6000 W 1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Pull down power, gear oil, hydraulic oil + compressed air In floor hoist or mobile column	8.0	59.8	478.0	OH Door: 12' W x 12' H (Drive in / back out) Bay size typ: 9900 D x 6000 W 1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Pull down power, gear oil, hydraulic oil, compressed air, pressure washer connection In floor hoist or mobile column	8.0	59.8	478.0	
	RUNNING REPAIR	1 tool crib (mobile tool storage) 1 work bench Bay size typ: 8400 D x 6000 W 1 workstation (mobile) Pull down power, gear oil, hydraulic oil + compressed air Mobile column Located adjacent to secondary circulation + Main Aisle	3.0	50.0	150.0	1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Bay size typ: 8400 D x 6000 W Pull down power, gear oil, hydraulic oil, compressed air, pressure washer connection Mobile column Located adjacent to secondary circulation and Main Aisle	3.0	50.0	150.0	
	PREVENTATIVE MAINTENANCE	OH Door: 12' W x 12' H (Drive in / back out) Bay Size: 4700 W x 9900 D 1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Pull down power, gear oil, hydraulic oil + compressed air In floor hoist or mobile column	6.0	54.3	326.0	OH Door: 12' W x 12' H (Drive in / back out) Bay Size: 4700 W x 9900 D 1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Pull down power, gear oil, hydraulic oil, compressed air, pressure washer connection In floor hoist or mobile column	6.0	54.3	326.0	
	ACCIDENT REPAIR	OH Door: 12' W x 12' H Bay Size: 4700 W x 9900 D 1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Pull down power, gear oil, hydraulic oil + compressed air In floor hoist or mobile column	1.0	47.0	47.0	OH Door: 12' W x 12' H Bay Size: 4700 W x 9900 D 1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Pull down power, gear oil, hydraulic oil, compressed air, pressure washer connection In floor hoist or mobile column	1.0	47.0	47.0	
	MAIN ACCESS AISLE	Drive through capability across all bays High Speed Rubber Rolling Door: 18' H x 16' W (5486mm H x 4800mm W) 1 grille floor trench c/w sump/interceptor	1.0	263.0	263.0	Drive through capability across all bays High Speed Rubber Rolling Door: 18' H x 16' W (5486mm H x 4800mm W) 1 grille floor trench c/w sump/interceptor	1.0	263.0	263.0	
	SECONDARY CIRCULATION	Painted lines to allocate circulation ailse b/w bays	1.0	359.0	359.0	Painted lines to allocate circulation ailse b/w bays	1.0	359.0	359.0	
	OVERHEAD CRANE	Located above 9 exterior bays	1.0			1 x 5 ton overhead crane To span entire shop within 1 structural bay	1.0			
		4.2.1 SUB-TOTAL			1623.0				1623.0	
4.2.2	VEHICLE WORKBAYS - HEAVY					**Exhaust System Types:** 1. exhaust grilles located along exterior walls at each overhead door @ floor level; 1 duct per bay 2. mobile ventilation system c/w retractable / flexible ducting mounted to u.s. structure; min 1 per central bay (if not located on exterior wall) **Drainage:** Trenches c/w sumps/interceptors				
	HEAVY VEHICLE BAY - SMALL MOBILE / IN-FLOOR HOISTS 6 m x 12 m (TYP.)	OH Door: 16' H x 14' W 1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Pull down power, gear oil, hydraulic oil + compressed air In floor hoist or mobile column	12.0	72.7	872.0	OH Door: 16' H x 14' W 1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Pull down power, gear oil, hydraulic oil, compressed air, pressure washer connection In floor hoist or mobile column	12.0	72.7	872.4	
	HEAVY VEHICLE BAY - LARGE SUNKEN TRENCH 7.6 m x 12 m (TYP.)	OH Door: 16' H x 14' W 1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Pull down power, gear oil, hydraulic oil + compressed air In floor repair trench	3.0	91.0	273.0	OH Door: 16' H x 14' W 1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Pull down power, gear oil, hydraulic oil, compressed air, pressure washer connection In floor repair trench	3.0	91.0	273.0	
	HEAVY VEHICLE BAY - LARGE MOBILE / IN-FLOOR HOISTS 7.6 m x 12 m (TYP.)	OH Door: 16' H x 14' W 1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Pull down power, gear oil, hydraulic oil + compressed air In floor hoist or mobile column	7.0	89.3	625.0	OH Door: 16' H x 14' W 1 tool crib (mobile tool storage) 1 work bench 1 workstation (mobile) Pull down power, gear oil, hydraulic oil, compressed air, pressure washer connection In floor hoist or mobile column	7.0	89.3	625.1	
	MAIN ACCESS AISLE - ENTRY	Drive in / back out High Speed Rubber Rolling Door: 18' H x 16' W (5486mm H x 4800mm W) 1 grille floor trench c/w sump/interceptor	1.0	95.0	95.0	Drive in / back out High Speed Rubber Rolling Door: 18' H x 16' W (5486mm H x 4800mm W) 1 grille floor trench c/w sump/interceptor	1.0	95.0	95.0	
	MAIN ACCESS AISLE - CIRCULATION	Temporary storage, parking + repair Trench c/w sumps/interceptor Across width of shop	1.0	577.0	577.0	Temporary storage, parking + repair Trench c/w sumps/interceptor Across width of shop	1.0	577.0	577.0	
	OVERHEAD CRANE	3 x 5 ton overhead cranes	3.0			3 x 5 ton overhead crane To span entire shop within 3 structural bays	3.0			
	SECONDARY CIRCULATION	Painted lines to allocate circulation ailse b/w bays	1.0	542.0	542.0	Painted lines to allocate circulation ailse b/w bays	1.0	519.0	519.0	

FLEET

NO	NAME	DESCRIPTION - EXISTING	EXISTING PROGRAM - WESTWOOD (UNO) QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
	4.2.2 SUB-TOTAL				2984.0				2961.5	
4.3	SHARED STORAGE									
	SECURE MATERIALS STORAGE	Secure storage c/w chainlink fencing Card access secure entry; RFID taggin on equipment / tools	1.0	42.0	42.0	Secure storage c/w chainlink fencing Card access secure entry; RFID taggin on equipment / tools; centrally located	1.0	42.0	42.0	
	BARREL STORAGE	Open storage along main circulation route for standard metal drum barrels	1.0	13.0	13.0	Open storage along main circulation route for standard metal drum barrels	1.0	13.0	13.0	
	MOBILE COLUMN STORAGE	Chain link storage c/w secure access	1.0	22.0	22.0	Chain link storage c/w secure access	1.0	22.0	22.0	
	EQUIPMENT + MATERIALS STORAGE	Open materials + equipment storage Storage hooks, shelving + racks for small to medium sized equipment	1.0	136.0	136.0	Open materials + equipment storage Storage hooks, shelving + racks for small to medium sized equipment	1.0	136.0	136.0	
	EQUIPMENT PARKING	Open area for small vehicle/equipment parking (fork lift, etc.); painted lines to allocate parking area	1.0	37.0	37.0	Open area for small vehicle/equipment parking (fork lift, etc.); painted lines to allocate parking area	1.0	37.0	37.0	
	OIL STORAGE	Secondary containment required for oil storage (concrete containment) - Heavy Vehicle Bays	1.0	19.0	19.0	Secondary containment required for oil storage (concrete containment) - Heavy Vehicle Bays	1.0	19.0	19.0	
	LUBE STORAGE	OH Door: 12' W x 12' H (Drive in / Back out) Bay size: 4500 W x 9000 L A bit small	1.0	45.0	45.0	OH Door: 12' W x 12' H (Drive in / Back out) Bay size: 6000 W x 9900 L Secondary containment required Secure enclosed storage (concrete / CMU)	1.0	59.0	59.0	
	OPEN STORAGE	Mezzanine; open storage	1.0	126.0	126.0	Open storage - Heavy Vehicle Bays	1.0	126.0	126.0	
	STORAGE	Enclosed	1.0	20.0	20.0	Enclosed - Heavy Vehicle Bays	1.0	20.0	20.0	
	STORAGE	Open within bays	1.0	20.0	20.0	Open within bays - Heavy Vehicle Bays	1.0	20.0	20.0	
	STORAGE	Mezzanine; open storage	1.0	39.0	39.0	Open storage - Light Vehicle Bays	1.0	39.0	39.0	
	SINK BASIN					Located centrally w/in circulation; 1 per shop	2.0			
	4.3 SUB-TOTAL				519.0				533.0	
4.4	SAFETY									
	EYE WASH / SHOWER STATION					open; clear sight lines; located throughout per Alberta Building Code / Safety Guidelines				Included in building gross-up factor
	FIRE EXTINQUISHER**					wall mounted; clear sight-lines; accessible; located per ABC				Included in building gross-up factor
	DE-FIBULATOR**					wall mounted; clear sight-lines; accessible; located per ABC				Included in building gross-up factor
	FIRST AID	Located along main circulation for facility	1.0	18.0	18.0		1.0	19.0	19.0	
	VESTIBULE		1.0	3.0	3.0		1.0	3.0	3.0	
	WASHROOM		1.0	3.0	3.0	Barrier free; unisex	1.0	5.0	5.0	
	HAZARDOUS FUME DETECTION	Carbon Monoxide + Nitrogen Dioxide detection; located centrally in ea. maintenance shop c/w large scale signage				Carbon Monoxide + Nitrogen Dioxide detection; located centrally in ea. maintenance shop c/w large scale signage				
	EMERGENCY NOTIFICATION					PA system to be auditable decibles; siren/horn; include visible notification				
	4.4 SUB-TOTAL				24.0				27.0	
4.5	AUXILLARY / BUILDING SERVICES									
	METRE ROOM		1.0	21.0	21.0					Included in building gross-up factor
	TRANSFORMER		1.0	36.0	36.0					Included in building gross-up factor
	SERVICES		1.0	20.0	20.0					Included in building gross-up factor
	CONTROL ROOM		1.0	7.0	7.0					Included in building gross-up factor
	ELECTRICAL ROOM		1.0	23.0	23.0					Included in building gross-up factor
	AIR COMPRESSOR EQUIPMENT ROOM	Second Floor	1.0	57.0	57.0	Enclosed	1.0	57.0	57.0	
	CENTRALIZED H/P EQUIPMENT ROOM	Second Floor	1.0	18.0	18.0	Enclosed	1.0	18.0	18.0	
	EMERGENCY GENERATOR	Second Floor	1.0	25.0	25.0	Enclosed	1.0	25.0	25.0	
	4.5 SUB-TOTAL				207.0				100.0	
	SUB TOTAL, NSM								**5309.5**	
	Net to Gross Space Conversion Factor: 15%									Circulation included in spaces
	SUB TOTAL, CGSM								**5309.5**	
	Building Gross Up Conversion Factor: 10%								531.0	Building services / exterior walls
	TOTAL VEHICLE MAINTENANCE + STORAGE, BGSM				**5405.0**				**5840.5**	
	FLEET SUB-TOTAL, CGSM									
	Building Gross-Up (exterior walls, circulation + service not already captured)									
	TOTAL FLEET BUILDING, BGSM				**7416.0**				**7821.5**	
	MAIN FLOOR GROSS				6678.0				7118.8	
	SECOND FLOOR GROSS				738.0				702.7	
YARD										
5.2	STAFF GATHERING									

FLEET

NO	NAME	DESCRIPTION - EXISTING	EXISTING PROGRAM - WESTWOOD (UNO) QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
	STAFF GATHERING						1.0	20.0	20.0	
	MUSTER					Located within Yard Area				
	TRAINING					Located within Yard Area				
	5.2 SUB-TOTAL								20.0	
5.4	BULK STORAGE (OPEN)									
	SECURE STORAGE					Seasonal secured storage c/w chain link fence	1.0	100.0	100.0	
	40-YARD BINS					2 recycle, 2 waste, 1 steel, 1 filter	6.0	40.0	240.0	
	5.4 SUB-TOTAL								340.0	
5.5	FUEL STATION	Per Kennedale Fuel Station								
	FUEL ISLANDS	4 pumps per island; 7m aisle width 3m x 44m island	3.0	139.0	417.0	3 pumps per island; 7m aisle width 3m x 44m island	3.0	139.0	417.0	
	STORAGE TANK - GASOLINE	Underground tank	1.0	100.0	100.0	Underground gasoline tank preferred; 100,000 litre capacity; Basis for programming: 3m dia x 15.080m length tank; clearance assumed at 50% tank dia.; excavation dimension: 6m x 18.08m	1.0	108.5	108.5	
	STORAGE TANK - DIESEL	Underground tank	1.0	50.0	50.0	Underground diesel tank perferred; 100,000 litre capacity; Basis for programming: 3m dia x 15.080m length tank; clearance assumed at 50% tank dia.; excavation dimension: 6m x 18.08m	1.0	108.5	108.5	
	GENERATOR + WINDSHIELD FLUID TANK BUILDING					Building for generator and fuel monitoring system; washer fuild 1380 litre capacity; 1 barrier free WC; Note: Kennedale Fuel Facility Central Fuel Building utilized as basis for programming	1.0	38.0	38.0	
	DEF DISENSING SYSTEM					1900 litre capacity; tank dim: 1.250 x 2.0 m; locate on concrete pad: 2.5 m x 3.25	1.0	8.1	8.1	
	CIRCULATION	Asphalt paving			2746.0	Asphalt paving	1.0	2746.0	2746.0	Fuel Station Circulation
	5.5 SUB-TOTAL				3313.0				3426.1	
5.7	COVERED STORAGE									
	COVERED EXTERIOR STORAGE	Per AMP1 example	1.0	17.0	17.0	Chain link doors; exterior access; cold storage	1.0	17.0	17.0	
	5.7 SUB-TOTAL				17.0				17.0	
5.8	SECURE VEHILCE PARKING					Fleet vehicle parking needs depends on adjacent COE Operational Yards and ability to park internal Ops vehicles in adjacent Ops yards;				**Assumption for Fleet Vehicle parking:** Per 2017 values, Westwood Facility services approx 1190 light vehicles and 840 heavy vehicles; the assumption is that 91% of this fleet would be in use with 10% at the facility, either parked or being serviced. The provided count assumes 75% of 10% for fleet parking as a basis for design. Required fleet parking count to b reviewed and confirmed by Owner as reductions may be possible if close in proximity to COE Integrated Operations Site
	STALL A - 4.5 m x 11 m					oversized vehilces (> 2 tons)	8.0	67.5	540.0	Unit area includes 50% aisle width
	STALL B - 4.75 m x 8.8 m					tractors, large trucks, 2 ton vehicles	50.0	60.0	3000.0	Unit area includes 50% aisle width
	STALL C - 2.6 m x 5.5 m					3/4 ton - 1 ton trucks, cars, vans	82.0	23.4	1918.8	Unit area includes 50% aisle width
	5.8 SUB-TOTAL						140.0		5458.8	
5.8	TOUCHLESS CARWASH									
	WASHBAY - TOUCHLESS	Separate building; 8m W x 22m L per Kennedale Fuel Station	1.0	176.0	176.0	For City-Wide Fleet use as well as exteral clients For light vehicles (trucks, cars)	1.0	176.0	176.0	
	WASHBAY - TOUCHLESS - SERVICES	Services for washbay per Kennedale Fuel Station	1.0	48.0	48.0	Equipment rooms, mechanical / electrical	1.0	48.0	48.0	
	5.8 SUB-TOTAL				224.0				224.0	Building only
	YARD SUB TOTAL, NSM				**3554.0**				**9485.9**	
PUBLIC										
6.1	LIGHT VEHILCE PARKING									
	VISITOR PARKING						5.0	23.4	117.0	
	PERSONAL VEHICLE PARKING	Per AMP1 example	11.0		275.0	2.6m x 5.5m Typ. Stall	62.0	23.4	1450.8	1:1 ratio provided; however, sharing due to shift work is preferred and to be determined via Owners direction
	BICYCLE PARKING / COVERED STORAGE***									
	PUBLIC SUB TOTAL, NSM				**275.0**				**1567.8**	
SITE GROSS UP										
7.1	SOFT SURFACE (25% Gross Up)									
	LANDSCAPE / BUFFER	Per AMP1 example			1579.0	Includes soft landscaping areas			2763.4	
7.2	HARD SURFACE (35% Gross Up)	Per AMP1 example			5242.0	Includes roads, circulation, sidewalks, garbage/recycling			2907.7	Excludes Fuel Station circulation
	SITE GROSS-UP SUB-TOTAL				**6821.0**				**5671.1**	
	SITE TOTAL, GSM				**10,650.0**				**25,986.7**	**Increase in site size requirement due to staff and Fleet Parking requirement**
	TOTAL FOOTPRINT				**17,328.0**				**33,105.5**	
	FLEET PROGRAM AREA				**18,066.0**				**33,808.2**	**For comparision purposes, AMP1 footprint was approved at 12,997.4 sq. m for future development**

NOTES:

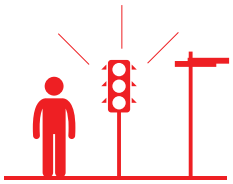
FLEET

NO	NAME	DESCRIPTION - EXISTING	EXISTING PROGRAM - WESTWOOD (UNO)			DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM			COMMENTS
			QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M		QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	

* Size / configuration to be per the City of Edmonton Space Standards

** Size / configuration / quantity to be per the Alberta Building Code

*** Size / configuration / quantity to be per the City of Edmonton Zoning / Land Use Bylaw



2.7 TRAFFIC OPERATIONS (TRAFFIC)

INTRODUCTION

The Traffic component program includes administration, support spaces and a fabrication/repair bay. The largest component of the Traffic program is the exterior bulk storage that is primarily required for street light storage, signage, and transportation racks. Access to central stores, washbay and pressure washer equipment is also required within the secure yard area.

WORK FLOW ANALYSIS

An analysis of existing workflow and Traffic's staffing requirements was conducted and is summarized in Figure 2.7a. The workflows demonstrates the sequence of program usage for each staffing type. These workflows are intended to summarize how the operations facilities are currently utilized.

YEARLY STAFFING SUMMARY

Interviews were conducted in order to understand Traffic's staffing schedule with the results being summarized in Figure 2.7b. The interviews revealed May through September to be a peak time in terms of number of employees with more than twice as many employees than October through April.

EXISTING FACILITY REVIEW

The design intentions from the Northeast Traffic Field Operations, the Southwest District Operations Road + Traffic Maintenance Yard (refer to Figure 2.7c), and the Wayne Gretzky Yard (refer to Figure 2.7d) located at Yellowhead Trail were utilized as a basis for Traffic's functional needs assessment. The following were the key desirable characteristics from the facilities:

- large central stores requirement
- single bay for minor signage repair and fabrication
- secure outdoor bulk storage for signage and light poles

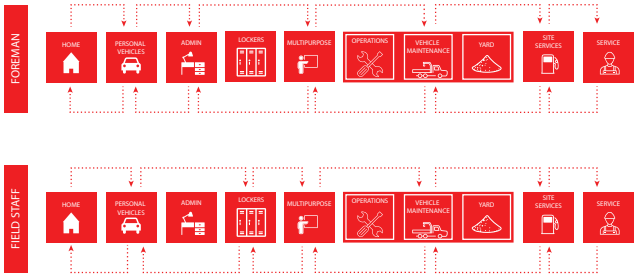


Figure 2.7a: Traffic Work Flow Analysis

TRAFFIC

DAY	SHIFT	# STAFF	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mon - Fri	7:00am - 3:30pm	10												
Mon - Fri	5:00am - 1:30pm	3												
Mon - Fri	3:30pm - 12:00am	3												
Mon - Fri	11:00pm - 1:00am	10												
		Total	10									26		10

Figure 2.7b: Traffic Yearly Staffing Summary

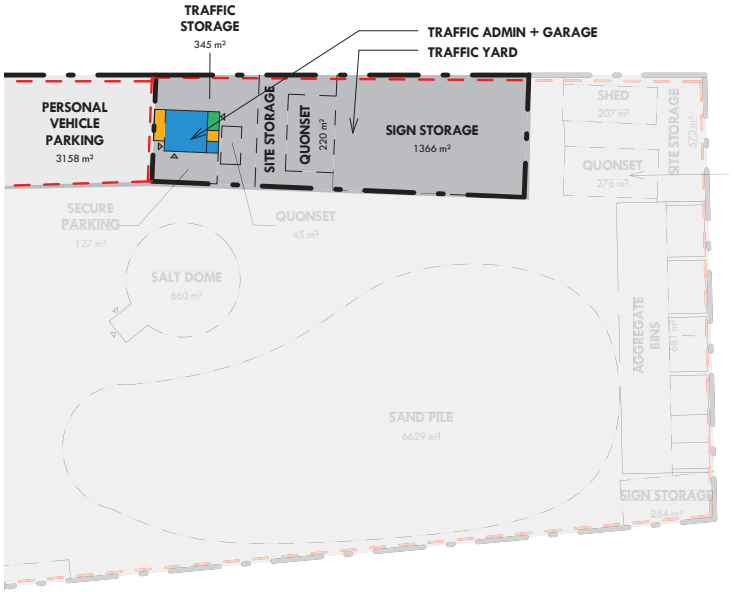
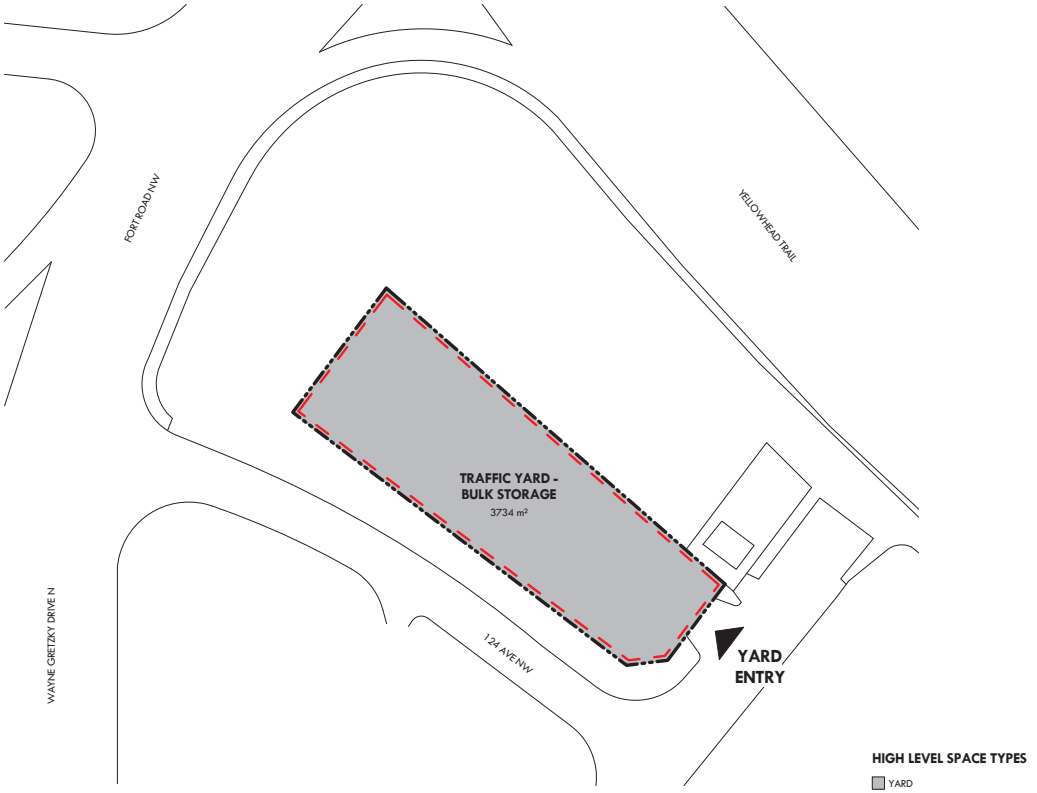


Figure 2.7c: SW District Operations Road+ Traffic Maintenance Yard



SITE PLAN
1 : 1200

Figure 2.7d: Wayne Gretzky Yard

FUNCTIONAL ADJACENCIES: High-Level Adjacency Diagram

A high-level adjacency diagram was developed and describes the functional adjacencies between major program types (refer to Figure 2.7e). This adjacency diagram reflects the previously described workflows.

FUNCTIONAL ADJACENCIES: Detailed Adjacency Diagram

A detailed adjacency diagram was developed and provides an in-depth overview of adjacencies between the program types (refer to Figure 2.7f). This adjacency diagram illustrates the programming space types identified within the existing Traffic operations facility located in the SW District Operations Roadway Maintenance Yard, the Kennedale Roadway Maintenance Facility and the Wayne Gretzky Yard. These space types have been organized into programmatic groupings, and illustrate programmatic relationships based on the information obtained through the existing facility reviews and interviews held with the Operations Groups.

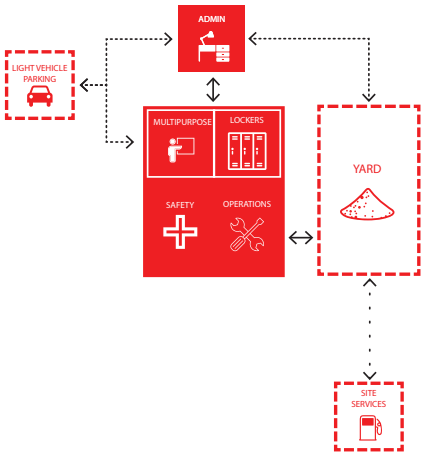


Figure 2.7e: Traffic High-Level Adjacency Diagram

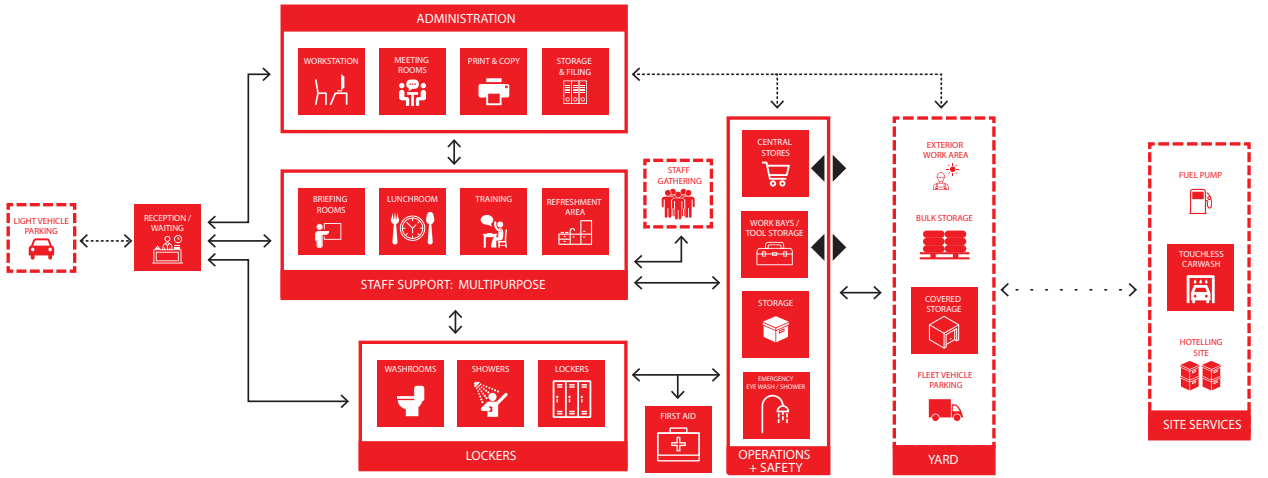
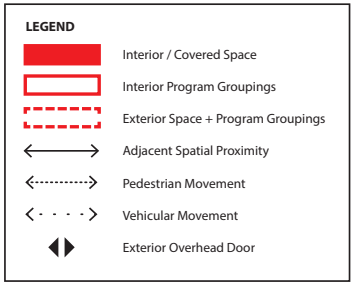


Figure 2.7f: Traffic Detailed Adjacency Diagram



PROGRAM SUMMARY

The following Program Summary (refer to Figure 2.7g) has been based on the existing Traffic Operations located in the SW District Operations Road + Traffic Maintenance Yard and Wayne Gretzky Yard.

The adjusted program was modified from the existing program due to changes in current City Standards and Guidelines and based on subsequent information provided by the Owner Group and the Traffic Operations Group representative. These Adjustments are included in the "Adjusted Program columns, and are further clarified in the "Comments" column.

TRAFFIC

NO	NAME	DESCRIPTION - SW DISTRICT	EXISTING PROGRAM - SW DISTRICT QTY.	EXISTING PROGRAM - SW DISTRICT AREA/EA. SQ. M	EXISTING PROGRAM - SW DISTRICT TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	ADJUSTED PROGRAM AREA/EA. SQ. M	ADJUSTED PROGRAM TOTAL AREA SQ. M	COMMENTS
ADMINISTRATION										
1.1	ENTRY + RECEPTION									
	ENTRANCE / VEST.					Include boot cleaners in vestible	1	7.0	7.0	
		1.1 SUB-TOTAL			7.4				7.0	
1.2	OFFICES*									
	WORKSTATIONS - OPEN	Includes entry	1.0	13.4	13.4	2 Foreman	2.0	6.0	12.0	
	HOTELLING					Crew (2 sign crews and 2 detour crews; 2 person crews)	4.0	6.0	24.0	
		1.2 SUB-TOTAL			13.4				36.0	
1.3	MEETING ROOMS					1.8 sq. m per person				
	MEETING ROOM (SM)					4-6 people	1	10.8	10.8	
	NOW ROOM*					small telephone room	1	3.0	3.0	
		1.3 SUB-TOTAL							13.8	
1.4	ADMIN SUPPORT									
	PRINT / COPY						1	2.0	2.0	
	FILE STORAGE						1	5.0	5.0	
		1.4 SUB-TOTAL								
		SUB TOTAL, NSM							56.8	
		Net to Gross Space Conversion Factor: 25%							14.2	
		SUB TOTAL, CGSM							71.0	
		Building Gross Up Conversion Factor: 25%							17.8	
		TOTAL ADMIN, BGSM			20.8				88.8	
STAFF SUPPORT										
2.1	BRIEFING, TRAINING + LUNCH ROOM									
	TRAINING / MULTIPURPOSE ROOM					10-12 people; 1.8 sq. m per person; multifunctional to include lunch room	1	21.6	21.6	
	REFRESHMENT AREA					located within / direct adjacent to training room	1.0	15.0	15.0	
	STAFF LUNCH ROOM		1.0	20.7	20.7					
		2.1 SUB-TOTAL			20.7				36.6	
2.2	LOCKERS + CHANGE ROOMS									
	WASHROOMS - MALE**						1.0	10.0	10.0	
	SHOWERS - MALE					barrier free	1.0	4.0	4.0	
	LOCKERS - MALE					24" x 24" locker c/w interior partition; full size + half size; benches	10.0	1.85	18.5	
	WASHROOMS - FEMALE**						1.0	10.0	10.0	
	SHOWERS - FEMALE					barrier free	1.0	4.0	4.0	
	LOCKERS - FEMALE					24" x 24" locker c/w interior partition; full size + half size; benches	4.0	1.85	7.4	
	BARRIER FREE WASHROOM**		1.0	7.8	7.8		1.0	4.7	4.7	
		2.2 SUB-TOTAL			7.8				58.6	
2.3	CLEANING									
	LAUNDRY AREA					washer and dryer machines; floor drain; water; power	1.0	8.0	8.0	
		2.3 SUB-TOTAL							8.0	
2.4	AUXILLARY / BUILDING SERVICES									
	JANITOR						1.0	5.0	5.0	
		2.4 SUB-TOTAL							5.0	
		SUB TOTAL, NSM							108.2	
		Net to Gross Space Conversion Factor: 30%							27.1	
		SUB TOTAL, CGSM							135.3	
		Building Gross Up Conversion Factor: 25%							33.8	
		TOTAL STAFF SUPPORT, BGSM			28.5				169.1	
		TOTAL ADMIN BUILDING, BGSM			49.3				257.8	
OPERATIONS SHOPS										
3.1	CENTRAL STORES	Includes fabrication area	1.0	0.0	104.6					
	CENTRAL LOADING + RECEIVING					12' x 12' overhead door	1.0	20.0	20.0	
	STORAGE AREA					typical to oversized shelving; includes sign storage, pipe and base, telus bar	1.0	210.0	210.0	
	RECEPTION / VESTIBULE					reception counter; secure point	1.0	5.0	5.0	
	WORKSTATION/OFFICE						1.0	6.0	6.0	
		3.1 SUB-TOTAL			104.6				241.0	
3.2	WORKBAYS	Included in stores area								
	FABRICATION / REPAIR BAY (SM)					16' x 16' overhead door; Floor drain trench; oil interceptor; compressed air; water; power	1.0	52.5	52.5	Standard Workbay: 20.0 m x 6.0 m; Locate tool crib within bay for standardization
	TOOL CRIB					chain link; secure; power to charge tools; drills, grinders, bits	1.0	8.0	8.0	

Figure 2.7g: Traffic Program Summary

TRAFFIC

NO	NAME	DESCRIPTION - SW DISTRICT	EXISTING PROGRAM - SW DISTRICT QTY.	EXISTING PROGRAM - SW DISTRICT AREA/EA. SQ. M	EXISTING PROGRAM - SW DISTRICT TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	ADJUSTED PROGRAM AREA/EA. SQ. M	ADJUSTED PROGRAM TOTAL AREA SQ. M	COMMENTS
		3.2 SUB-TOTAL							60.5	
3.5	SAFETY**									
	EYE WASH/SHOWER STATION					open; clear sight lines	1	1.0	1.0	
	FIRE EXTINQUISHER					wall mounted; clear sight-lines; accessible				
	DE-FIBULATOR					wall mounted; clear sight-lines; accessible				
		3.5 SUB-TOTAL							1.0	
		SUB TOTAL, NSM							302.1	
		Net to Gross Space Conversion Factor: 20%							75.6	
		SUB TOTAL, CGSM							378.1	
		Building Gross Up Conversion Factor: 25%							94.5	
		TOTAL OPERATIONS SHOPS, BGSM			112.7				472.7	
VEHICLE MAINTENANCE + STORAGE										
4.1	WASHBAY									
	WASHBAY					OH Door: 16' x 16' typ. Drive through capability or drive in/back out is acceptable Trench + interceptor Compressed Air Water hose per pressure washer specifications Enclosed w concrete / CMU sealed walls Bay size: 4700 W x 9900 D	1.0	48.0	48.0	Standard double loaded washbay for standardization: 42.0 m x 7.8m
	PRESSURE WASHER EQUIPMENT ROOM					Locate on a mezz or at grade equipment room Enclosed Requires concrete equipment pad	1.0	15.0	15.0	
	VACUUM EQUIPMENT					Outside of wasbay proper	1.0	2.0	2.0	
		4.1 SUB-TOTAL							65.0	
		SUB TOTAL, NSM							130.0	
		Net to Gross Space Conversion Factor: 20%							26.0	
		SUB TOTAL, CGSM							156.0	
		Building Gross Up Conversion Factor: 25%							39.0	
		TOTAL VEHICLE MAINTENANCE + STORAGE, BGSM							195.0	
		TOTAL TRAFFIC BUILDING, BGSM			162.0				730.5	
YARD										
5.2	STAFF GATHERING									
	STAFF GATHERING						1.0	10.0	10.0	
		5.2 SUB-TOTAL							10.0	
5.4	AGGREGATE STORAGE									
	AGGREGATE BINS						1.0	110.0	110.0	
		5.3 SUB-TOTAL							110.0	
5.5	BULK STORAGE (OPEN)									
	PALLET / SECURE STORAGE		1.0	2016.4	2016.4	Street light storage required along edges of yard: long and thin lay down area for racks; truck access required beside to crane lights off racks; interior storage can be for signage / detours	1.0	7262.0	7262.0	Size of Wayne Gretzky Yard x 2
	GARBAGE BINS					40 yard bins: steel, aluminum	2.0	40.0	80.0	
	DUMPSTER					cardboard, garbage	2.0	4.0	8.0	
		5.4 SUB-TOTAL			2016.4				7350.0	
5.8	COVERED STORAGE									
	COLD STORAGE	Quonset	1.0	220.0	220.0					
	COLD STORAGE	Quonset	1.0	45.0	45.0					
	HAZARDOUS STORAGE - SHED					5' x 6' shed; paint, aerosols, 4 x 55 galon drums	1.0	3.0	3.0	
		5.7 SUB-TOTAL			265.0				3.0	
5.9	SECURE VEHILCE PARKING	3.4 ton to 1 ton trucks	1.0	127.0	127.0					
	STALL C - 3.0 m x 6.0 m					3/4 ton, 1 ton trucks; 8 m aisle	6.0	30.0	180.0	
		5.8 SUB-TOTAL			127.0				180.0	
		YARD SUB TOTAL, NSM			2408.4				7653.0	
LIGHT VEHICLE PARKING***										
6.1	LIGHT VEHILCE PARKING									
	PERSONAL VEHICLE PARKING					2.6m x 5.5m Typ. Stall	6.0	23.4	140.4	
	BICYCLE PARKING / COVERED STORAGE						1.0	10.0	10.0	
		LIGHT VEHICLE SUB TOTAL, NSM							150.4	
SITE GROSS UP										
7.1	SOFT SURFACE									
	LANDSCAPE / BUFFER***					25% Gross Up			1950.9	
7.2	HARD SURFACE					20% Gross Up as Gretzky Yard area includes internal ciculation (Note: 35% Gross Up is typical)				
	ROADS + SIDEWALKS	includes yard entry and sidewalks; all other roadways included in Yard Sub-Total							1560.7	

TRAFFIC

NO	NAME	DESCRIPTION - SW DISTRICT	EXISTING PROGRAM - SW DISTRICT QTY.	EXISTING PROGRAM - SW DISTRICT AREA/EA. SQ. M	EXISTING PROGRAM - SW DISTRICT TOTAL AREA SQ. M	DESCRIPTION - ADJUSTED	ADJUSTED PROGRAM QTY.	ADJUSTED PROGRAM AREA/EA. SQ. M	ADJUSTED PROGRAM TOTAL AREA SQ. M	COMMENTS
	SIDEWALKS									
	GARBAGE / RECYCLING BINS	included in yard sub-total								
	ELEC. TRANSFORMER / ATCO BUILDING									
		SITE GROSS-UP SUB-TOTAL							3511.5	
		SITE TOTAL, BGSM			2,408.4				11,164.5	
		TOTAL TRAFFIC PROGRAM AREA			2,570.4				11,895.0	

NOTES:

Existing Areas: All existing program values are dervied from scaled PDFs provided by the Owner. There may be inaccuracies from scaled drawings. Building Gross-Up (foot print of walls and circulation) is included in areas UNO.

* Size / configuration to be per the City of Edmonton Space Standards

** Size / configuration / quantity to be per the Alberta Building Code

*** Size / configuration / quantity to be per the City of Edmonton Zoning / Land Use Bylaw

3.0

3.1 INTRODUCTION

The City of Edmonton's vision, to achieve a robust and exemplary city where citizens learn, prosper and celebrate today and into the future, is inherently supported by the City's various Operations Groups. This study focuses on how this vision of stewardship can be met through an integrated operations model, where City Operations and their staff are key metrics to meeting this mandate.

City Operations Groups "keep Edmonton working, moving and thriving - a place citizens are proud of". The visioning completed by various City Operations Groups illustrates that by providing efficient and enhanced services today and tomorrow, the CoE remains credible and financially responsible to it's citizens.

In order to develop an integrated operations model that can become a foundation for the future planning of integrated facilities, this study began with the review of various City Operations facilities in early 2017, user group interviews held in March and May 2017, and the development of program summaries in order to understand the needs from each City Operations Group involved.

From there, various synergies, optimization, integrated principles and integrated planning strategies were conceived to help develop an integrated program and provide guidance for the future design and planning of integrated sites.

The intent of this section is to not only develop strategies for the AIS, but to generate a document that could be used as the basis of design for future integrated facilities.

SYNERGIES

An integrated operations model calls for the exploration of various synergies in order to achieve efficient, enhanced and adaptable delivery of services to the City. The synergy studies bring together the various needs of the City Operations Groups, defined in the previous Section 2.0, and looks at how the groups can work in unison to create an integrated typology. The intention of the integrated typology would be to maximize the needs of each group while minimizing the cost and footprint of the facility by combining these spatial and programmatic synergies:

- Program Types
- Staffing Types
- Workflows
- Adjacencies

OPTIMIZATION

An integrated model is also founded on the study of optimization. Optimization, in the form of standardization and sharing, looks at the future flexibility of the site to accommodate ever changing needs as well as opportunities for shared amenities and infrastructure between Operations Groups. Initial standardization and sharing strategies were discussed with each City Operations group and have been enhanced based on the feedback provided and are included in this Master Plan.

INTEGRATED PRINCIPLES

Integrated principles are the primary design objectives and provide guidelines for best practices in planning and design for integrated operations facilities. The integrated principles were derived from the AMPV1, 2016 and Stakeholder Visioning Session, held on November 25, 2016 with representatives from the CoE Integrated Infrastructure Services, Sustainable Development, and City Operations Departments. The November Visioning Session posed three different questions with the purpose to frame and broaden the thinking around City Operations, and resulted in various themes (refer to Appendix B). The integrated principles were developed and capture:

1. Security + Safety
2. Efficiency
3. Sustainability
4. Good Neighbours
5. Legibility
6. Adaptability + Future Proofing

INTEGRATED PLANNING STRATEGIES

The development of an integrated model requires the exploration of various planning strategies. This section includes various building typologies, site planning strategies and some high level integrated schemes on a conceptual site. Each study includes various considerations, such as high level cost comparisons, land use implications, program achievement, and the application and evaluation of the integrated principles.

The integrated planning strategies include:

1. Integrated Site Relationship Strategies
2. Conceptual Base Block Layout Strategies
3. Integrated Site Options

INTEGRATED PROGRAM

Why integrate?

Bringing together various Operations Groups under one shared roof will achieve greater efficiency and flexibility through synergies and optimization. By generating an optimized facility a reduction in capital facility costs, maintenance and operations costs, and land costs can be accomplished and the future needs of the Operations Groups can be met benefiting the City as a whole.

Previously, City Operations have developed independent facilities. In reviewing the independent program compared to an integrated program, there are illustrated reductions in overall program area thereby reducing capital and operating costs to the City. This is due in part to the application of shared site amenities, ranging from meeting rooms to site circulation, as well as a densification of physical program resulting in more efficient day-to-day workflows.

3.2 SYNERGIES

PROGRAM TYPES

Out of the individual Operations Groups program summaries, all program types were categorized into overarching classifications such as Administration and Staff Support (refer to Figure 3.2a). This diagram consolidates the general programming needs of all the Operations Groups and represents the combination of all program types to be included in an integrated model. These program types were used as the basis of design for all of the following integrated facility strategies, schemes and test fits.

Figure 3.2a: Operation Group Program Types

- Administration
- Staff Support
- Operations
- Light Vehicle Parking
- Yard Operations
- Site Services
- Off-Site Program

STAFFING TYPES

The Operations Groups interviews revealed that there are three major staffing types shared between the City Operations Groups:

1. **INTERNAL CITY OF EDMONTON OPERATIONS GROUPS**
2. **EXTERNAL CITY OF EDMONTON BUSINESS GROUPS**
3. **EXTERNAL TO CITY OF EDMONTON**

Internal CoE Operations Groups include CoE staff working consistently on operations facilities such as administration, foremen and field staff. Exterior CoE Business Groups include CoE staff that work remotely and may visit the site for use of the facility or site services. The External to CoE staffing type is reserved for groups such as contractors who are not directly working for the CoE.

These staff types were studied in order to understand the day-to-day workflows and needs of the staff to be using the integrated facility.

WORKFLOWS

The user group interviews also illustrated the similarities in the workflows of the various staff within each staffing type. Figures 3.2b, 3.2c and 3.2d illustrate general staff workflows shared across all groups.

The staffing types and their workflows are important when planning an integrated site. The planning should consider how each workflow will function, with the goal of achieving efficient and effective movement of each staff type without impeding the function or efficiency of another.

As the site is combining multiple business units under a single umbrella, efficiency and organization of the operations is key as the orchestration of the site and program needs to maximize workflows and prevent conflicts between Operations Groups.

- Administration
- Staff Support
- Operations
- Light Vehicle Parking
- Yard Operations
- Site Services
- Off-Site Program

INTERNAL CITY OF EDMONTON OPERATIONS GROUPS

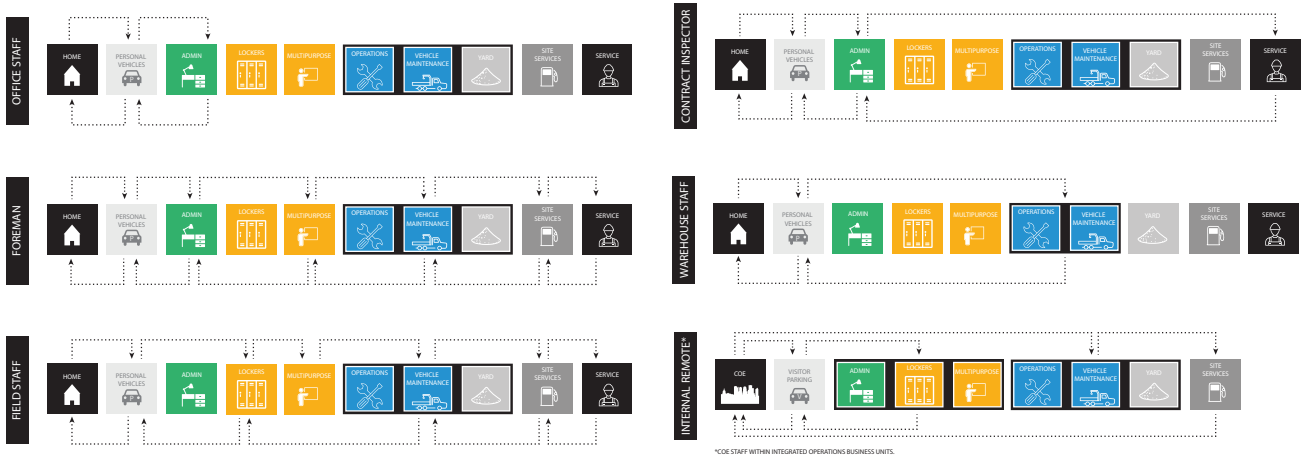


Figure 3.2b: Internal City of Edmonton Operation Group Workflows

EXTERNAL CITY OF EDMONTON BUSINESS GROUPS

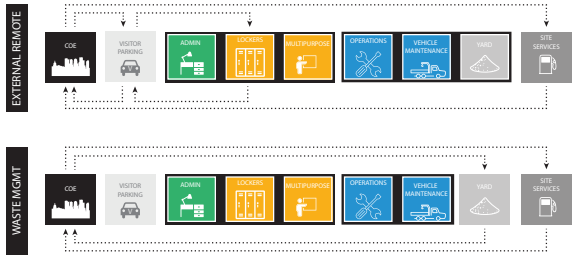


Figure 3.2c: External City of Edmonton Operation Group Workflows

EXTERNAL TO CITY OF EDMONTON

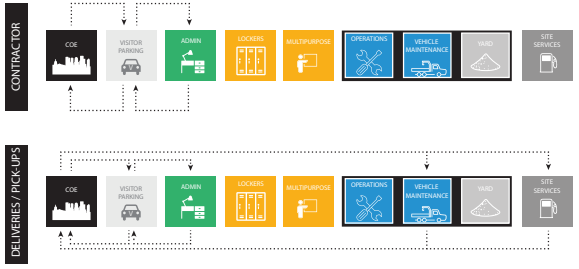


Figure 3.2d: External to the City of Edmonton Operation Group Workflows

ADJACENCIES

Figure 3.2e illustrates high-level adjacencies between the major program types for all Operations Groups.

Figure 3.2f provides a detailed overview of the adjacencies between the program types across all Operations Groups. This illustrates the relationships between programming space types required by each Operations Group as determined through the Operations Groups interviews. The space types are organized into programmatic groupings, and illustrate programmatic relationships of an integrated operations facility.

These diagrams provide the basis of organization of the following integrated facility strategies, schemes, and test fits.

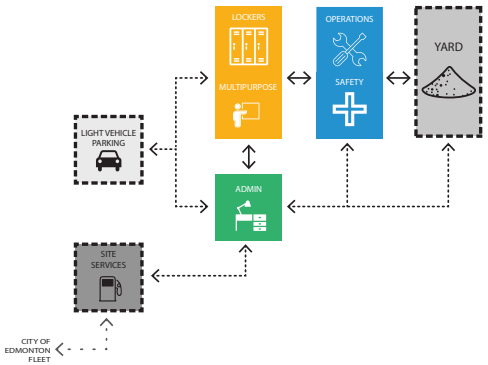


Figure 3.2e: High Level Adjacency Diagram

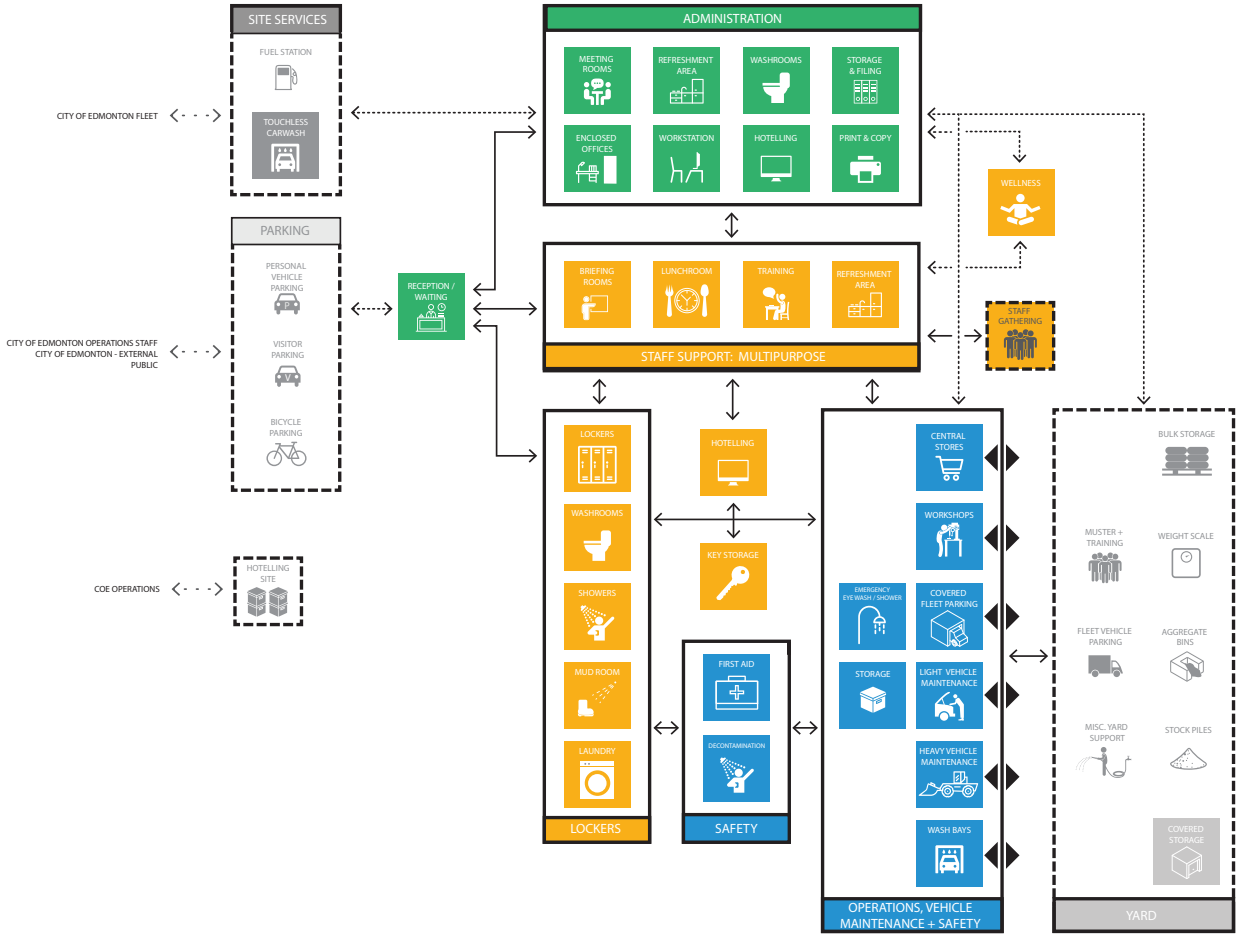


Figure 3.2f: Detailed Adjacency Diagram

LEGEND

- Interior / Covered Space
- Interior Program Groupings
- Exterior Space + Program Groupings
- Adjacent Spatial Proximity
- Pedestrian Movement
- Vehicular Movement
- Exterior Overhead Door

3.3 OPTIMIZATION

STANDARDIZATION DIAGRAMS

Standardization is a key strategy in the development of an integrated operations model. Essentially, a standardized approach to programming will allow the CoE flexibility in the future as operations augment, reduce and change. For example, the operations workbays have been standardized to accommodate any one of the City Operations Groups, allowing for shifting occupancy over time.

Standardization increases flexibility and reduces maintenance costs by introducing common ground between facilities while continuing to allow each facility to meet the day-to-day needs. One goal of the AIS document is to develop standardization units and layouts for each program type that could be applied to not only the AIS, but to future integrated operations facilities.

Figure 3.3a indicates the proposed standardized spaces for an integrated site. The program types displayed in full saturation are identified as a program type that will implement standardization processes.

Following the Operations Groups interviews, the standardization diagrams (refer to Figures 3.3b though Figure 3.3l) were streamlined to capture the comments and feedback from each group and to remove any redundant program requirements based on Operations Groups input. The detailed standardization diagrams on the following pages explain how the program types will be optimized, including required services, materials, finishes, spatial functions and dimensions where applicable.

Other standardization is also applicable to an integrated operations model, including the City of Edmonton Space Planning Standards, the City of Edmonton Zoning Bylaw and the Alberta Building Code 2014.

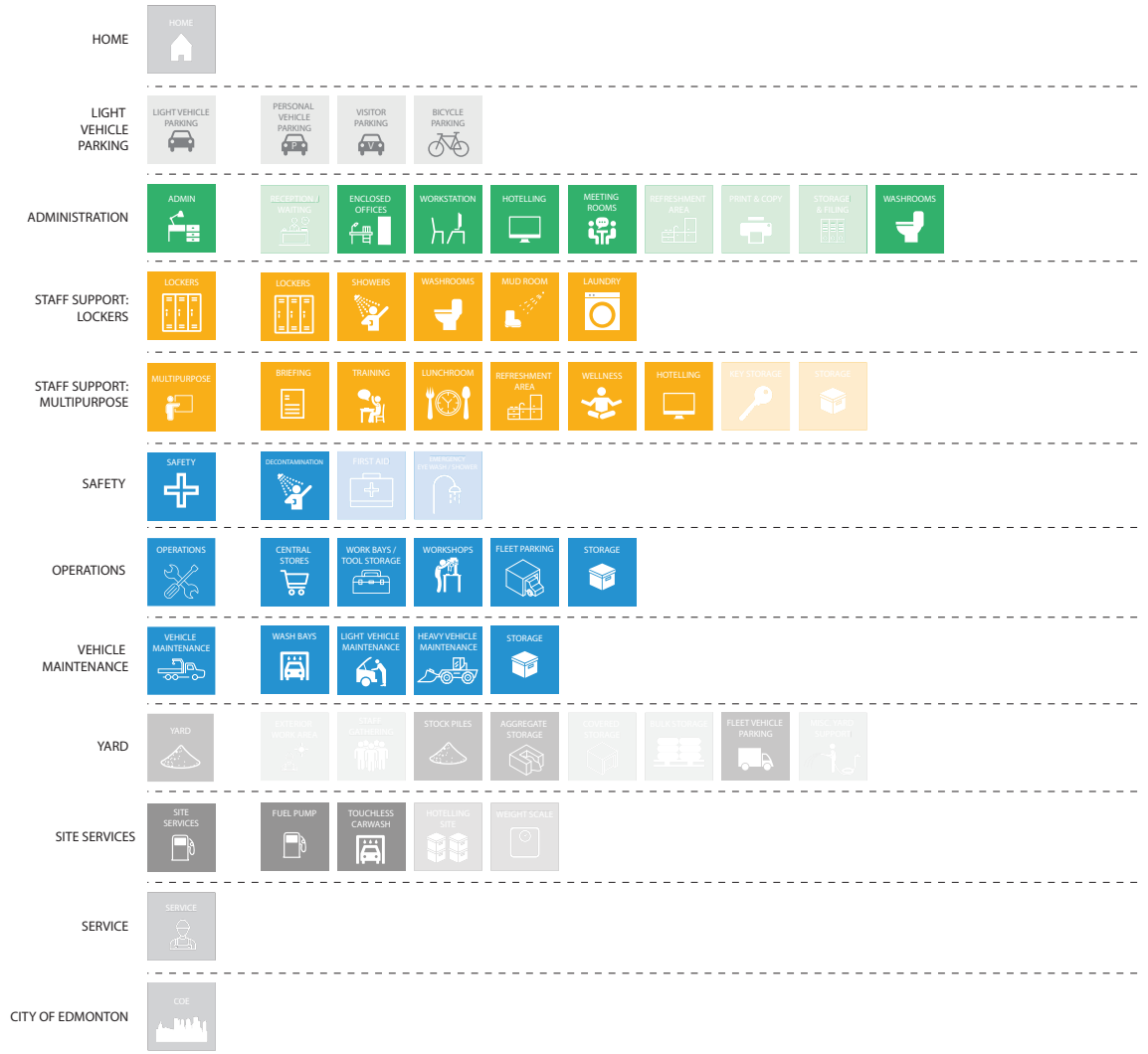


Figure 3.3a: Standardized Program Types

- Administration
- Staff Support
- Operations
- Light Vehicle Parking
- Yard Operations
- Site Services
- Off-Site Program

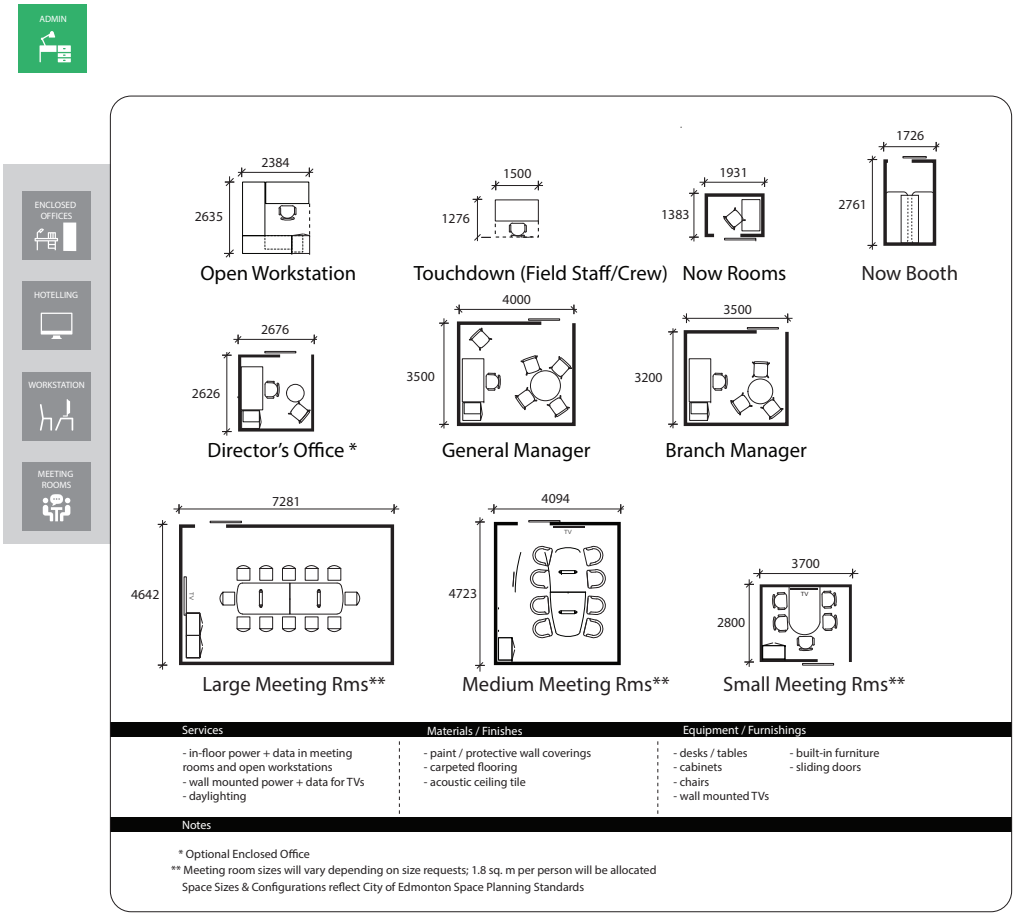


Figure 3.3b: Administration Standardization Diagrams

MULTIPURPOSE

BRIEFING

TRAINING

LUNCHROOM

REFRESHMENT AREA

Multifunctional Room = 1.8 m^2 / person

Functions

training, lunch room, refreshments, meetings, staff briefing, staff gathering

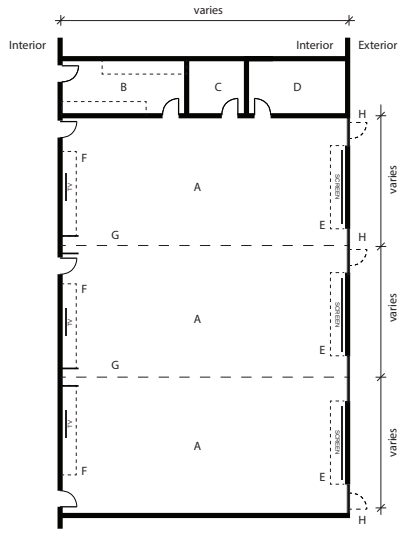
moveable partitions c/w acoustic attenuation

- wall mounted chrome box / LCD TVs
- projector(s) + screens(s) : 1 per divisible space
- pin-up boards (1 per Operations Group + 1 general COE)

kitchenette (additional sq. footage as indicated):
- centrally located and/or accessible to staff when room is partitioned
- consider multiple locations due to partitions

training casework:
- lockable lower casework to store presentation equipment / computer tower
- 1 per partitioned room

- tables / chairs / equipment storage
- secure vending machine refreshment storage



Services

- water
- in-floor power + data for computer training
- dimmable lighting in addition to typical
- daylighting

Materials / Finishes

- acoustic ceiling
- painted durable walls
- resilient flooring (epoxy sealed c/w varigated texture)
- easily maintained + durable finishes

Equipment / Furnishings

- 1 refrigerator per space
- 1 x stove
- microsaves
- dishwasher
- ice machine
- lower casework
- 3 vending machines
- computer tower c/w secure storage
- ceiling mounted projector
- ceiling mounted automatic screens
- pin up boards
- wipeable 'whiteboard' wall finish
- double basin sinks

Notes

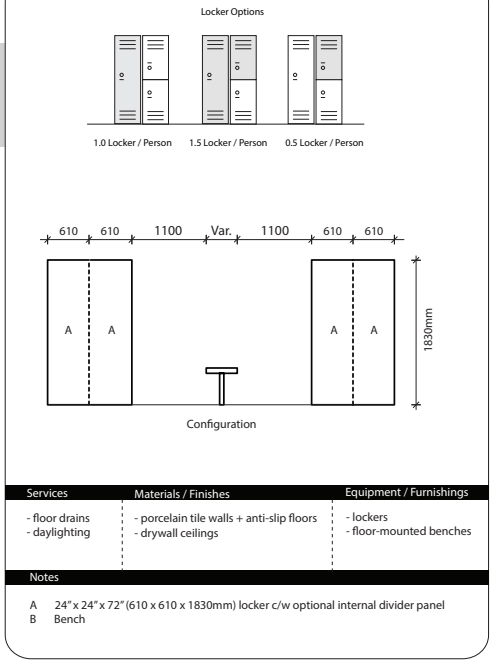
- divisible via movable partitions
- daylighting + acoustic separation

A training / meeting / lunch room
B catering / service room
C vending machine storage
D furniture / equipment storage
E presentation casework
F kitchentte casework c/w vending machine
G sliding partition c/w acoustic attenuation
H exterior access to gathering space

Figure 3.3c: Multipurpose Standardization Diagrams

LOCKERS

LOCKERS



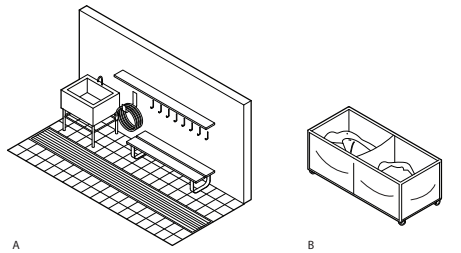
Services	Materials / Finishes	Equipment / Furnishings
- floor drains - daylighting	- porcelain tile walls + anti-slip floors - drywall ceilings	- lockers - floor-mounted benches

Notes

A 24" x 24" x 72" (610 x 610 x 1830mm) locker c/w optional internal divider panel
B Bench

LOCKERS

MUD ROOM



Services	Materials / Finishes	Equipment / Furnishings
- hose bibb - laundry sink - walk-on floor grate drainager	- drywall ceiling - porcelain wall tiles - porcelain anti-slip floor tiles	- benches - wall mounted hooks - wire shelving - water hose + wall mounted hook - laundry bin / storage

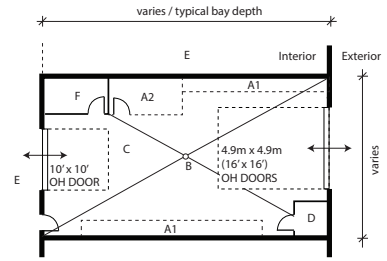
Notes

A Walk-on Drainage Grate with Water Hose, Hangers, and Wire Shelving, Sink
B Laundry Bins / Laundry Storage

Figure 3.3d: Locker Standardization Diagrams

OPERATIONS

WORKSHOPS



Functions

- Workshop
- Oil Change
- Machining + Welding
- Small Engine Repair
- Tire Repair

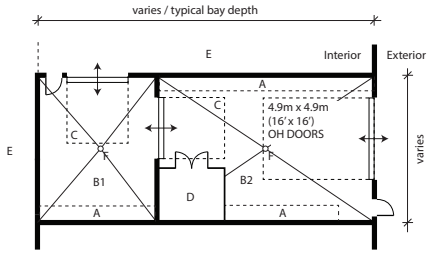
- enclosed workshops; size + configuration per Owner directive
- equipment layout planning required per Ower directed equipment lists

Services	Materials / Finishes	Equipment
- roll-down compressed air - roll-down overhead 115 VAC power - ventilation / dust control - floor drain / trench c/w interceptor - heated (radiant) - wall-mounted hose-bib - daylighting	- sealed concrete floors - CMU sealed walls or durable surface - ceiling open to structure	- workshop equipment per Owner directive - lockable casework + cabinets - workbenches - ventilation equipment - lockers for personal materials/equipment secure storage

Notes

A1	lockable casework/cabinets/lockers; workbenches; open material storage
A2	secure material storage
B	drain
C	double height bay
D	exterior wall located ventilation equipment room
E	adjacent workbay / circulation aisle
F	secure tool storage c/w storage management system (i.e. RFID tags)
*	dimensions provided are targeted for best-case standardization and may be adjusted per Owne-r directive

WORKSHOPS



Functions

- Paint Shop

- enclosed workshops; size + configuration per Owner directive
- equipment layout planning required per Ower directed equipment lists

Services	Materials / Finishes	Equip
- roll-down compressed air - roll-down overhead 115 VAC power - ventilation / dust control - floor drain / trench c/w interceptor - heated (radiant) - wall-mounted hose-bib - daylighting	- sealed concrete floors - CMU sealed walls or durable surface - ceiling open to structure	- workshop equipment per Owner directive - lockable casework + cabinets - workbenches - ventilation equipment

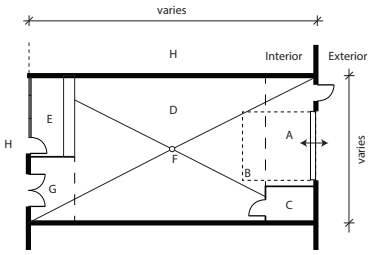
Notes

A	lockable casework + cabinets; workbenches; materials storage
B1	double height preparation/fabrication bay
B2	double height finishing bay
C	interior access: 10' x 10' overhead door or double swing doors
D	spray booth
E	adjacent workbay / circulation aisle
F	drain
*	dimensions provided are targeted for best-case standardization and may be adjusted per Owner directive

Figure 3.3e: Workshop Standardization Diagrams

OPERATIONS

CENTRAL STORES



Functions

- central receiving
- materials + equipment storage
- enclosed + secure
- stores administration

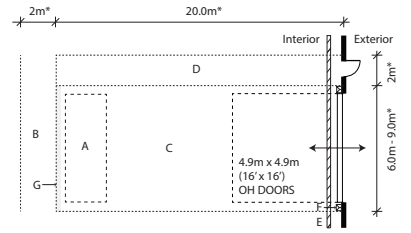
Services	Materials / Finishes	Equipment / Furnishings
- floor drain - heated - water - daylighting	- sealed concrete floors - CMU sealed walls or durable surface - ceiling open to structure	- pallet racking - typical storage shelving - service counter - workstation

A central receiving lay-down area
B 16' x 16' (4.9 m x 4.9m) overhead door
C enclosed office
D materials + equipment storage ; 1 1/2 to 2 storey high bay
E service vestible + counter
F floor drain(s)
G prep/pick up area
H adjacent workbay / circulation aisle

Figure 3.3f: Central Stores Standardization Diagrams

WORK BAYS / TOOL STORAGE

FLEET PARKING



Functions

- dirve in / back-out workbay
- minor vehicle / equipment maintenance
- minor fabrication work
- vehicle and equipment storage

Services	Materials / Finishes	Equipment
- roll-down overhead compressed air + 115 VAC power - floor trench c/w interceptor - 2" water line(s) c/w valved quick connects - heathed or tempered space (radiant - daylighting	- sealed concrete floors - CMU walls or easily cleaned finishes - ceiling open to U.S. structure	- floor mounted vehicle ramp (select bays) - overhead crane (select bays)

Notes

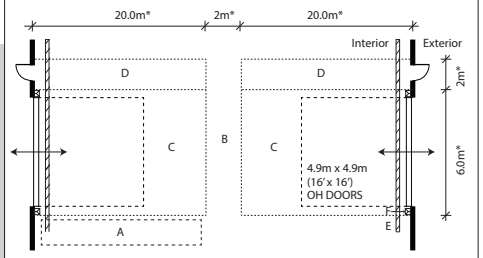
A material / tool crib located within bay where required; Secure w chain link or wire mesh cabinet; power required
B 2m wide painted circulation spine c/w services
C double height bay
D aisle c/w painted lines @ same floor level as bays; 1 per 2 bays ideal or egress to code
E in-floor drainage trench + sump/oil interceptor
F exhaust duct
G barrier required for heavy equipment
* dimensions provided are targeted for best-case standardization and may be adjusted per Owner directive

Figure 3.3g: Workbay / Tool Storage / Fleet Parking Standardization Diagrams

OPERATIONS

WORK BAYS / TOOL STORAGE

FLEET PARKING



Functions

- drive-through capable workbay
- minor vehicle / equipment maintenance
- minor fabrication work
- oversized vehicle storage

Services	Materials / Finishes	Equipment / Furnishings
- roll-down overhead compressed air + 115 VAC power - floor trench c/w interceptor - 2" water line(s) c/w valved quick connects - heathed or tempered space (radiant) - daylighting	- sealed concrete floors - CMU walls or easily cleaned finishes - ceiling open to U.S. structure	- overhead crane (select bays)

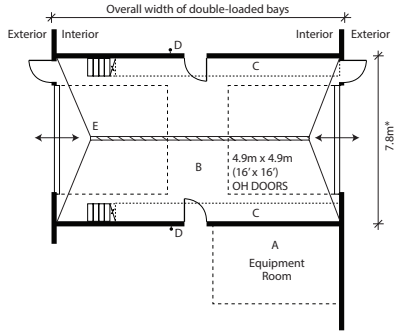
Notes

A Material / Tool Crib located within bay where required; Secure w chain link or wire mesh cabinet
B 2m wide painted circulation spine c/w services
C Double height bay
D Aisle c/w painted lines @ same floor level as bays; 1 per 2 bays ideal or egress to code
E In-floor drainage trench + sump/oil interceptor
F Exhaust duct
* dimensions provided are targeted for best-case standardization and may be adjusted per Owner directive

Figure 3.3h: Workbay / Tool Storage / Fleet Parking Standardization Diagrams

VEHICLE MAINTENANCE

WASH BAYS



Functions

- manual vehicle washing, primarily for oversized specialty vehicles and equipment -
- drive-through capability
- no vehicle or equipment storage

Services	Materials / Finishes	Equipment / Furnishings
- roll-down overhead compressed air + 115 VAC power - drainage trench c/w interceptor - 2" chlorinated water line(s) c/w valved quick connects - vehicle exhaust ventilation - heated - daylighting	- sealed concrete floors - sealed CMU walls - ceiling open to U.S. structure	- oversized water hoses c/w wall mounted storage hooks - vacuum equipment - pressure washing equipment

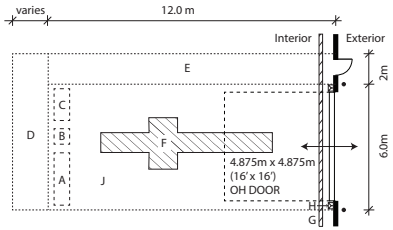
Notes

A adjacent equipment room (mezzanine or main floor) to house pressure washing equipment/pump, soap, etc.
B double height bay
C overhead steel grated catwalk w stair, rust resistant finish
D vacuum adjacent to mandoors + located in dry area / adjacent bay
E in-floor drainage trench + sump/oil interceptor
* dimensions provided are targeted for best-case standardization and may be adjusted per Owner directive

Figure #: Washbay Standardization Diagrams

VEHICLE MAINTENANCE

VEHICLE MAINT.



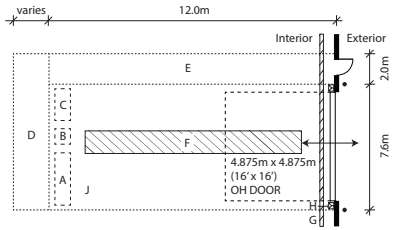
Light Vehicle Repair
max 2 ton vehicles; trucks, cars, small equipment

	Materials / Finishes	Equipment
- Roll-down overhead compressed air, gear oil, hydraulic oil + power - Floor trench c/w interceptor - 2" water line(s) c/w valved quick connects - Heated (radiant) -exhaust ducts @ floor level along exterior wall - overhead mobile exhaust ducts in central bays - daylighting	- Sealed concrete floors - CMU walls or easily cleaned finishes - Ceiling open to U.S. structure	- infloor or mobile vehicle hoist - computer station - mobile tool crib - workbench - 5 ton crane(s) spanning length of shop

Notes

A Mobile tool crib
B Computer station
C Workbench
D Painted aisle; secondary aisle (2 m to 4 m wide) or major vehicular aisle (6 - 14m wide c/w 18'H x 16'W high-speed rolling rubber door)
E Aisle c/w painted lines @ same floor level as bays; 1 per 2 bays ideal or to code
F Vehicle hoist: in-floor 30% of bays; mobile 70% of bays
G In-floor drainage trench + sump/oil interceptor
J Double height bay
H Exhaust duct
* Dimensions provided are targeted for best-case standardization and may be adjusted per Owner directive

VEHICLE MAINT.



Functions

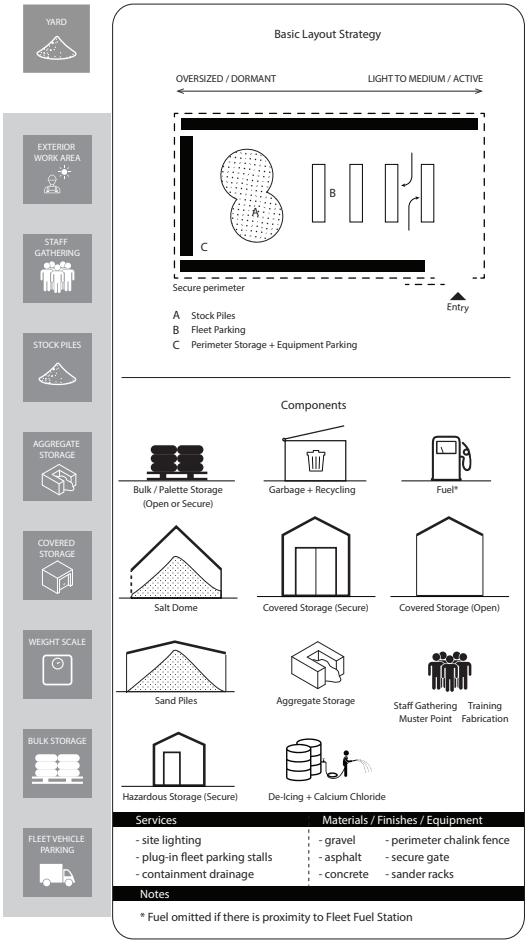
Heavy Vehicle Repair
>2 ton vehicles; seasonal vehicles/equipment; tractors; aerials; etc.

Services	Materials / Finishes	Equipment
- Roll-down overhead compressed air, gear oil, hydraulic oil + power - Floor trench c/w interceptor - 2" water line(s) c/w valved quick connects - Heated (radiant) -exhaust ducts @ floor level along exterior wall - overhead mobile exhaust ducts in central bays - daylighting	- Sealed concrete floors - CMU walls or easily cleaned finishes - Ceiling open to U.S. structure	- infloor or mobile vehicle hoist - in-floor service trench - computer station - mobile tool crib - workbench - 5 ton crane(s) spanning length of shop

Notes

A Mobile tool crib
B Computer station
C Workbench
D Painted aisle; secondary aisle (2 m to 4 m wide) or major vehicular aisle (6 - 14m wide c/w 18'H x 16'W high-speed rolling rubber door)
E Aisle c/w painted lines @ same floor level as bays; 1 per 2 bays ideal or to code
F In-floor trench or vehicle hoist: in-floor 30% of bays; mobile 70% of bays
G In-floor drainage trench + sump/oil interceptor
J Double height bay
H Exhaust duct
* Dimensions provided are targeted for best-case standardization and may be adjusted per Owner directive

Figure 3.3i: Vehicle Maintenance Standardization Diagrams



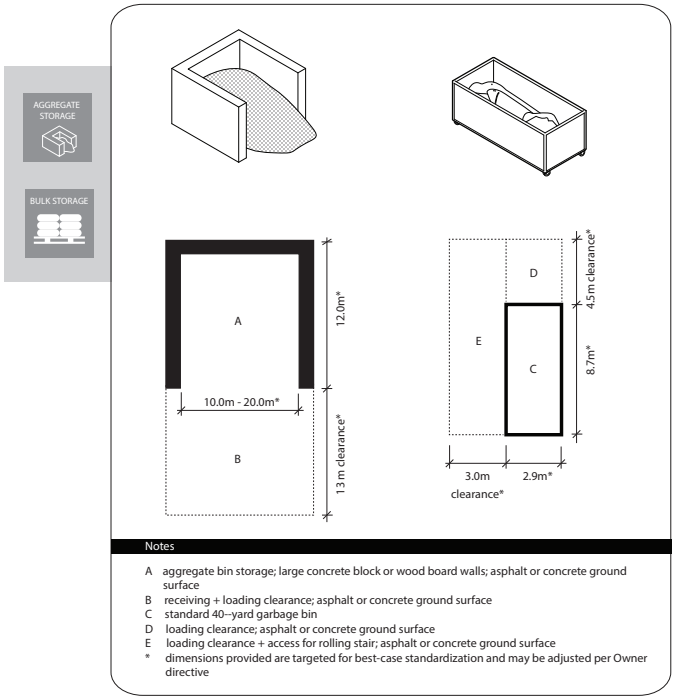
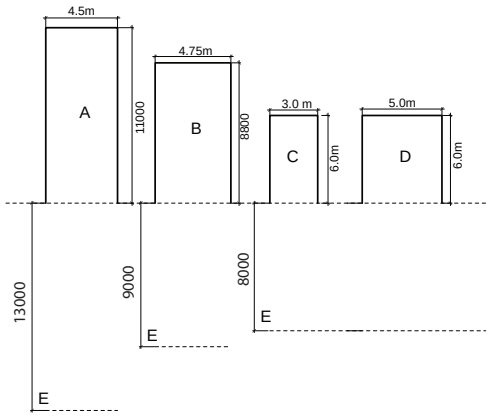


Figure 3.3j: Yard Standardization Diagrams

YARD

FLEET VEHICLE PARKING



Services	Materials / Finishes	Equipment
- plug-in fleet parking stalls*	- asphalt - gravel	

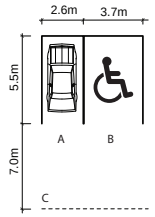
Notes

A Oversized vehicles
B 1/2 ton - 2 ton, tractors, chippers
C utility vanc, skid steer, stump grinder, trailers, etc
D mowers
E Aisle / clearance
* Quantity defined by owner group

Figure 3.3k: Fleet Parking Standardization Diagrams

LIGHT VEHICLE PARKING

PERSONAL VEHICLE PARKING



Services	Materials / Finishes
- plug in light vehicle stalls*	- asphalt

Notes

A City of Edmonton regular by-law staff
B barrier free parkings stall
C City of Edmonton aisle
* Quantity defined by owner group

Figure 3.3l: Personal Vehicle Standardization Diagrams

SHARING DIAGRAMS

Sharing is another key strategy in the development of an integrated operations model. Figures 3.3m and 3.3n indicate the proposed program uses that can be optimized by their shared use. Sharing can be applied both from the perspective of shared spaces that are reduced in area due to the ability to share the amenity (such as reducing yard circulation by having shared lanes) and shared spaces that have dedicated programs within them (such as a shared office with dedicated workstations).

Figure 3.3m focuses on sharing opportunities that can reduce program area. The program types displayed in full saturation are identified as a sharing program type. The sharing of these spaces will result in the reduction of required area for the integrated site in comparison to the total individual Operations Groups program. This is due to the reduction of program area by sharing spaces such as meeting rooms and washbays.

Figure 3.3m: Shared Program Types

- Administration
- Staff Support
- Operations
- Light Vehicle Parking
- Yard Operations
- Site Services
- Off-Site Program

DEDICATED SHARING DIAGRAM

Figure 3.3n illustrates the parts of an integrated operations model that are considered dedicated per each Operations Group. The program types displayed in full saturation are identified as a dedicated sharing program type.

These spaces will not reduce the required area for the integrated site in comparison to the total individual Operations Groups program; however, the sharing aspect of these spaces will allow for the flexibility of the type and size of Operations Groups occupying the facility throughout the future.

There is the opportunity to further investigate sharing, such as shared workstations or reducing personal vehicle parking in order to reduce required program area for the integrated site. This is something that should continue to be part of the discussion around developing an integrated operations site that functions efficiently while being fiscally and environmentally responsible by reducing capital costs and facility footprint while maintaining operational integrity.

As a basis for design, this study considers dedicated operations spaces at a 1:1 ratio per each operations group's stated requirements.

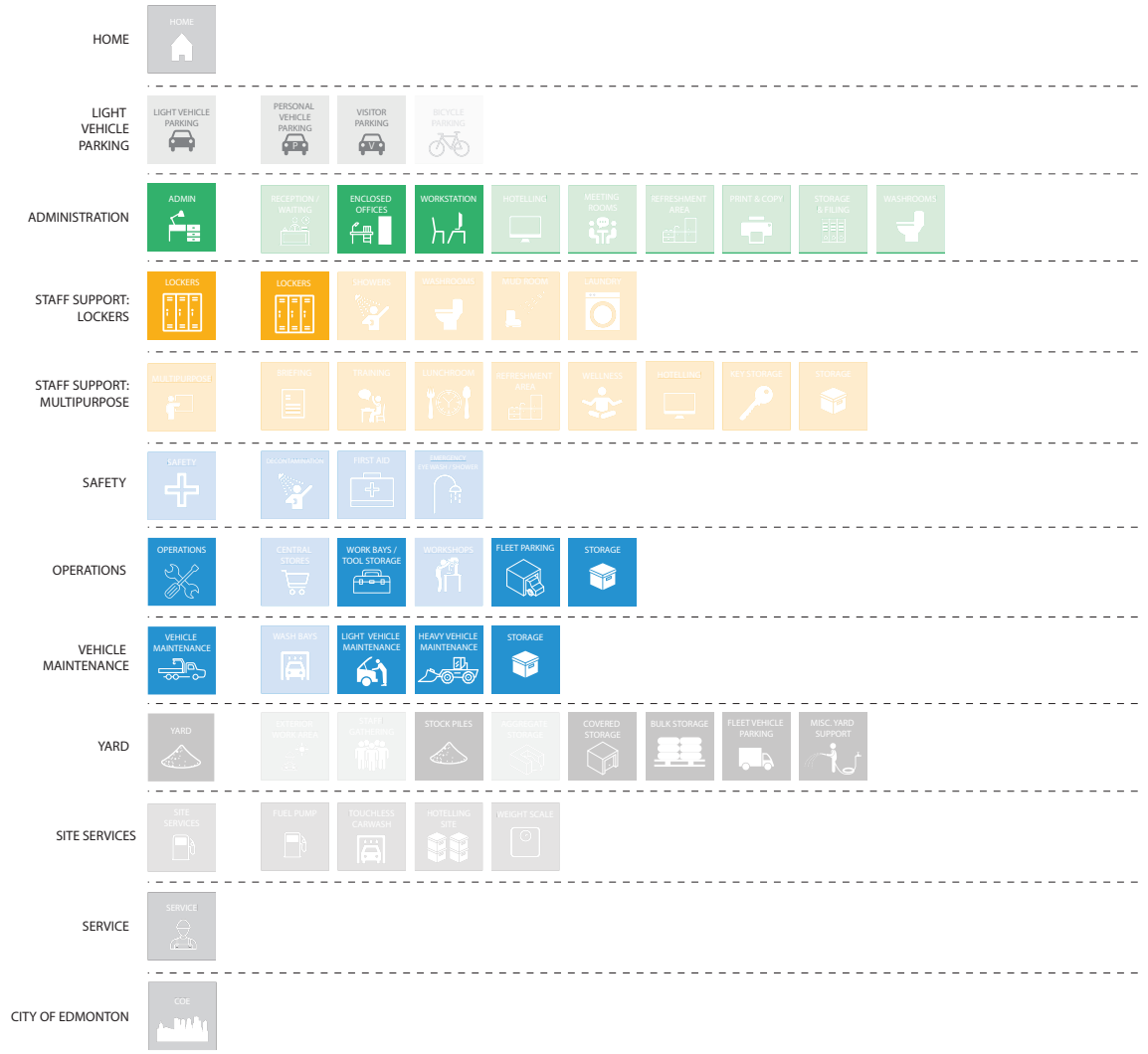


Figure 3.3n: Dedicated Sharing Program Types

- Administration
- Staff Support
- Operations
- Light Vehicle Parking
- Yard Operations
- Site Services
- Off-Site Program

3.4 PLANNING PRINCIPLES

Integrated principles are the primary design objectives and provide guidelines for best practices in planning and design for integrated operations facilities. The integrated principles were derived from the AMPV2, 2016 and Stakeholder Visioning Session, held on November 25, 2016 with CoE Integrated Infrastructure Services, Sustainable Development, Parks + Roads Services, Fleet and Facility Services and Utility Services. The integrated principles were developed and capture:

1. **SECURITY & SAFETY**
2. **EFFICIENCY**
3. **SUSTAINABILITY**
4. **GOOD NEIGHBOUR**
5. **LEGIBILITY**
6. **ADAPTABILITY + FUTURE PROOFING**

These principles were used as a basis for design and evaluation of the integrated strategies, schemes, and test fits.

1. SECURITY & SAFETY

Public and Secure Separation:

The Master Plan should to create a safe and secure separation between service operations and public program. The separation of light from heavy vehicle traffic will allow services to operate efficiently, while public program (administration and staff support), including pedestrian movement, can be easily and safely accessed outside of the secure area and away from heavy traffic (refer to Figures 3.4a, 3.4b, and 3.4c). The design of this interface is key to achieving excellence in operations and day to day work flows.

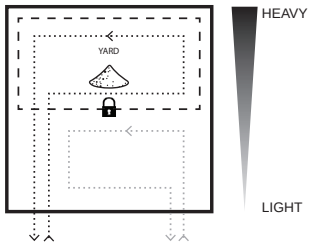


Figure 3.4a: Vehicular Movement

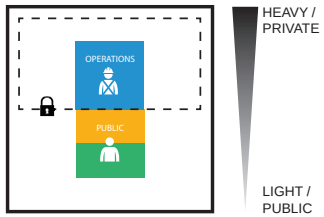


Figure 3.4b: Program Distribution

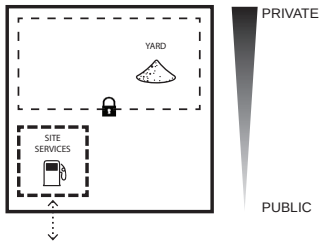


Figure 3.4c: Site Services

2. EFFICIENCY

Effective Day to Day Workflows:

A high quality work environment is required to encourage ownership, a rewarding experience, and productivity from the staff on a day-to-day basis. Ease of access and creating clear and efficient workflows require a highly organized site where one program does not impede the workflows of another program (refer to Figure 3.4d). In order to meet operational requirements, the site requires clear, efficient, and safe circulation, rational planning of each program's workflow and visible and easily accessible entrances. On a broader scale, the site will require logical phasing during construction so initial programs can function while others are under construction.

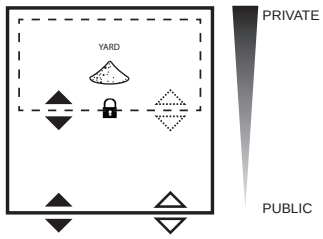


Figure 3.4d: Access and Egress

3. SUSTAINABILITY

Respecting the Environment:

The site's relationship to the natural environment should lead by example, encouraging people to care for, protect and respect the natural environment and communities in which we live. The Master Plan should consider sustainable site responses such as building orientation (refer to Figure 3.4e), access to natural daylight, containment of on-site particulates (refer to Figure 3.4f), natural water management (refer to Figure 3.4g), proximity to public transportation, and the protection of natural areas.

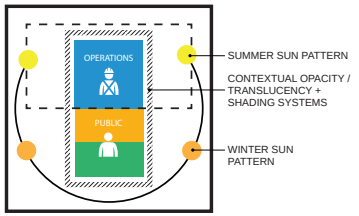


Figure 3.4e: Orientation and Shading

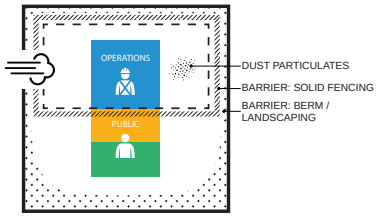


Figure 3.4f: Prevailing Winds

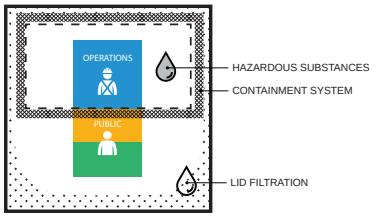


Figure 3.4g: Drainage and Low Impact Development (LID)

4. GOOD NEIGHBOUR

Contextual Response:

The site development should respond to its surroundings and strive to be a good neighbor. This can be achieved through addressing the interface between less desirable site programming and the public (refer to Figure 3.4h), the consideration of noise pollution (refer to Figure 3.4i), and providing interaction with the natural environment through views and access to landscaped areas and natural features (refer to Figure 3.4j). The implementation of good urban design gestures is desired to enhance the community interface.

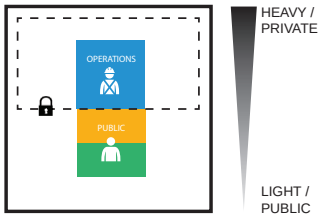


Figure 3.4h: Program Distribution

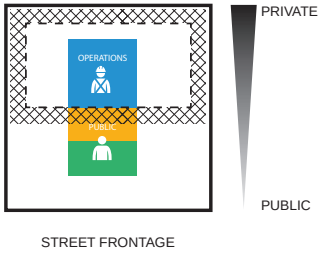


Figure 3.4i: Noise Pollution

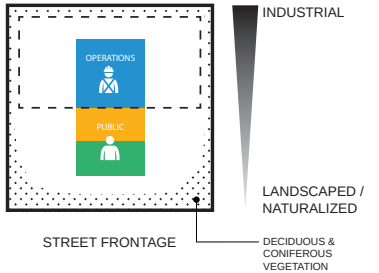


Figure 3.4j: Green Space

5. LEGIBILITY

Holistic Planning:

The site and facilities will become emblematic of the CoE's mission and goals by creating a legible integrated site without compromising operational functionality (refer to Figure 3.4k). The site will be holistically planned first, between the site and its environment, and second, between each of the program elements within the site.

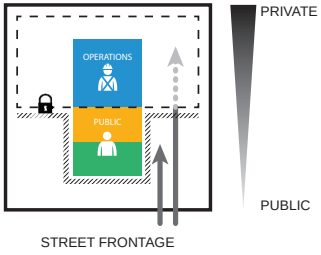


Figure 3.4k: Public Perception

6. ADAPTABILITY + FUTURE PROOFING

Planning for the Future:

As the CoE envisions its communities with to enjoy spaces and amenities that can be enjoyed now and into the future, the Master Plan should consider the same flexibility and adaptability. Designing towards a 2035 planning horizon and beyond, the design should provide flexibility and continued improvement for future needs through optimization, standardization, and sharing of infrastructure and amenities. Flexible and adaptable spaces create compact design, are multi-functional, adaptable and flexible (refer to Figure 3.4l and 3.4m), and maximize site area (refer to Figure 3.4n). This allows the facilities to grow and evolve with the CoE.

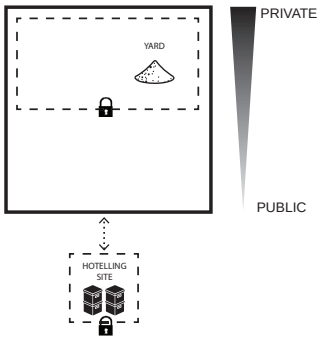


Figure 3.4l: Hotelling Option 1

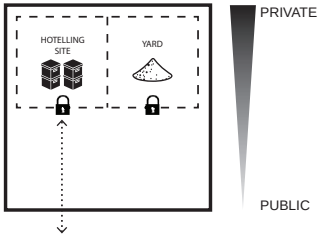


Figure 3.4m: Hotelling Option 2

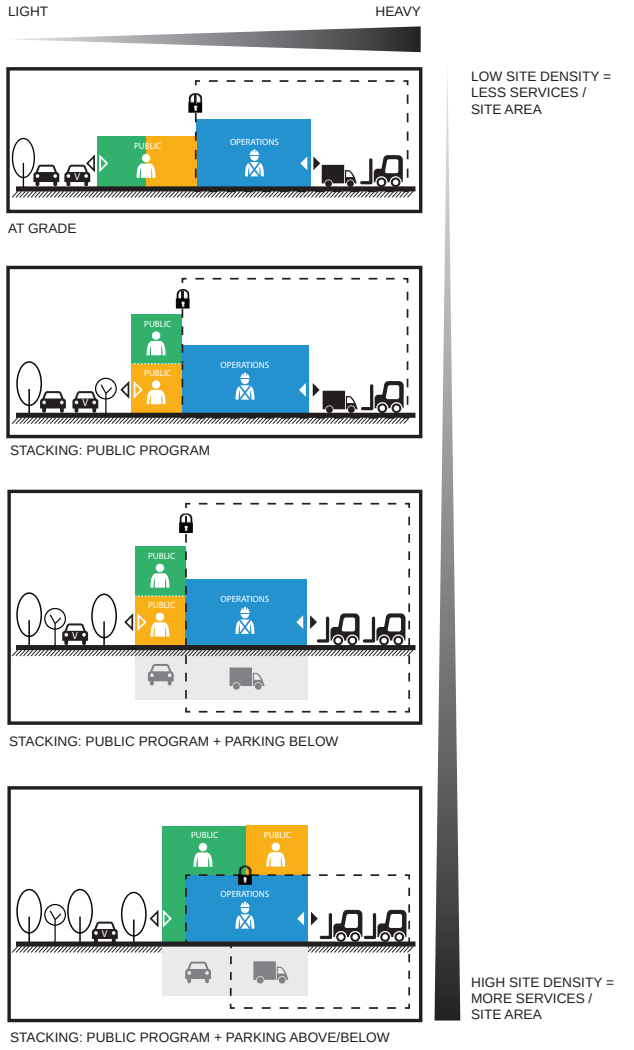


Figure 3.4n: Strategies for Site Densification

3.5 INTEGRATED SITE RELATIONSHIP STRATEGIES

The following pages illustrate various integrated planning strategies that consider a variety of generic site and building typologies. The goal of the explorations is to provide various high-level program distributions for an integrated site. Each strategy compares planning principle benefits and limitations as well as recommended considerations when applying a particular typology to an integrated site such as AIS or other future CoE integrated sites.

LINEAR STRATEGY

BENEFITS:

Efficiency, Safety + Security:

- Separated public access with controlled and minimal heavy vehicle interaction
- Separated site services easily accessible to CoE Fleet
- Clearly defined yard circulation
- Stacking staff support alleviates field staff from long workflow distances
- Flexible operations bays allow for back in / drive out and drive through capability
- Single yard control point enhances safety and security

Adaptability + Future Proofing:

- Stacking Administration and Staff Support and situating parking underground liberates the ground plane, allowing greater density of programming

Good Neighbour:

- Proposed screening and landscaping to soften the community edge

Legibility:

- Opportunity to design a legible public interface enhancing the community edge

LIMITATIONS:

Efficiency, Safety + Security:

- Yard circulation is not looped around the facility; this should be addressed by designing a turn-around area in a open yard which would result in increased yard area
- Distance between administration and briefing is not ideal
- Staff is required to move between levels to access lockers and staff support

Good Neighbour:

- Large portion of yard requires screening from public view

Legibility:

- Public interface portion of the facility (Administration and Staff Support) is less prominent as a large portion of yard area is directly adjacent to the community edge

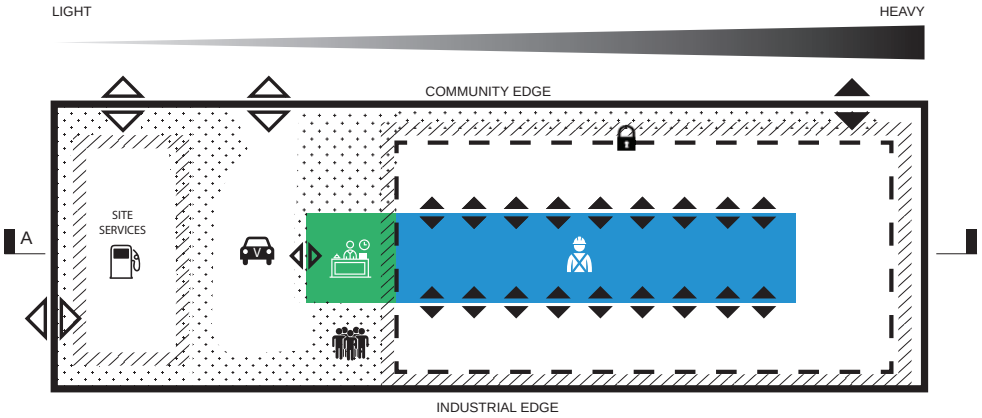


Figure 3.5a: Linear Strategy Plan

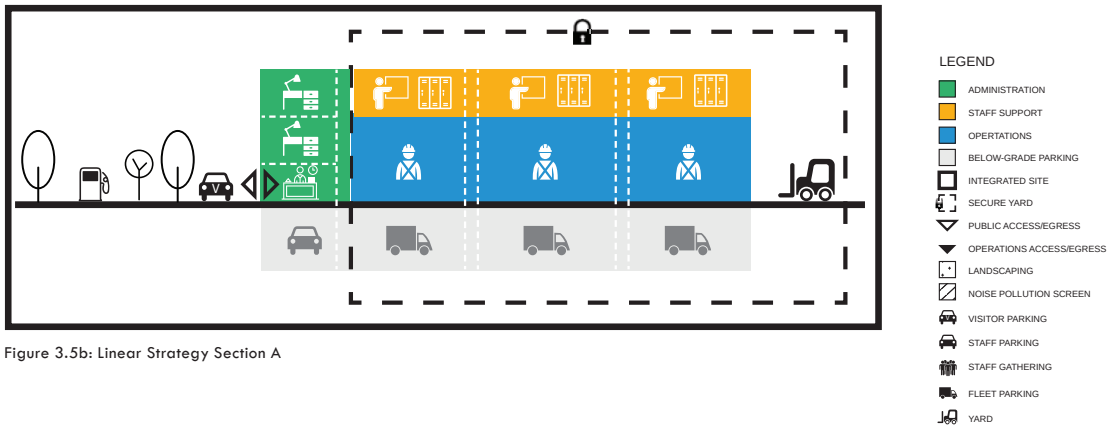


Figure 3.5b: Linear Strategy Section A

LINEAR STRATEGY - SEMI-DETACHED OPERATIONS BLOCK

BENEFITS:

Efficiency, Safety + Security:

- Yard loop provides effective and clear circulation within secured space
- Separated public access with controlled and minimal heavy vehicle interaction
- Separated site services easily accessible to CoE Fleet
- Stacking staff support alleviates field staff from long workflow distances
- Flexible operations bays allow for back in / drive out and drive through capability
- Single yard control point enhances safety and security

Adaptability + Future Proofing:

- Stacking Administration and Staff Support and situating parking underground liberates the ground plane, allowing greater density of programming

Good Neighbour:

- Proposed screening and landscaping to soften the community edge

Legibility:

- Opportunity to design a legible public interface enhancing the community edge

LIMITATIONS:

Efficiency, Safety + Security:

- Ground plane program connectivity is diminished; accessibility is still available, yet crosses a vehicular path; safety measures such as lighting, surfacing and signals should be implemented to prevent safety incidents
- Distance between administration and briefing is not ideal
- Staff is required to move between levels to access lockers and staff support

Good Neighbour:

- Large portion of yard requires screening from public view

Legibility:

- Public interface portion of the facility (Administration and Staff Support) is less prominent as a large portion of yard area is directly adjacent to the community edge

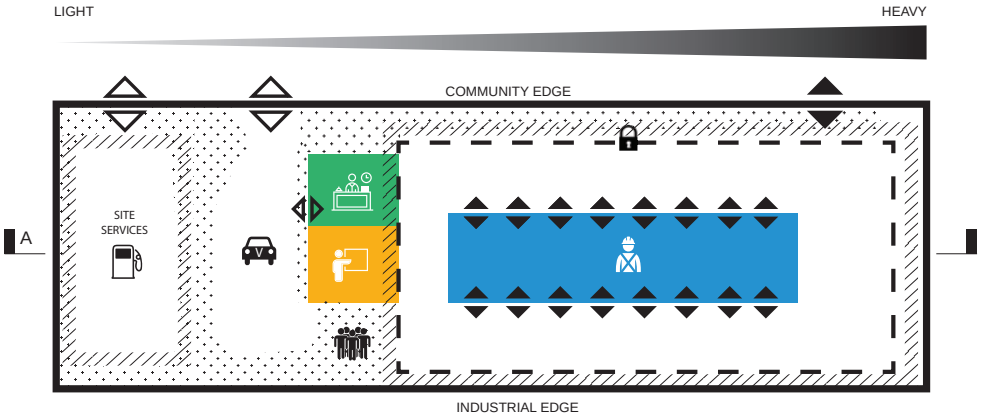


Figure 3.5c: Linear Strategy - Semi Detached Operations Block Plan

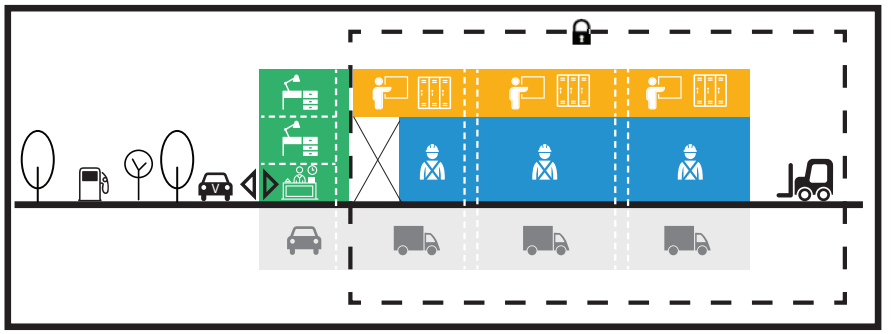


Figure 3.5d: Linear Strategy - Semi Detached Operations Block Section A

LEGEND

- ADMINISTRATION
- STAFF SUPPORT
- OPERTATIONS
- BELOW-GRADE PARKING
- INTEGRATED SITE
- SECURE YARD
- PUBLIC ACCESS/EGRESS
- OPERATIONS ACCESS/EGRESS
- LANDSCAPING
- NOISE POLLUTION SCREEN
- VISITOR PARKING
- STAFF PARKING
- STAFF GATHERING
- FLEET PARKING
- YARD

LINEAR STRATEGY - FULLY DETACHED OPERATIONS BLOCK

BENEFITS:

Efficiency, Safety + Security:

- Separated public access with controlled and minimal heavy vehicle interaction
- Separated site services easily accessible to CoE Fleet
- Clearly defined yard circulation
- Flexible operations bays allow for back in / drive out and drive through capability
- Single yard control point enhances safety and security
- Yard loop provides effective and clear circulation within secure space

Adaptability + Future Proofing:

- Stacking Administration and Staff Support and situating parking underground liberates the ground plane, allowing greater density of programming

Good Neighbour:

- Proposed screening and landscaping to soften the community edge

Legibility:

- Opportunity to design a legible public interface enhancing the community edge

LIMITATIONS:

Efficiency, Safety + Security:

- Detached multipurpose increases field staff workflow distances
- Ground plane program connectivity is diminished; accessibility is still available, yet crosses a vehicular path; safety measures such as lighting, surfacing and signals should be implemented to prevent safety incidents
- Distance between administration and briefing is not ideal
- Staff is required to move between levels to access lockers and staff support

Good Neighbour:

- Large portion of yard requires screening from public view

Legibility:

- Public interface portion of the facility (Administration and Staff Support) is less prominent as a large portion of yard area is directly adjacent to the community edge

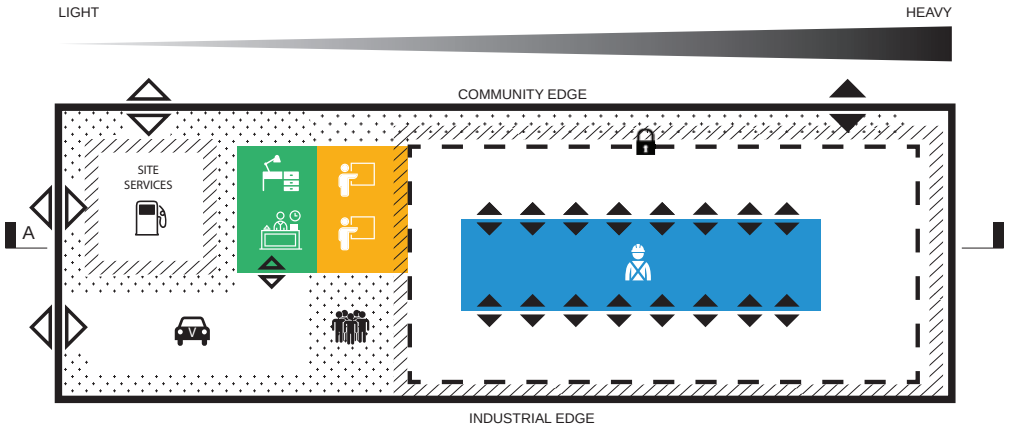


Figure 3.5e: Linear Strategy - Fully Detached Operations Block Plan

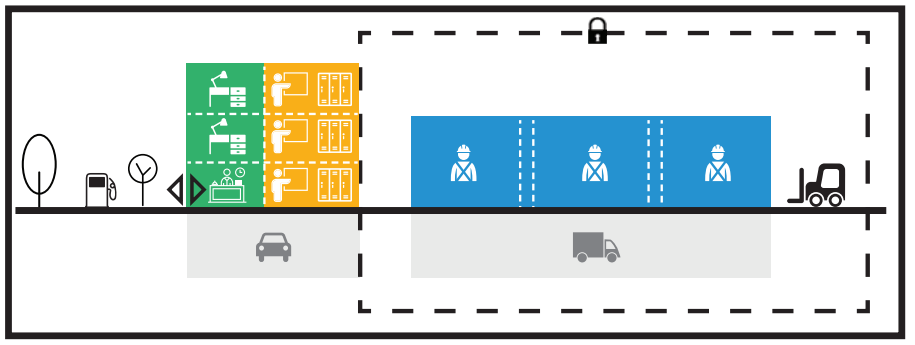
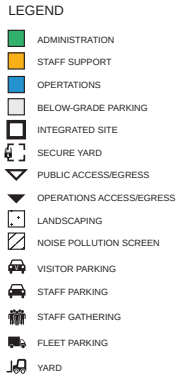


Figure 3.5f: Linear Strategy - Full Detached Operations Block Section A



“C” STRATEGY

BENEFITS:

Efficiency, Safety + Security:

- Separated public access with controlled and minimal heavy vehicle interaction
- Separated site services easily accessible to CoE Fleet
- Clearly defined yard circulation
- Single yard control point enhances safety and security
- The non-consolidated yard area could be organized to define and separate active vs dormant zones, helping to increase site safety and efficiency
- Flexible operations bays allow for back in / drive out and drive through capability
- Staff Support accessible on the ground plane with direct adjacency to each operations block

Adaptability + Future Proofing:

- Stacking Administration and situating parking underground liberates the ground plane, allowing greater density of programming

Good Neighbour:

- Building functions as a screen to the operations yard for a large portion of the site
- Good site frontage opportunities with landscaping and urban design

Legibility:

- Opportunity to design a highly legible public interface enhancing the community edge

LIMITATIONS:

Efficiency, Safety + Security:

- Yard circulation is not looped around the facility; this should be addressed by designing a turn-around area in a open yard which would result in increased yard area
- Yard area is not consolidated which could limit future flexibility
- Yard area between operations blocks may pose movement and circulation issues if not enough clearance is provided

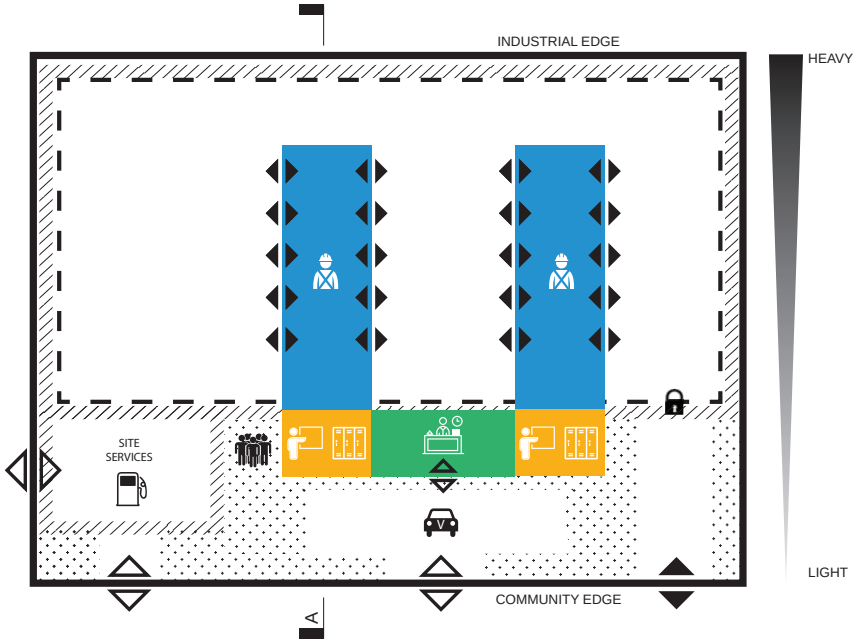


Figure 3.5g: “C” Strategy Plan

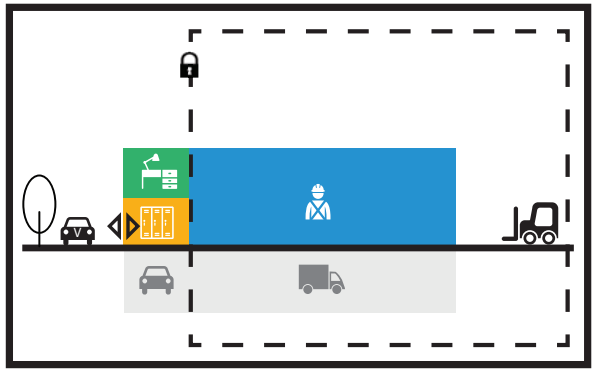


Figure 3.5h: “C” Strategy Section A

LEGEND

- ADMINISTRATION
- STAFF SUPPORT
- OPERTATIONS
- BELOW-GRADE PARKING
- INTEGRATED SITE
- SECURE YARD
- PUBLIC ACCESS/EGRESS
- OPERATIONS ACCESS/EGRESS
- LANDSCAPING
- NOISE POLLUTION SCREEN
- VISITOR PARKING
- STAFF PARKING
- STAFF GATHERING
- FLEET PARKING
- YARD

"L" STRATEGY

BENEFITS:

Efficiency, Safety + Security:

- Separated public access with controlled and minimal heavy vehicle interaction
- Single yard control point enhances safety and security
- Easily programmable and flexible consolidated yard area increases future flexibility
- Flexible operations bays allow for back in / drive out and drive through capability
- Separated site services easily accessible to CoE Fleet
- Staff Support accessible on the ground plane with direct adjacency to both operations blocks

Adaptability + Future Proofing:

- Stacking Administration and situating parking underground liberates the ground plane, allowing greater density of programming

Good Neighbour:

- Proposed screening and landscaping to soften the community edge

Legibility:

- Opportunity to design a legible public interface with visible connection to the community edge

LIMITATIONS:

Efficiency, Safety + Security:

- Yard area adjacent to 90 deg. operations blocks may pose movement and circulation issues if not enough clearance is provided
- Large portion of yard requires screening from public view

Good Neighbour:

- Public interface portion of the facility (Administration and Staff Support) is less prominent as a good portion of yard is adjacent to public view; this could be mitigated with screening and landscape barriers

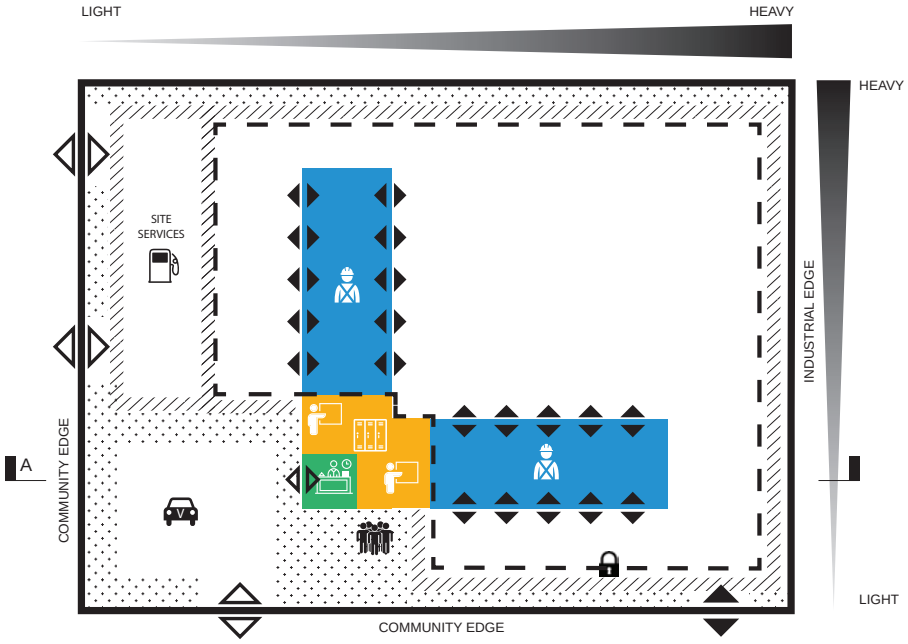


Figure 3.5i: "L" Strategy Plan

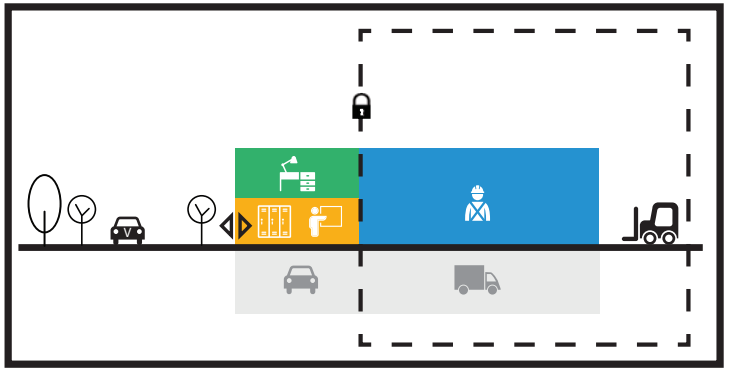
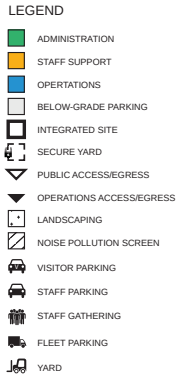


Figure 3.5j: "L" Strategy Section A



3.6 CONCEPTUAL BASE BLOCK LAYOUT STRATEGIES

The following pages illustrate various integrated planning strategies that consider workflows, program adjacencies, spatial relationships, secure points, and adaptability. The intent of these diagrams is to provide various detailed program distributions for an integrated site. Each strategy compares planning principle benefits and limitations as well as recommendations when applying a particular typology to a future integrated site.

AT GRADE SCHEME

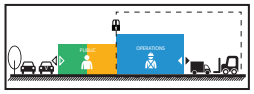


Figure 3.6a: At Grade Scheme Key Section

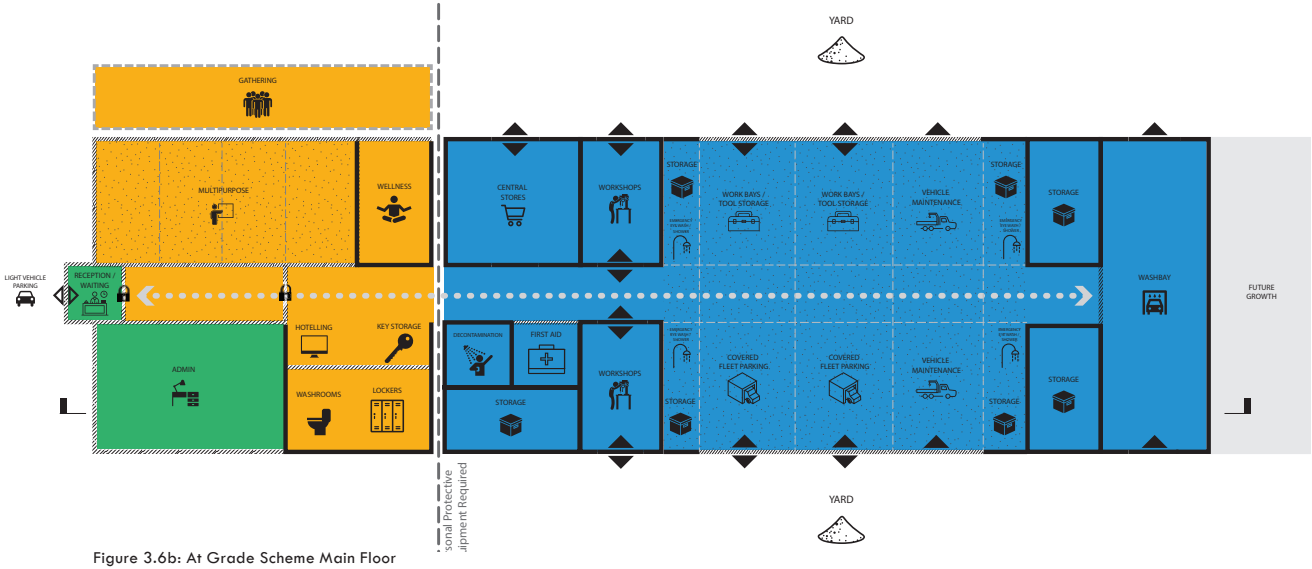


Figure 3.6b: At Grade Scheme Main Floor

BENEFITS:

Efficiency, Safety + Security:

- Separated public access with controlled and minimal heavy vehicle interaction
- Separated site services easily accessible to CoE Fleet
- Flexible operations bays allow for back in / drive out and drive through capability
- Multipurpose accessible on the ground plane with direct adjacency to each operations block

Adaptability + Future Proofing:

- Standardized workbays allows for future flexible use

Good Neighbour:

- Good site frontage opportunities with landscaping and urban design

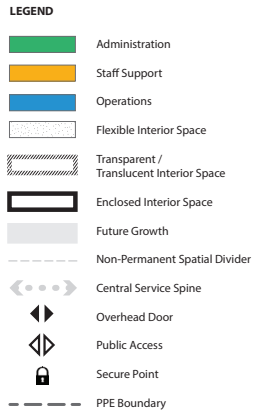
Legibility:

- Opportunity to design a highly legible public interface (Administration and Staff Support) with good proximity to the community edge

LIMITATIONS:

Efficiency, Safety + Security:

- Building all program at grade increases the overall distance between program blocks and reduces the efficiency of workflows
- Parking at grade reduces the amount of programming that can be achieved on the site and reduces efficiency of workflows



STACKING PUBLIC PROGRAM SCHEME

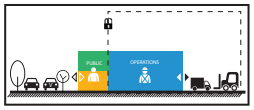


Figure 3.6c: Stacking Public Program Scheme Key Section

BENEFITS:

Efficiency, Safety + Security:

- Separated public access with controlled and minimal heavy vehicle interaction
- Separated site services easily accessible to CoE Fleet
- Operations bays allow for back in / drive out and drive through capability
- Multipurpose accessible on the ground plane with direct adjacency to each operations block

Adaptability + Future Proofing:

- Standardized workbays allows for future flexible use
- Stacking Administration and Staff Support liberates the ground plane, allowing greater density of programming

Good Neighbour:

- Good site frontage opportunities with landscaping and urban design

Legibility:

- Opportunity to design a highly legible public interface (Administration and Staff Support) with good proximity to the community edge

LIMITATIONS:

Efficiency, Safety + Security:

- Parking at grade reduces the amount of programming that can be achieved on the site and reduces efficiency of workflows

LEGEND

- Administration
- Staff Support
- Operations
- Flexible Interior Space
- Transparent / Translucent Interior Space
- Enclosed Interior Space
- Future Growth
- Non-Permanent Spatial Divider
- Central Service Spine
- Overhead Door
- Public Access
- Secure Point
- PPE Boundary

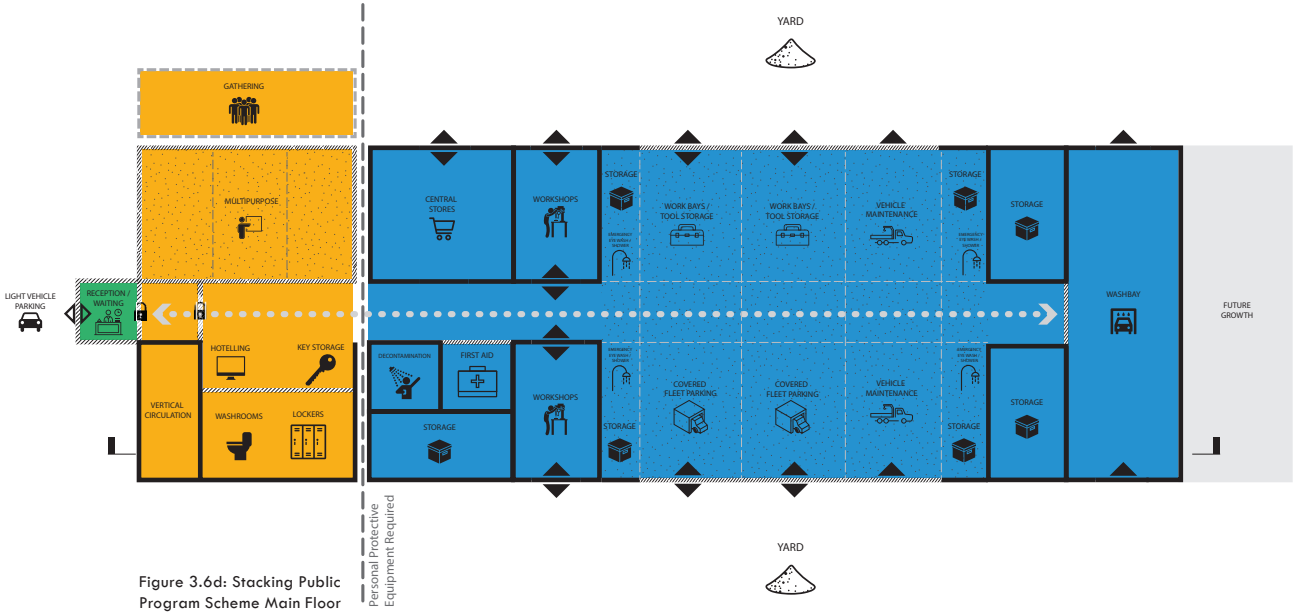


Figure 3.6d: Stacking Public Program Scheme Main Floor

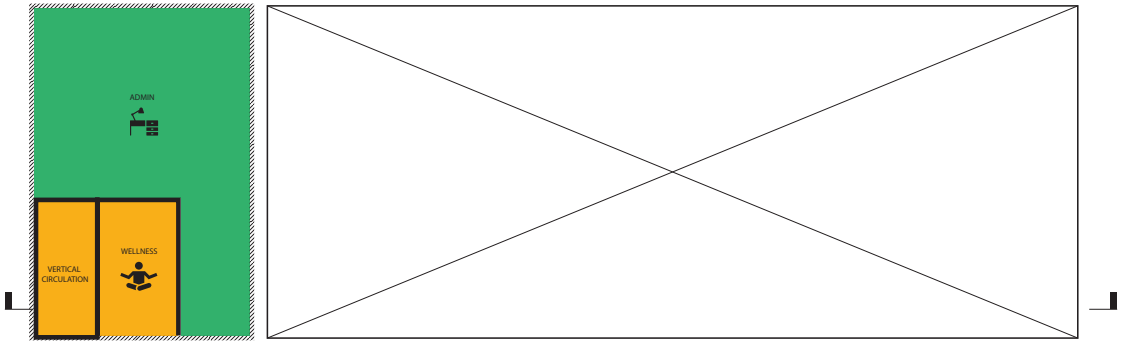


Figure 3.6e: Stacking Public Program Scheme Second Floor

STACKING PUBLIC PROGRAM + PARKING BELOW SCHEME

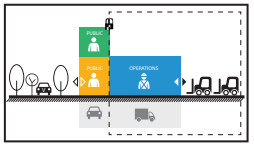


Figure 3.6f: Stacking Public Program + Parking Below Scheme Key Section

BENEFITS:

Efficiency, Safety + Security:

- Separated site services easily accessible to CoE Fleet
- Operations bays allow for back in / drive out and drive through capability
- Multipurpose accessible on the ground plane with direct adjacency to each operations block

Adaptability + Future Proofing:

- Standardized workbays allows for future flexible use
- Stacking Administration and Staff Support and situating parking below grade liberates the ground plane, allowing greater density of programming

Good Neighbour:

- Good site frontage opportunities with landscaping and urban design

Legibility:

- Opportunity to design a highly legible public interface (Administration and Staff Support) with good proximity to the community edge

LIMITATIONS:

Efficiency, Safety + Security:

- Single point of access into the parkade increases public and heavy vehicle interaction

LEGEND

- Administration
- Staff Support
- Operations
- Flexible Interior Space
- Transparent / Translucent Interior Space
- Enclosed Interior Space
- Future Growth
- Non-Permanent Spatial Divider
- Central Service Spine
- Overhead Door
- Public Access
- Secure Point
- PPE Boundary

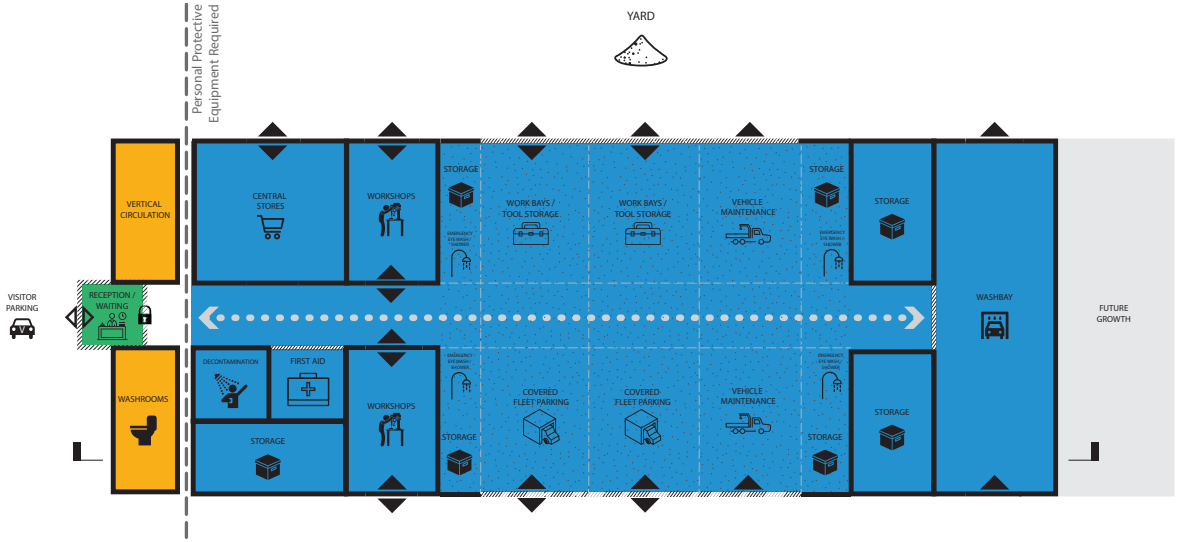


Figure 3.6g: Stacking Public Program + Parking Below Scheme Main Floor

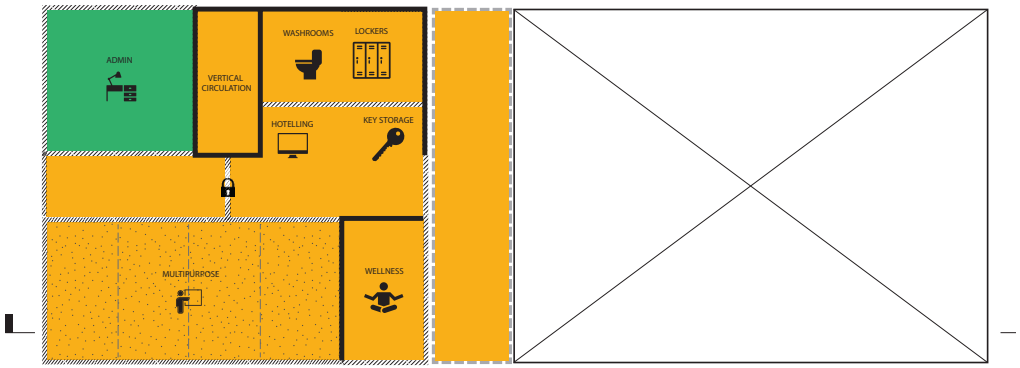


Figure 3.6h: Stacking Public Program + Parking Below Scheme Second Floor

STACKING PUBLIC PROGRAM + PARKING BELOW SCHEME CONTINUED

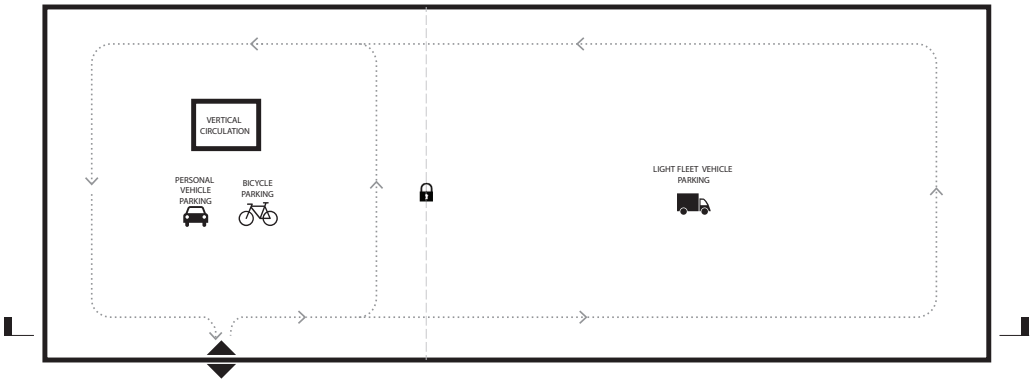


Figure 3.6i: Integrated "C" Scheme - Grade - Below Grade Parking

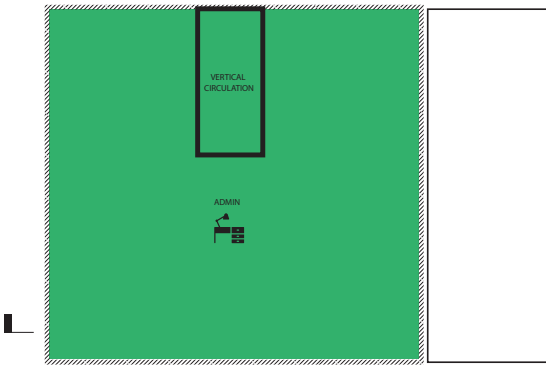


Figure 3.6j: Integrated "C" Scheme - Grade - Third Floor

LEGEND

- Administration
- Staff Support
- Operations
- Flexible Interior Space
- Transparent / Translucent Interior Space
- Enclosed Interior Space
- Future Growth
- Non-Permanent Spatial Divider
- Central Service Spine
- Overhead Door
- Public Access
- Secure Point
- PPE Boundary

3.7 INTEGRATED SITE OPTIONS

A series of high level investigations were conducted on a conceptual site in order to test and assess the strategies developed during the synergy, optimization, and integrated planning stages. The building program tested in these schemes is the same integrated program developed for the AIS; however, the intention of this exercise is to provide direction and strategies for future CoE integrated sites. Each scheme compares planning principle benefits and limitations as well as recommendations when applying a particular integrated site development option to future integrated sites.

"C" SCHEME - SINGLE STOREY

The first scheme is 100% of the integrated program located at grade. With a single integrated building the program is achieved in a site footprint that is 86% of the size of the site footprint that would be required if the operation groups operated individually on separate sites. This results in 14% land savings while keeping all program to a single storey reducing maintenance and operations, and capital costs.

BENEFITS:

Efficiency, Safety + Security:

- Separated public access with controlled and minimal heavy vehicle interaction
- Staff Support accessible on the ground plane with good adjacency to both operations blocks
- Site layout is compact with defined yard circulation and a flexible consolidated yard
- Administration has good connectivity and views into the yard

Adaptability + Future Proofing:

- Hotelling site included with access from public edge

Good Neighbour:

- Building functions as a screen to the operations yard for a large portion of the site creating a community edge buffer

Legibility:

- Opportunity to design a highly legible public interface (Administration and Staff Support) along the community edge

LIMITATIONS:

Efficiency, Safety + Security:

- Multiple points of secure access to the yard; recommended due to the size of the facility and the need for multiple groups to access the site at similar times throughout the day
- Operations blocks have long workflow distances; recommendation to include service programming (washrooms) throughout

Good Neighbour:

- Site frontage is dominated by parking

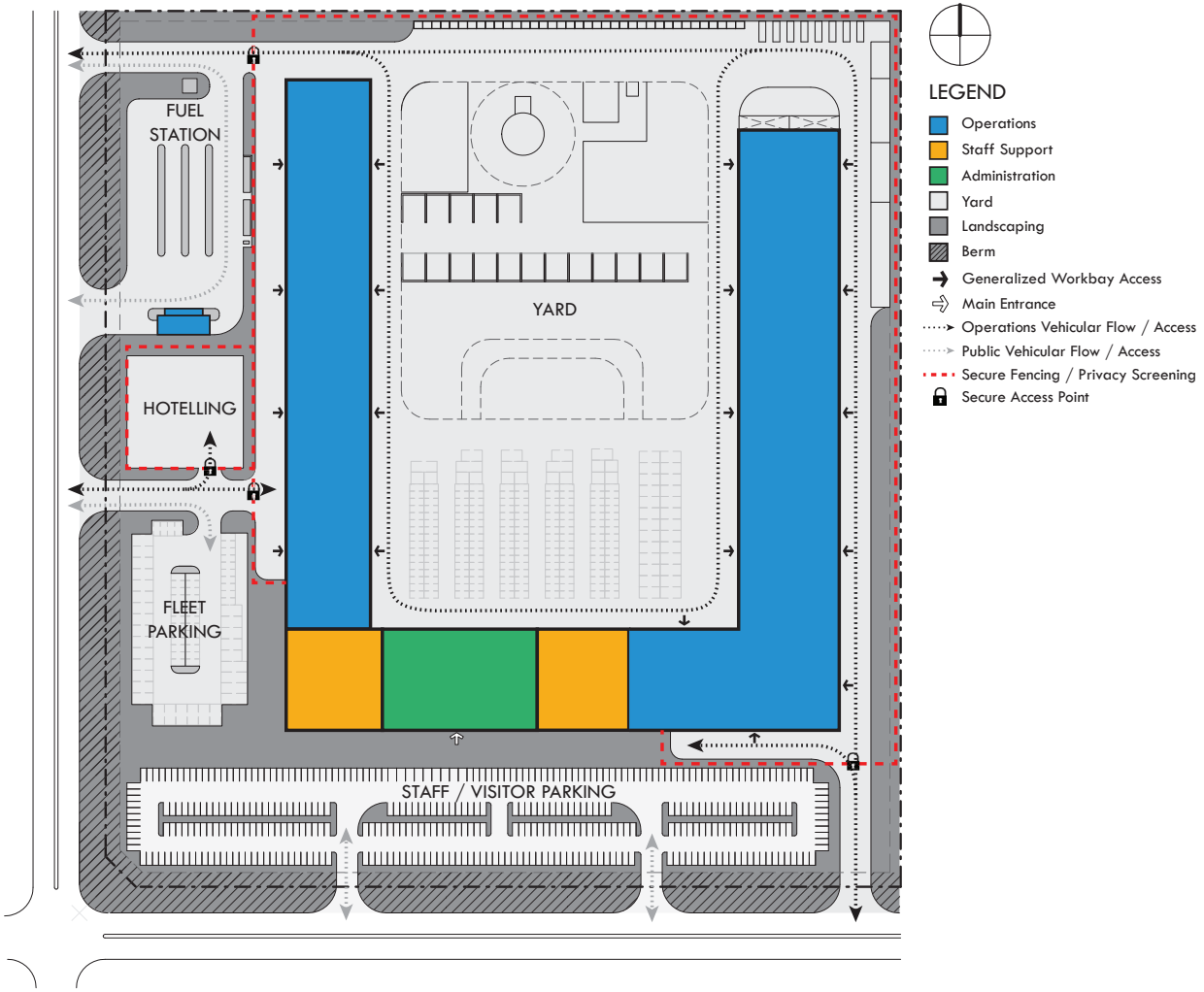


Figure 3.7a: Integrated "C" Scheme - Single Storey - Main Floor

"C" SCHEME - MULTI-STOREY

The "C" Scheme - Multi-Storey analyzes the site composition when the majority of administrative services, staff parking, and small vehicle fleet parking is provided either below grade or on the second floor. With a single integrated building the program is achieved in a site footprint that is 71% of the size of the site footprint that would be required if the operation groups operated individually on separate sites. This results in 29% land savings reducing capital, and maintenance and operations costs.

BENEFITS:

Adaptability + Future Proofing:

- Separated public access with controlled and minimal heavy vehicle interaction
- Staff Support accessible on the ground plane with good adjacency to each operations block
- Site layout is compact with defined yard circulation
- Administration has views into the yard from the second floor

Adaptability + Future Proofing:

- Stacking Administration and Staff Support and situating parking below grade liberates the ground plane, allowing greater density of programming
- Hotelling site included with access from public edge

Good Neighbour:

- Building functions as a screen to the operations yard for a large portion of the site
- Minimal parking on public edge provides good urban design opportunities

Legibility:

- Opportunity to design a highly legible public interface with adjacency to the community edge

LIMITATIONS:

Efficiency, Safety + Security:

- Multiple points of secure access to the yard; this is recommended due to the size of the facility and the need for multiple groups to access the site at similar times throughout the day
- Operations blocks have long walking distances; recommendation to include service programming (washrooms) throughout

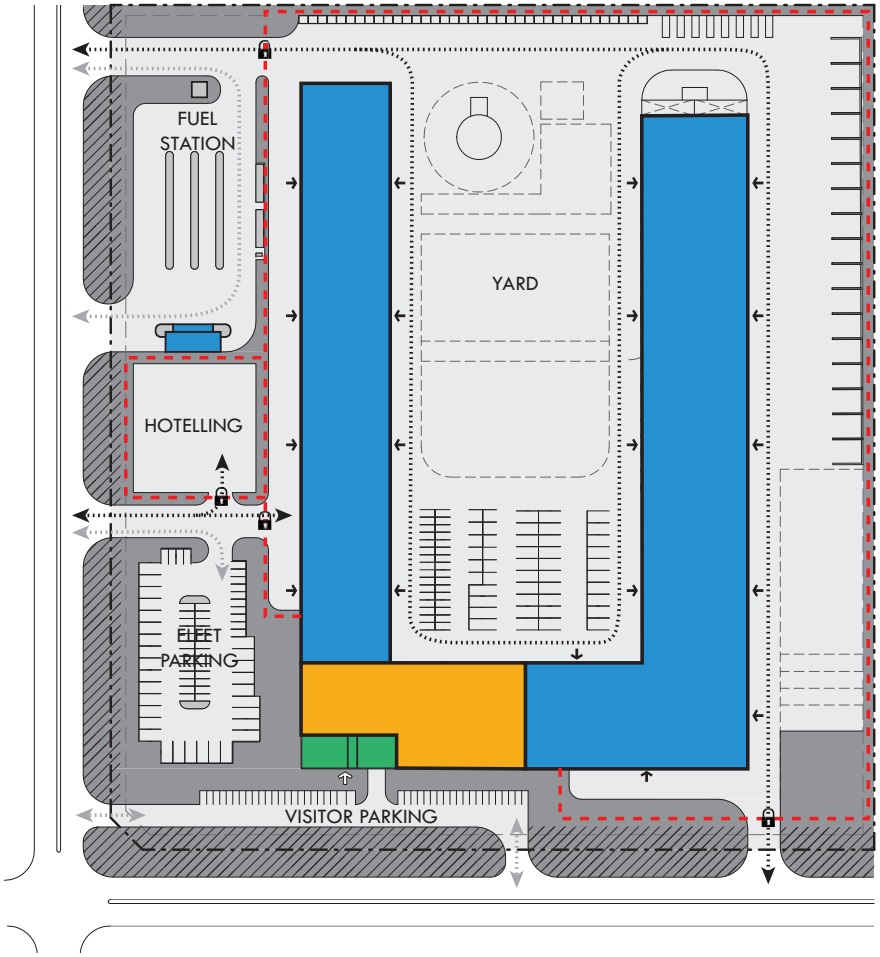


Figure 3.7b: Integrated "C" Scheme - Multi-Storey - Main Floor

“C” SCHEME - STACK

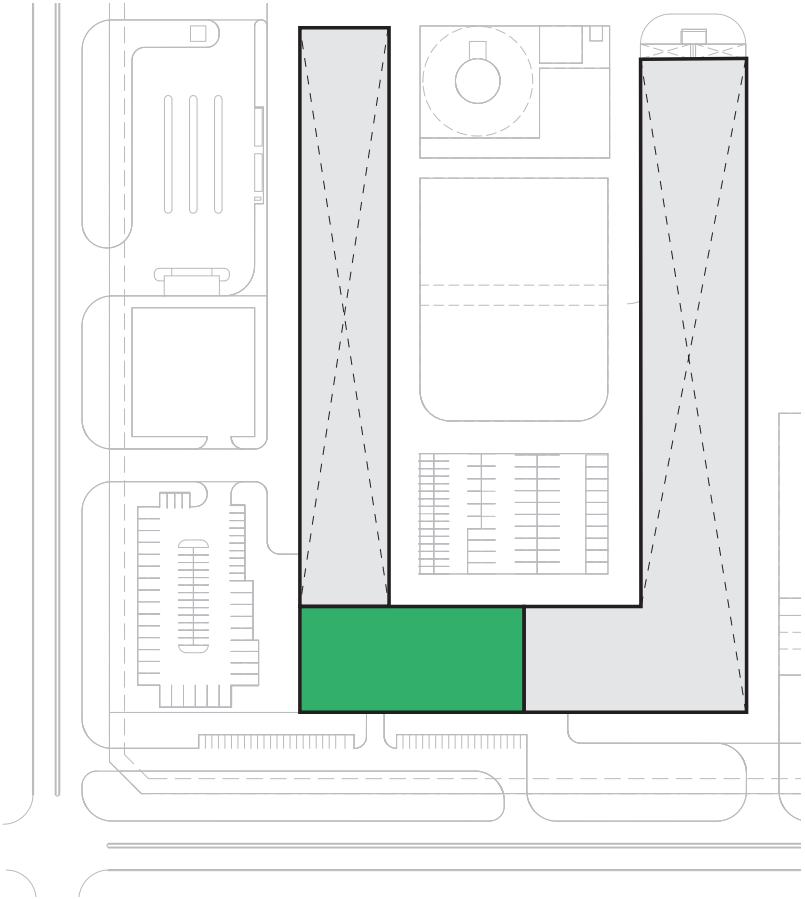


Figure 3.7c: Integrated “C” Scheme - Multi-Storey - Second Floor

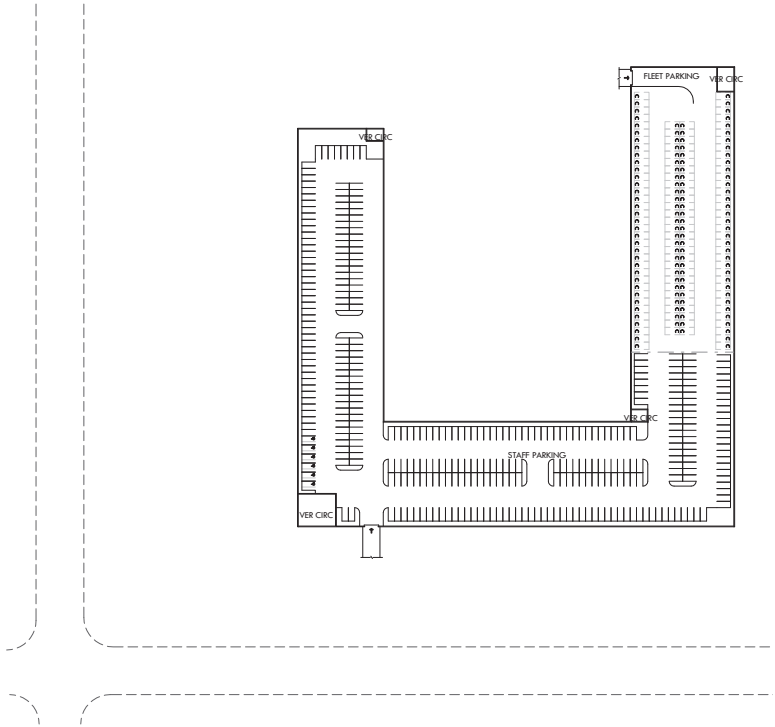


Figure 3.7d: Integrated “C” Scheme - Multi-Storey - Parkade

LEGEND

- Operations
- Staff Support
- Administration
- Yard
- Landscaping
- Berm
- Generalized Workbay Access
- Main Entrance
- Operations Vehicular Flow / Access
- Public Vehicular Flow / Access
- Secure Fencing / Privacy Screening
- Secure Access Point

3.8 INTEGRATED PROGRAM

The integrated program (refer to Figure 3.8a) was developed from the optimization strategies of standardization and sharing of synergistic program between the five groups as outlined in the previous portions of this document. All the program types consistent between the groups were standardized (such as operation bays) so the groups could have flexibility in the integrated facility and to anticipate future changes in space requirements. Synergies were explored for spaces that could be shared between groups (such as meeting rooms) and these were developed to reduce redundancy and minimize the required area while still meeting the Operations Groups needs.

The following integrated program is split into six (6) major categories:

1. Administration
2. Staff Support
3. Operations, Fleet Storage and Vehicle Maintenance
4. Yard
5. Light Vehicle Parking
6. Site Services

Dedicated programming is indicated by each groups' colour (refer to legend below) and gray is representative of shared spaces. Comments are included to explain recommendations and assumptions for standardization, shared and dedicated spaces, as well as remarks on precedents used as a basis for the programming assumptions. The precedents used throughout the development of this program include, but are not limited to: Kennedale (NE District) Traffic and Roads, Kennedale Fuel Station, Roads SW and Central Districts, FMS 47th Ave warehouse, Fleet Services Westwood facility, Ambleside Master Plan V1 including Parks and FMS Cornerstone programs and AMPV1 program revisions, City of Edmonton Tower, and the City of Edmonton Space Planning Guidelines.

Each section includes gross-up values, which accounts for circulation, walls, mechanical and electrical services, other building services, landscaping and hardscaping. These values were derived from previous programming analysis from Ambleside Master Plan V1 (refer to terminology on the right).

Operations Groups Colour Legend:


PARKS


FACILITY MAINTENANCE


ROADS


FLEET SERVICES


TRAFFIC (SIGNAGE + DETOURS)

NOTE: Line items that require particular attention from the Operations Groups include a ***bolded italicized*** comment

TERMINOLOGY:

Net Square Metres (NSM): Interior dimensions of a room as measured from inside wall surface of opposing wall(s); also includes site net square meters, which includes the boundary of a particular component

Component Gross Square Metres (CGSM): The total net plus allowance for wall thickness between rooms and for circulation within a given component (i.e. corridors used to access offices meeting rooms, reception areas, etc.)

Building Gross Square Metres (BGSM): The total gross area plus an allowance for general building circulation not within a component (stairs, elevator shafts), mechanical spaces (data rooms, utilidors, and utility rooms used to house furnaces, generators, etc.) and exterior wall thicknesses

Gross Square Metres (GSM): The total gross are of the site including gross-up factors of landscaping and hardscaping (roadways, circulation, sidewalks, etc.).

AMP2 - INTEGRATED OPERATIONS PROGRAM

NO	NAME	DESCRIPTION	INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
ADMINISTRATION						
1.1	ENTRY + RECEPTION					
	ENTRANCE / VEST.		1.0	15.0	15.0	
	LOBBY/WAITING	Includes waiting on main and second floor, main floor lobby and circulation	1.0	150.0	150.0	
	RECEPTION DESK	main floor reception desk	1.0	6.0	6.0	
		1.1 SUB-TOTAL			171.0	
1.2	OFFICES*					
1.2.1	WORKSTATIONS - DIRECTOR / SUPERVISOR / CLERK / DISPATCH / CONTRACT INSPECTOR / COORDINATOR / TECH	1 workstation w/ computer terminal, VOIP telephone, 1 lateral 4-drawer file cabinet -	111.0	6.0	666.0	Note: Traffic administration was not required per program requirements
		Parks	22.0			
		FMS	71.0			
		Roads	14			
		Fleet	4			
	WORKSTATIONS - FOREMEN	Open plan workstation with data drop for computer terminal, VOIP telephone, 1 lateral 4-drawer filing cabinet, task lighting	27.0	6.0	162.0	***Number of foremen is assumed and not confirmed. This is being used as a basis for design and should be confirmed by the Operations Group. Fleet foremen are included in Operations section as requested.***
		Parks	7.0			
		FMS	6.0			
		Roads	12			
		Traffic	2			
		1.2.1 Sub-Total	138.0		828.0	
1.2.2	HOTELLING - ADMIN	Touchdown Workstations	15.0	2.3	34.5	Per the Edmonton Tower precedent, 10% hotelling per staff count is provided as a basis for design Per program analysis, 57 hotelling stations are required for admin, foremen and crew touch down; Alternate hotelling for crew is proposed along main corridor b/w multipurpose, lockers + operations bays (see Staff Support section)
		1.2 SUB-TOTAL			862.5	
1.3	MEETING ROOMS	1.8 sq. m per person				
	MEETING ROOM (SM)	4-6 people	2.0	10.8	21.6	2 required per program review
	MEETING ROOM (SM)	8-10 people	5.0	18.0	90.0	7 required per program review
	MEETING ROOM (LG)	20 people	2.0	36.0	72.0	1 required per program review
	MEETING ROOM (LG)	30 people	3.0	54.0	162.0	4 required per program review
	NOW ROOM	Small Telephone Room	6.0	3.0	18.0	4% Now Rooms per open work stations per Edmonton Tower; (Towe Precedent: 106 open work stations; 4 Now stations; 1 Now Booth)
	NOW BOOTH	Small Meeting Room 2 - 4 People	2.0	7.2	14.4	
		1.3 SUB-TOTAL			378.0	***Meeting rooms are decreased as these spaces can be shared; there is also the opportunity to utilize the multifunctional rooms as alternate boardroom space; Operations Groups to confirm if further reductions are possible due to sharing capability.***
1.4	ADMIN SUPPORT					
	PRINT / COPY		2	30.0	60.0	The program analysis equates to 48 sq. m total required print/copy area; 60 sq. m is recommended per Edmonton Tower precedent; (Edmonton Tower: 2 print / copy @ 30 sq. m ea; 2 per 116 total staff)
	FILE STORAGE	Dispatch File Room; mobile high density shelving units	2	10.0	20.0	
	RESOURCE ROOM		1.0	20.0	20.0	
	STORAGE		2	5.0	10.0	
	REFRESHMENT AREA	appliances, sink, casework, seating	1	126.0	126.0	Per Edmonton Tower precedent, provide 50% per staff count
	WASHROOMS - MALE**		1.0	24.0	24.0	4 water closests required per the ABC 2014 Basis for Design: Edmonton Tower
	WASHROOMS - FEMALE**		1.0	28.0	28.0	4 water closests required per the ABC 2014 Basis for Design: Edmonton Tower
	STAFF CLOSET	Included in casework in Refreshement Area	3	2.0	6.0	
		1.4 SUB-TOTAL			294.0	
1.5	AUXILLARY / BUILDING SERVICES					
	JANITOR	Cart - Shelves for supplies storage - floor sink; Floor finish to be antiskid and easily cleaned	1.0	5.0	5.0	
	PUBLIC BARRIER FREE WASHROOMS		1.0	6.0	6.0	
		1.5 SUB-TOTAL			11.0	
		SUB TOTAL, NSM			**1,716.5**	
		Net to Gross Space Conversion Factor: 25%			429.1	
		SUB TOTAL, CGSM			**2,145.6**	
		Building Gross Up Conversion Factor: 25%			536.4	
		TOTAL ADMIN, BGSM			**2,682.0**	

Figure 3.8a: Integrated Program Summary - Administration

AMP2 - INTEGRATED OPERATIONS PROGRAM

NO	NAME	DESCRIPTION	INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
STAFF SUPPORT						
2.1	BRIEFING, TRAINING + LUNCH ROOM					***PEAK CREW ASSUMPTIONS FOR BASIS OF DESIGN:*** ***Parks: 80*** ***Roads: 125*** ***Traffic: 14*** ***Fleet: 40*** ***FMS: 79*** ***Total Peak: 340*** ***This assumption allows for cross over between shifts***
2.1.1	TRAINING / MULTIPURPOSE ROOM / LUNCH ROOM	150 person capacity per block; 450 total person capacity assumed for basis of design; 1.8 sq. m per person; Resilient flooring, acoustic ceiling, easily maintainable c/w durable finishes; daylighting + exterior access recommended; black-out blinds	3.0	270.0	810.0	This value accounts for 340 peak internal staff as well as additional space for external staff and/or spreading out for shift briefing purposes
	KITCHENETTE	Per divisible space: refigerator, microwaves, ice machine, lower casework, computer tower c/w secure lower casework, ceiling mounted projector and screens, pin up boards, wipeable 'whiteboard' wall finish, double basin sink; Per block: 3 vending machines	3.0	12.0	36.0	
	STORAGE ROOM	Vending Machine	3.0	5.0	15.0	
	STORAGE ROOM	Tables + Chairs	3.0	10.0	30.0	
	CATERING ROOM	Lowercase cabinets, refigerator, stove, dishwasher, double basi sink	3.0	15.0	45.0	
		2.1.1 Sub-Total			936.0	Divide into blocks; recommendation of 3 blocks
	WELLNESS ROOM	Rubber mats/flooring; Size per Roads Central District	2.0	64.0	128.0	
	HOTELLING	Locate hotelling as standing bench along main corridor; 500mm depth counter c/w power + data plug in; 85 stations total	75.0	1.7	123.8	Each station to allow for 1.1m wide x 1.5 m deep (includes .5m deep counter) = 1.65 per station Basis for design: FMS utilized 25% hotelling per staff count; 25% of total peak staff of 300 is recommended for a basis of design (Fleet mechanics have allocated hotelling in each bay); total hotelling to be confirmed by Owner
	KEY BOXES	Locate along main corridor; count and equipment type to be determined by Owner				
		2.1 SUB-TOTAL			1,187.8	
2.2	LOCKERS + CHANGE ROOMS					The basis for design proposes gendered lockers and washrooms; consideration should be given to shared lockers + gender neutral individual shower and barrier free washrooms within locker / change room block; If shared lockers are proposed, separate male / female change areas are required
	MALE					
	LOCKERS - MALE	24" x 24" X 72" H locker; benches;	449	1.85	830.7	Locker counts represents a full sized locker; half sized lockers are included in the total count
		PARKS	49.0			
		FMS	56.0			
		ROADS	300			
		FLEET	34			
		TRAFFIC	10			
	WASHROOMS - MALE**	Include vestibule within washroom design	1.0	36.0	36.0	Based on the program analysis, total male washrooms eqates to 165.3 sq. m. Per the ABC 2014, Table 3.7.2.2C for Industrial Occupancy, 11 male water closets are required (or 2 WC + 3 urinals) This considers 28 / 72 % female / male ratio split as a determined average of male / female across all groups;***the requirement to increase washrooms should be directed by the Operations Groups***
	SHOWERS - MALE		7.0	2.0	14.0	
	SHOWERS - MALE - BF	Barrier Free	1.0	4.0	4.0	
		MALE SUBTOTAL			884.7	
	FEMALE					
	LOCKERS - FEMALE	24" x 24" X 72" H locker; benches;	148.0	1.85	273.8	Locker counts represents a full sized locker; half sized lockers are included in the total count
		PARKS	40.0			
		FMS	23.0			
		ROADS	75			
		FLEET	6			
		TRAFFIC	4			

AMP2 - INTEGRATED OPERATIONS PROGRAM

NO	NAME	DESCRIPTION	INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
	WASHROOMS - FEMALE**	Include vestibule within washroom design	1.0	40.0	40.0	Based on the program analysis, total female washrooms eqates to 115 sq. m. Per the ABC 2014, Table 3.7.2.2C for Industrial Occupancy, 5 female water closets are required. This considers 28 / 72 % female / male ratio split as a determined average of male / female across all groups;***the requirement to increase washrooms should be directed by the Operations Groups***
	SHOWERS - FEMALE		5.0	2.0	10.0	
	SHOWERS - FEMALE - BF	Barrier Free	1.0	4.0	4.0	
		FEMALE SUBTOTAL			327.8	
		2.2 SUB-TOTAL			1,212.5	
		Circulation gross-up (30%)			363.7	
		2.2 SUB-TOTAL			1,576.2	Divide into blocks; recommendation of 3 blocks
2.3	CLEANING + JANITOR					
	LAUNDRY AREA	1 commercial grade washer and 1 commercial grade dryer (220 VAC power supply required - Counter; Floor finish to be antiskid and easily cleaned	3.0	10.0	30.0	
	MUD ROOM	Grated walk-off mat; hose-down area; laundry dry rack; laundry sink; Floor finish to be antiskid and easily cleaned	3.0	10.0	30.0	
	JANITOR	Cart - Shelves for supplies storage - floor sink; Floor finish to be antiskid and easily cleaned	3.0	5.0	15.0	
		2.3 SUB-TOTAL			75.0	
		Circulation gross-up (30%)			22.5	
		2.3 SUB-TOTAL			97.5	Divide into blocks; recommendation of 3 blocks
		SUB TOTAL, CGSM			**2,861.4**	
		Building Gross Up Conversion Factor: 25%			715.4	Includes non-internal circulation, exterior walls + building services
		TOTAL STAFF SUPPORT, BGSM			**3,576.8**	

Figure 3.8b: Integrated Program Summary - Staff Support

AMP2 - INTEGRATED OPERATIONS PROGRAM

NO	NAME	DESCRIPTION	INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
OPERATIONS SHOPS, FLEET STORAGE + VEHICLE MAINTENANCE						
3.1	CENTRAL STORES					
	CENTRAL LOADING + RECEIVING	16' X 16' Overhead Door	1.0	50.0	50.0	
	STORAGE AREA	typical to oversized shelving	1.0	853.8	853.8	***Per the program analysis, storage area equates to 853.8 sq. m for Central Stores. The recommendation is to utilize this as a basis of design and reduce storage area as recommended by the Operations Groups***
	RECEPTION / VESTIBULE	reception counter; secure point; included in Storage Area	1.0	10.0	10.0	
	WORKSTATION/OFFICE	required to be a closed office due to dust and debris	1.0	6.0	6.0	
		3.1 SUB-TOTAL			919.8	Central Stores should be maintained as one program space in an integrated facility
3.2	WORKBAYS					
3.2.1	PARKS					
	Standard Fabrication Bay	16' x 16' Overhead Door; includes tool crib + material storage; 2 b	10.0	120.0	1200.0	
		Turf Materials Storage	1.0	47.0	47.0	
		Turf Tool Crib	1.0	15.0	15.0	
	Drive Through Bay	16' x 16' Overhead Door; Forestry	2.0	252.0	504.0	
		Forestry Materials Storage	1.0	47.0	47.0	
		Forestry Tool Crib	1.0	15.0	15.0	
		3.2.1 Sub-Total	16.0		1828	
3.2.2	FACILITY MAINTENANCE					
	Standard Fabrication / Maintenance Bay	16' x 16' Overhead Door; includes tool crib + material storage; open bays; 1 bay ea: Refigeration, Plumbing, Air Handling, Electrical, Roofing	5.0	180.0	900.0	20m x 9m bay
		3.2.2 Sub-Total			900	
3.2.3	ROADS					
	Standard Blade Change Bay	16' x 16' Overhead Door; includes tool / material storage in bay area; blade change	2.0	120.0	240.0	
	Standard Vehicle Storage	16' x 16' Overhead Door	29.0	120.0	3,480.0	***The overall number of bays is proposed to be reduced to 75% of 38 bays. Per the program analysis, 38 single bays are required for vehicle storage. Existing Roads bay varry in length from 13 m to 16m long. Median lengh equates to 14.5. Based on the median length, 3 existing bay lengths are comparable to two proposed bay lengths. As such, the standard bay can store the equipment as 1.38 bays. Roads Operations Group to review and confirm if assumptions are ok.***
	Standard Storage Bay	16' x 16' Overhead Door; 1 Auxillary + 1 Bridge bay	2.0	120.0	240.0	
	Dirve Through Bay	16' x 16' Overhead Door	2.0	252.0	504.0	Reduced to two pull through bays as Roads users noted drive through is not a requirement
		3.2.3 Sub-Total	35		4464	
3.2.5	FLEET					
	Light Repair Bay	16' x 16' Overhead Door	7.0	72.0	504.0	12m x 6m bay (per Westwood facility)
	Light Aisle Circulation	18' h X 16'w speed rolling overhead door	1.0	616.0	616.0	6m wide (per Westwood facility precedent)
	Heavy Repair Bay	16' x 16' Overhead Door	10.0	91.2	912.0	12m x 7.6m bay (per Westwood facility)
	Heavy Aisle Circulation	18' h X 16'w speed rolling overhead door	1.0	964.0	964.0	8m wide (per Westwood facility precedent)
	Lube Storage Bay	16' x 16' Overhead Door	1.0	72.0	72.0	12m x 6m bay
	Storage		1.0	533.0	461.0	
	Fleet Administration	1 LVB Foreman, 1 HVB Foremen,	2.0	6.0	12.0	
		3.2.5 Sub-Tota			3541	
3.2.3	TRAFFIC					
	Standard Fabrication Bay	16' x 16' Overhead Door; includes tool crib + material storage	1.0	120.0	120.0	
		3.2.3 Sub-Total			120.0	
		3.2 SUB-TOTAL			10,853.0	
3.3	WORKSHOPS					
	FMS					
	Carpentry Shop	16' x 16' Overhead Door; drive through capacity requested; enclosed; dedicated to FMS	4.0	120.0	480.0	
	Paint	16' x 16' Overhead Door; enclosed; included flamable storage; dedicated to FMS	1.0	180.0	180.0	***Integrated Site Recommendation: FMS operated shop for all group; FMS Operations Group to review and comment on whether this could be a consideration for a future integrated site***
	Locksmith	Dedicated to FMS	1.0	120.0	120.0	
	FLEET					
	Welding	OH Door: 16' W x 16' H	2.0	72.0	144.0	
	Small Engine Repair	OH Door: 16' W x 16' H	1.0	72.0	72.0	
	Oil Change	OH Door: 16' W x 16' H	2.0	72.0	144.0	
	Fleet Administration	1 Oil Change Foreman	1.0	6.0	6.0	
	SHARED WORKSHOP					

Figure 3.8c: Integrated Program Summary - Operations, Fleet Storage, and Vehicle Maintenance

AMP2 - INTEGRATED OPERATIONS PROGRAM

NO	NAME	DESCRIPTION	INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
	Workshop	floor drain; specialized ventilation; workbenches/ casework; secure storage (materials + tools); equipment; enclosed;1 6' W x 16' H overhead exterior door; 3 x 10' x 10' interior doors; overhead 115 VAC power	1.0	150.0	150.0	Per program analysis, Parks requires 112 sq. m; Roads requires 120 sq. m. Proposed shared workshop of 150 sq. m; ***Recommended alternate option: operate 1 workshops managed by FMS (alternate to be reviewed and confirmed by FMS). Basis for design currently proposes two workshops (1 shared; 1 carpentry dedicated to FMS)***
	General Shop	floor drain; interceptor; specialized ventilation; workbenches/ casework; secure storage (materials + toos); equipment; 16' W x 16' H overhead exterior door; 10' x 10' interior door; overhead 115 VAC power	1.0	120.0	120.0	
		3.3 SUB-TOTAL			1,416.0	
3.4	STORAGE					
	OVERSIZED STORAGE	secure and enclosed	1.0	200.0	200.0	
	HAZARDOUS WASTE	secure; ventilated; exterior wall; enclosed	1.0	20.0	20.0	
		3.4 SUB-TOTAL			220.0	
3.5	SAFETY					
	FIRST AID		1.0	20.0	20.0	
		3.5 SUB-TOTAL			20.0	
3.6	WASHBAY					
	Washbay	16' x 16' overhead doors; drive-through capability; chlorinated oversized water line(s) c/w valved quick connects; oversized water hose(s) c/w wall mounted storage hook(s); drainage trench c/w oil interceptor; mezzanine cat-walk both sides c/w stairs; compressed air; enclosed w solid walls resistant to water damage	2.0	312.0	624.0	***Operations Groups to review and confirm if two drive through washbays (as illustrated in the standardization diagrams) will suite the needs of an integrated site***
	Washbay Equipment	Vacuum equipment	2.0	2.0	4.0	
	Washbay Equipment Room	Pressure washing equipment	2.0	15.0	30.0	
					658.0	
		SUB TOTAL, NSM			**14,086.8**	
		Net to Gross Space Conversion Factor: 20%			2,817.4	
		OPERATIONS SUB TOTAL, CGSM			**16,904.2**	
		Building Gross Up Conversion Factor: 15%			2,535.6	Proposed reduction to gross up from 25% to 15% as many operations spaces do not require additional circulation
		TOTAL OPERATIONS SHOPS, BGSM			**19,439.8**	
		TOTAL BUILDING, BGSM			**25,698.6**	
		MAIN FLOOR GROSS			23016.8	
		SECOND FLOOR GROSS			2682.0	Recommendation for second floor administration; consider at grade reception / waiting

AMP2 - INTEGRATED OPERATIONS PROGRAM

NO	NAME	DESCRIPTION	INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
YARD						
5.1	EXTERIOR WORK AREA					
	FABRICATION	Included in Yard Circulation				
		5.1 SUB-TOTAL				
5.2	STAFF GATHERING					
	MUSTER	Included in Yard Circulation				
	TRAINING	Included in Yard Circulation				
		5.2 SUB-TOTAL				
5.3	AGGREGATE STORAGE					
5.3.1	AGGREGATE BINS	Overall dim: 12.0 m x 11.2 m; interior clearance 10.0 m min.; loading clearance required: 13m				
	ORGANICS	Trees, branches, etc.; shared	1.0	127.0	127.0	
	20mm GRAVEL	Shared	2.0	127.0	254.0	
	SAND	Shared	1.0	127.0	127.0	
	WASTE/APPLIANCES	Shared	2.0	127.0	254.0	
	PARKS					
	MULCH/CHIPS		1.0	127.0	127.0	
	LOAM		1.0	127.0	127.0	
	ROADS					
	OIL MIX		3.0	127.0	381.0	
	PAP		1.0	127.0	127.0	
	SWEEPINGS		1.0	127.0	127.0	
	25 mm RECYCLED CONCRETE		1.0	127.0	127.0	
	PEA GRAVEL		0.5	127.0	63.5	
	BLACK DIRT		0.5	127.0	63.5	
	EZ STREET		0.5	127.0	63.5	
	MASONRY SAND		0.5	127.0	63.5	
	RED SHALE ROCK		0.5	127.0	63.5	
		5.3.1 Sub total	16.5		2095.5	
	ROADS					
5.3.2	SAND PILE	Covered (i.e. sprung or canvas structure); Dedicated to Roads	1.0	250.0	250.0	Capacity to be confirmed during Schematic Design
5.3.3	SALT DOME	Enclosed structure; 1,300 ton capacity; Dedicated to Roads	1.0	250.0	250.0	Capacity to be confirmed during Schematic Design
		5.3 SUB-TOTAL			2595.5	
5.4	BULK STORAGE (OPEN)					
5.4.1	PALLET / BULK STORAGE					
	PARKS	Asphalt laydown area; secure	1.0	1220.0	1220.0	
	FMS	C-can storage	1.0	100.0	100.0	
	ROADS	Asphalt laydown area; secure	1.0	2434.0	2,434.0	
	FLEET	Asphalt laydown area; secure	1.0	100.0	100.0	
	TRAFFIC	Asphalt laydown area; secure	1.0	7262.0	7,262.0	
		5.4.1 Sub Total			11116.0	
5.4.2	GARBAGE BINS	40 yard bins; asphalt area				
	STEEL	Shared	1.0	40.0	40.0	
	ALUMINUM	Shared	1.0	40.0	40.0	
	RECYCLING	Shared	1.0	40.0	40.0	
	FLEET					
	RECYCLING		2.0	40.0	80.0	
	WASTE		2.0	40.0	80.0	
	STEEL		1.0	40.0	40.0	
	FILTER		1.0	40.0	40.0	
		5.4.2 Sub Total	9.0		360.0	
5.4.3	SANDER RACKS	Roads; 3.785 m W each unit; 138m lineal m required	37.0	13.0	481.0	
		5.4 SUB-TOTAL			11957.0	
5.5	YARD SUPPORT / MISC. MATERIALS	Roads				
	DE-ICING	Containment Compound	1.0	46.8	46.8	
	CALCIUM CHLORIDE	6m W x 16.8m L; exterior concrete pad c/w drainage; adjacent to de-icing equipment	2.0	102.5	205.0	
	BLUE USED OIL TANK		1.0		5.0	
	CONTAINMENT STORAGE AREA		1.0		6.0	
		5.5 SUB-TOTAL			262.8	
5.6	COVERED STORAGE					
	COLD STORAGE	Secure storage; Parks (fertilizer, etc.)	1.0	340.0	340.0	
	COVERED STORAGE	Blade change; compressed air, water; Parks	1.0	200.0	200.0	
	COLD STORAGE	Secure storage; FMS	1.0	220.0	220.0	
	COLD STORAGE	Secure storage; Roads	1.0	200.0	200.0	
	COVERED STORAGE	Secure storage; Fleet	1.0	17.0	17.0	
	HAZARDOUS SHED - Shared	Secure storage for hazardous materials; shared	1.0	30.0	30.0	

AMP2 - INTEGRATED OPERATIONS PROGRAM

NO	NAME	DESCRIPTION	INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
5.7	SECURE VEHILCE PARKING					
	STALL A - 4.5 m x 11 m	Oversized vehilces; asphalt parking; one stall c/w concrete curbs for herbicide containment	**8.0**	67.5	540.0	
		Parks	4.0			
		Fleet	4.0			
	STALL B - 4.75 m x 8.8 m	Tractors, chippers, 1/2 ton, 1 ton, 2 ton	**54.0**	60.0	3240.0	
		Parks	29.0			
		Fleet	25.0			
	STALL C - 3.0 m x 6.0 m	Skid steer, stump grinder, trailers	**186.0**	30.0	5580.0	
		Parks - 1/2 ton - 1 ton trucks; parked inside or outside	52.0	30.0	1560.0	
		Parks - Skid steer, stump grinder, trailers; parked outside	11.0	30.0	330.0	
		FMS - Utility Vans	70.0	30.0	2100.0	
		Roads - Fleet Trucks	6.0	30.0	180.0	
		Fleet	41.0	30.0	1,230.0	
		Traffic - Fleet Trucks	6.0	30.0	180.0	
	STALL D - 5.0 m x 6.0 m	Mowers	**10.0**	50.0	500.0	
		Parks	10.0			
		5.7 SUB-TOTAL	**258.0**		**9860.0**	
5.8	YARD MISCELLANEOUS					
	GARBAGE / RECYCLING BINS	Included in yard circulation				Design is to meet COE Bylaw
	YARD CIRCULATION	Yard circulation value per Integrated Option plan analysis			26000.0	
		5.8 SUB-TOTAL			26000.0	
		YARD SUB TOTAL, NSM			**51682.3**	
		Landscape / Buffer Gross-Up (25%)			12,920.6	
		YARD TOTAL, GSM			**64602.9**	

Figure 3.8d: Integrated Program Summary - Yard

AMP2 - INTEGRATED OPERATIONS PROGRAM

NO	NAME	DESCRIPTION	INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
LIGHT VEHICLE PARKING						
6.1	VISITOR PARKING					
	STANDARD STALL - 2.6m x 5.5m		**44.0**	23.4	1029.6	
		Parks	24.0			
		FMS	9.0			
		Roads	6.0			
		Fleet	5.0			
		Traffic	0.0			
	BARRIER FREE STALLS 3.7m x 5.5m		**2.0**	33.3	66.6	
		6.1 SUB-TOTAL	**46.0**		**1096.2**	
		VISITOR VEHICLE PARKING, NSM			**1096.2**	
		Landscape / Buffer Gross-Up (25%)			274.1	
		Roadways / Hardscape Gross-Up (35%)			383.7	
		VISITOR VEHICLE TOTAL, GSM			**1753.9**	
6.2	PERSONAL VEHICLE PARKING					
	STANDARD STALL - 2.6m x 5.5m		**413.0**	23.4	9664.2	
		Parks	140.0			
		FMS	127.0			
		Roads	78.0			
		Fleet	62.0			
		Traffic	6.0			
	BARRIER FREE STALLS 3.7m x 5.5m		**7.0**	33.3	233.1	
		6.2 SUB-TOTAL	**420.0**		**9897.3**	
6.3	MOTORCYCLE PARKING STALLS		10.0			
6.4	BICYCLE PARKING / COVERED STORAGE					
		PERSONAL VEHICLE SUB TOTAL, NSM			**9897.3**	
		Landscape / Buffer Gross-Up (25%)			2,474.3	
		Roadways / Hardscape Gross-Up (35%)			3,464.1	
		PERSONAL VEHICLE TOTAL, GSM			**15835.7**	

Figure 3.8e: Integrated Program Summary - Light Vehicle Parking

AMP2 - INTEGRATED OPERATIONS PROGRAM

NO	NAME	DESCRIPTION	INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
SITE SERVICES						
7.1	FUEL STATION					
	FUEL ISLANDS	3 pumps per island; 7m aisle width 3m x 44m island	3.0	139.0	417.0	
	STORAGE TANK - GASOLINE	Underground gasoline tank preferred; 100,000 litre capacity; Basis for programming: 3m dia x 15.080m length tank; clearance assumed at 50% tank dia.; excavation dimension: 6m x 18.08m	1.0	108.5	108.5	
	STORAGE TANK - DIESEL	Underground diesel tank perferred; 100,000 litre capacity; Basis for programming: 3m dia x 15.080m length tank; clearance assumed at 50% tank dia.; excavation dimension: 6m x 18.08m	1.0	108.5	108.5	
	GENERATOR + WINDSHIELD FLUID TANK BU	Building for generator and fuel monitoring system; washer fuild 1360 litre capacity; 1 barrier free WC; Note: Kennedale Fuel Facility Central Fuel Building utilized as basis for programming	1.0	38.0	38.0	
	DEF DISENSING SYSTEM	1900 litre capacity; tank dim: 1.250 x 2.0 m; locate on concrete pad: 2.5 m x 3.25	1.0	8.1	8.1	
	AISLE	44m L x 7m width	4.0	308.0	1,232.0	
		7.1 SUB-TOTAL			1912.1	
7.2	TOUCHLESS CARWASH					
	WASHBAY - TOUCHLESS	For City-Wide Fleet use as well as exteral clients For light vehicles (trucks, cars)	1.0	176.0	176.0	
	SERVICES	Equipment rooms, mechanical / electrical	1.0	48.0	48.0	
	ACCESS DRIVE AISLE	14 m L x 8 m W	2.0	112.0	224.0	
		7.2 SUB-TOTAL			448.0	
		SITE SERVICES, NSM			**2360.1**	
		Landscape / Buffer Gross-Up (25%)			590.0	
		Roadways / Hardscape Gross-Up (85%)			2,006.1	Per precedent analysis, significant gross-up for the fuel station is required considering large turning radius and movement of heavy vehicles
		SITE SERVICES TOTAL, GSM			**4956.2**	
		TOTAL PROGRAM			**112847.3**	

NOTES:

* Size / configuration to be per the City of Edmonton Space Standards

** Size / configuration / quantity to be per the Alberta Building Code

*** Size / configuration / quantity to be per the City of Edmonton Zoning / Land Use Bylaw

** Per the Alberta Building Code 2014, Industrial Occupancy, Table 3.7.2.2C requires 9 water closets per each sex, considering a total staff count of 340 @ 50%

Staff Female to Male Ratios:

Parks: 45% Female, 55% Male
Roads: 25% Female; 75% Male
FMS: 28% Female; 72% Male
Traffic: 29% Female; 71% Male
Fleet: 15% Female; 85% Male
Average: 28 % Female: 72% Male

Considering a staff split of the average, 11 male water closets + 5 female water closets are required. Per ABC 2014, 2 water closests + 3 urinals are required for males

Figure 3.8f: Integrated Program Summary - Fuel Station

4.0

Figure 4.1a: AIS Site Context Plan

4.1 INTRODUCTION

A series of Test Fits were designed and analyzed for the Ambleside Integrated Site (AIS) using the integrated optimization strategies and integrated program as outlined in Section 3.0. Two series of Test Fits were presented to and discussed with the stakeholders, the first being on July 28, 2017 to the CoE AIS Steering Committee and the second on November 15th, 2017 to the Operations Groups representatives. The Test Fit selected on November 15, 2017 by the Operations Groups representatives was presented again on December 15, 2017 to the CoE AIS Steering Committee. The purpose of these Test Fits was to explore building configuration, operation group distribution, relative cost and optimized site layout. All the Test Fits were evaluated and compared using the planning principles discussed in Section 3.4. The intent of the presentations was to solicit stakeholder feedback on the project priorities with the end goal of achieving the optimal scheme for the Ambleside site balancing program requirements with site coverage and functionality.

The following section presents these Test Fits. The optimal scheme, as selected by the CoE stakeholders, Test Fit 5B, can be found in Section 5.0.

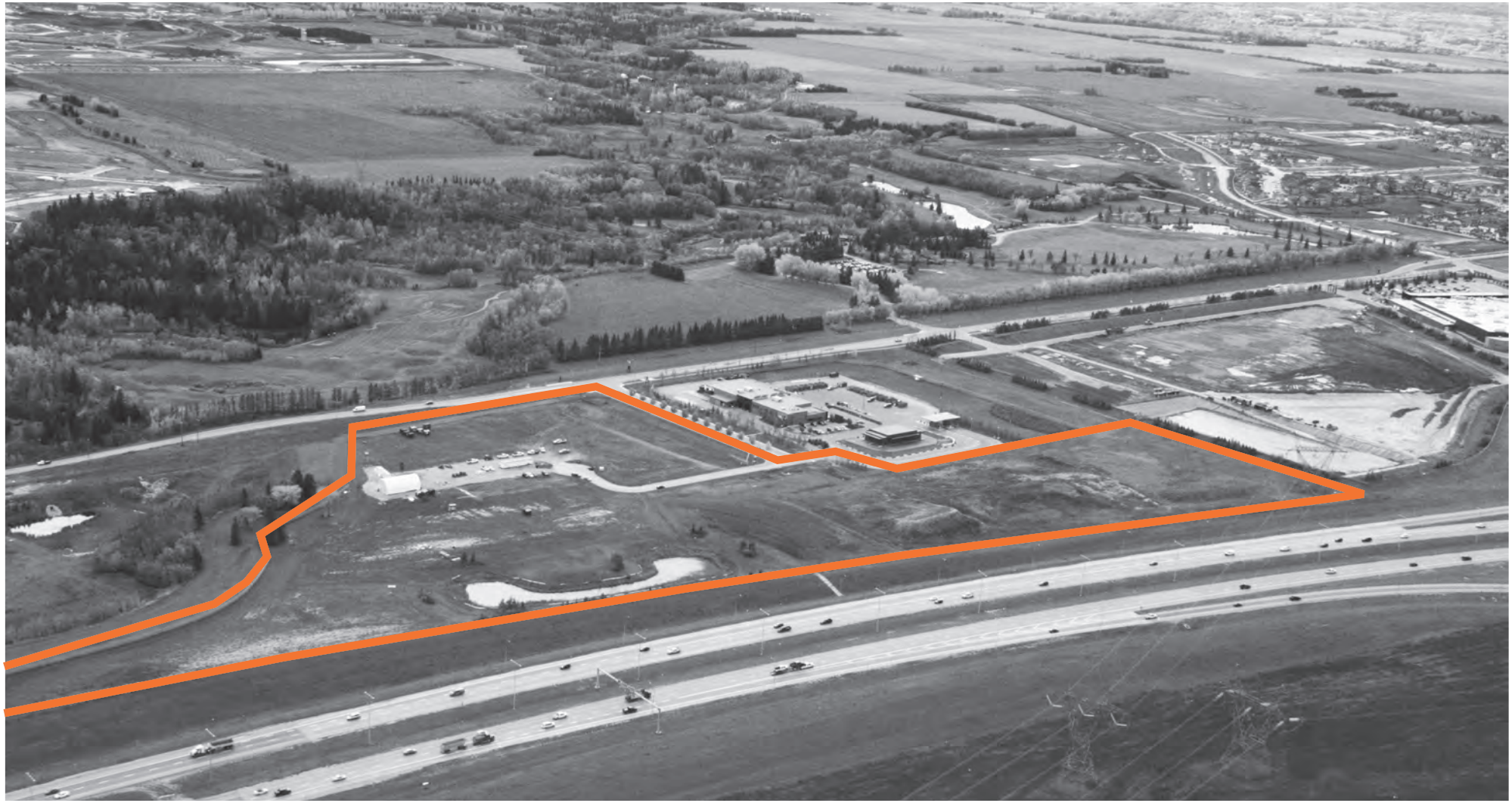


Figure 4.1b: AIS Site Context Plan

4.2 EXISTING SITE CONDITIONS

INFRASTRUCTURE (refer to Figure 4.2a)

Existing Roadways and Surface Utilities:

The AIS is bordered by Anthony Henday to the North and Ellerslie Road to the South. An existing boulevard was constructed as part of the Eco Station project which provides access into the site from Ellerslie Road. A roadway and cul-de-sac provides access from the boulevard to the East part of the site and to a temporary Park's facility trailer and storage quonset. Underground power, storm sewer, sanitary sewer lines, and light standards have been installed along the roadway with connections provided to the trailer and quonset. An underground fiber optic cable runs from the North of the site to the Eco Station and the trailer.

Utility Right-of-Ways (R.O.W.):

Three existing utility right-of-ways run through the site:

South Edmonton Sanitary Sewer (S.E.S.S.) R.O.W.: The S.E.S.S. is a large deep sewer line that runs diagonally across the site within a 10m wide R.O.W. approximately 30m below grade. There is an existing agreement to build on this R.O.W. for the CoE Snow Dumping Facility to the West however, currently no such agreements exists for the AIS site. See Section 5.2 for more information. (R/W PLAN 142 2246 - No URW Registered).

Drainage R.O.W.: A 6m drainage easement runs east to west across the site allowing for water from across the site to drain into the storm water retention pond and from the pond into the ravine. No structures are to be constructed over this R.O.W.. (R/W PLAN 082 5133 - URW NO. 082 346 149).

Altalink R.O.W.: Overhead power lines run within the 50m Altalink R.O.W. along the Western edge of the site adjacent to the Eco Station. (R/W PLAN 822 2847 - URW NO. 002 300 936)

ENVIRONMENT (refer to Figure 4.2b)

Wind:

The predominant wind on the site is out of the West and Northwest with wind speeds varying between 0-8m/s.

Sun:

On the longest day in Edmonton sunrise occurs at 5:02am and sets at 10:09pm. On the shortest day the sun rises at 8:52am and sets at 4:13pm. The highest solar altitude is 60 degrees in the summer and a lowest is 13 in the winter.

Views:

The site is perched on the edge of the Whitemud Creek Ravine which allows for views overlooking both the Jagare Ridge Golf Course to the south and Whitemud Creek Ravine to the East.

Noise:

The largest amount of noise on the site is created by traffic on Anthony Henday Drive. Although the site is elevated from the roadway creating a natural sound barrier, traffic noise pollution is still an issue that needs to be considered on this site.

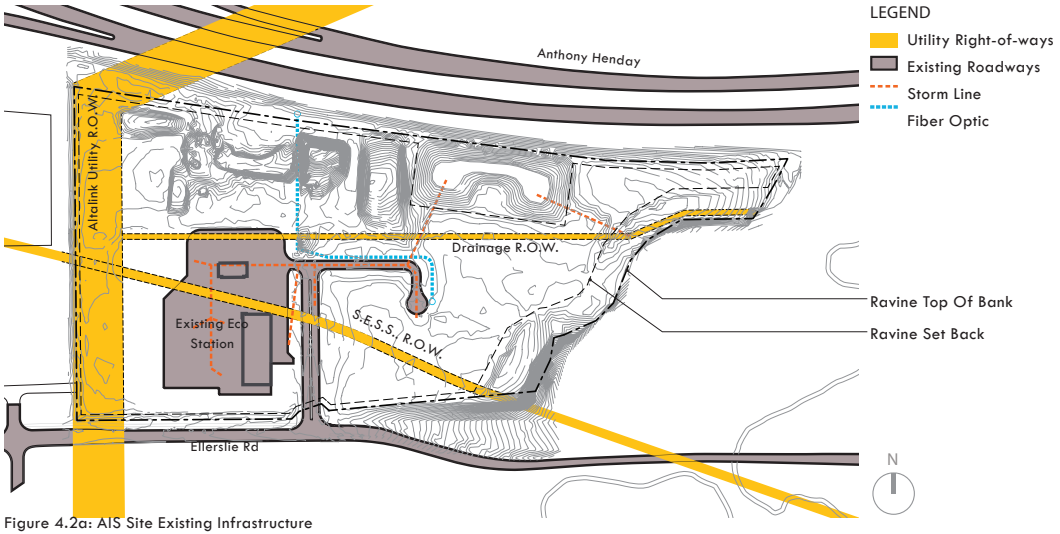


Figure 4.2a: AIS Site Existing Infrastructure

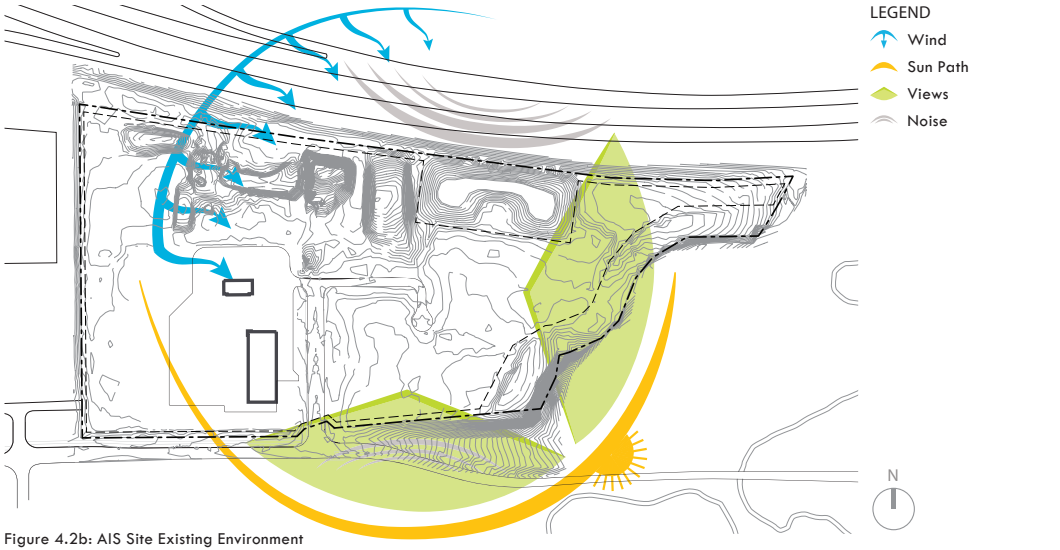


Figure 4.2b: AIS Site Existing Environment

LAND USE (refer to Figure 4.2c)

Based on the CoE Zoning Bylaw No. 12800, the AIS is zoned as Public Utility (PU). The majority of the area surrounding the site is zoned as Agricultural Zone (AG) except for the area directly to the East of the site, abutting the Whitemud Creek Ravine, which is zoned as Metropolitan Recreation Zone (A).

The purpose of the Public Utility Zone is to provide for a system or works that is used to provide for public consumption, benefit, convenience or use such as water or steam, sewage disposal, public transportation, irrigation, drainage, fuel, electric power, heat, waste management and telecommunications.

The purpose of the Agricultural Zone is to conserve agricultural and rural land use activities.

The purpose of the Metropolitan Zone is to preserve natural areas and parkland along the river, creeks, ravines and other designated areas for active and passive recreational uses and environment protection in conformance with Plan Edmonton and the North Saskatchewan River Valley Area Redevelopment Plan.

For more information on land use refer to Appendix C.2.

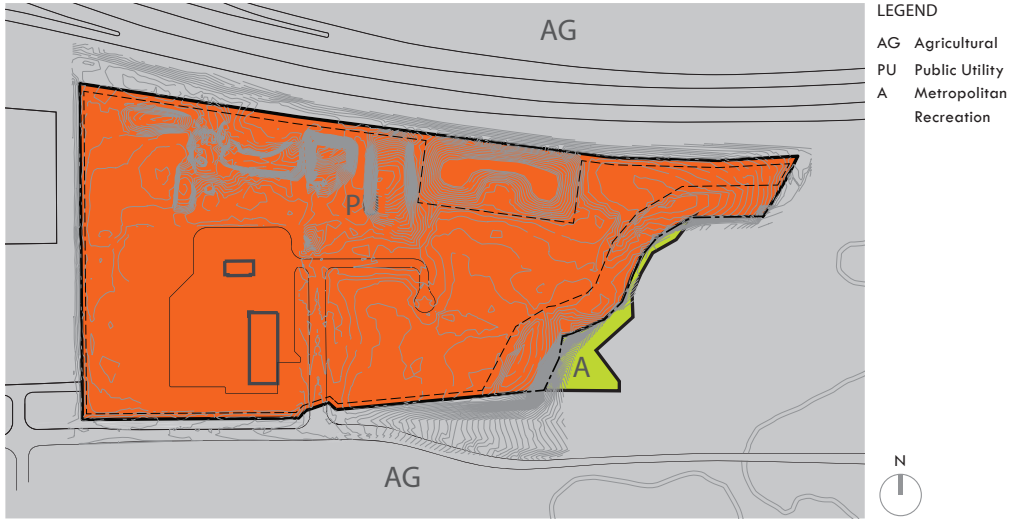


Figure 4.2c: AIS Site Land Use

LANDSCAPING AND SITE FEATURES (refer to Figure 4.2d)

The existing site has previously been graded and is relatively flat. The predominant landscape and site features on the AIS are:

Soil Mounds

Four soil mounds are located in the Northwest area of the site. These soil mounds were dumped on the site as a result of a previous project. The CoE will be responsible for any costs associated with the removal of the soil.

Retention Pond

The existing retention pond was constructed on the Northern edge of the site as part of a site-wide water management strategy. Water from across the site, including the Eco Station, is piped in underground storm lines to the pond where the water is naturally filtered and drains into the Whitemud Ravine. The banks of the pond have been landscaped with shrubs and trees and it is surrounded by a small landscape fence. The retention pond was designed in 2007 and constructed in 2011. The City of Edmonton Design Standards were updated in 2015 and the retention pond no longer meets the minimal requirements. Additional capacity for stormwater is required for the development of the Ambleside site.

Whitemud Ravine And Creek

The Whitemud Creek and Ravine runs along the Eastern edge of the site. The steep-banked ravine acts as an important wildlife corridor and public amenity area within the city. This environmental resource supports "a wide variety of plant communities providing a diversity of habitat for local bird species and larger mammalian wildlife." The adjacency to the Ravine provides opportunities for views of the ravine and its treed banks as well as a connection to the neighbourhoods to the North via a pedestrian and wildlife tunnel under Anthony Henday Drive.

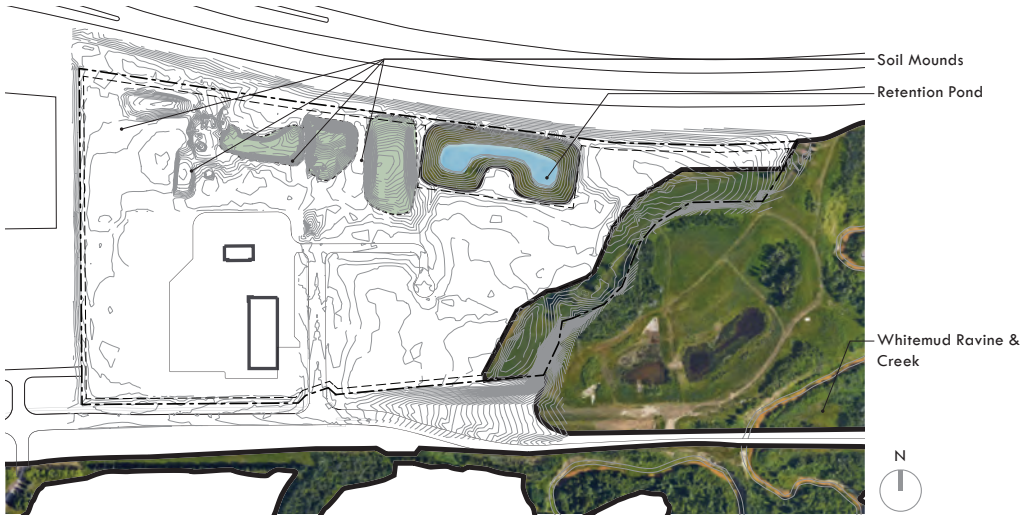


Figure 4.2d: AIS Site Landscaping and Site Features

AMBLESIDE SITE CONSIDERATIONS (refer to Figure 4.2e)

The key considerations during design include the drainage R.O.W. where no facility construction is allowed, a 33m Top-of-Bank setback has been imposed along the East property line where no site storage or parking can be situated, and the storm water pond, which due to a change in City of Edmonton standards in 2015, no longer meets the minimal criteria. Currently no agreement has been established between the utility owner and the City in terms of constructing over the S.E.S.S. utility right-of-way; however, an agreement is registered for the adjacent property to the West. A proposed secondary access roadway has been designed around the existing Eco Station to provide duel access to the integrated facility and fuel station and has yet to receive approval for construction. The AltaLink utility R.O.W. has been identified as a potential area for yard storage materials, but would require the approval of AltaLink L.P. With these considerations, the remaining developable land is approximately 92,140 m^2 with a stormwater pond approximately 11,090 m^2 in size.

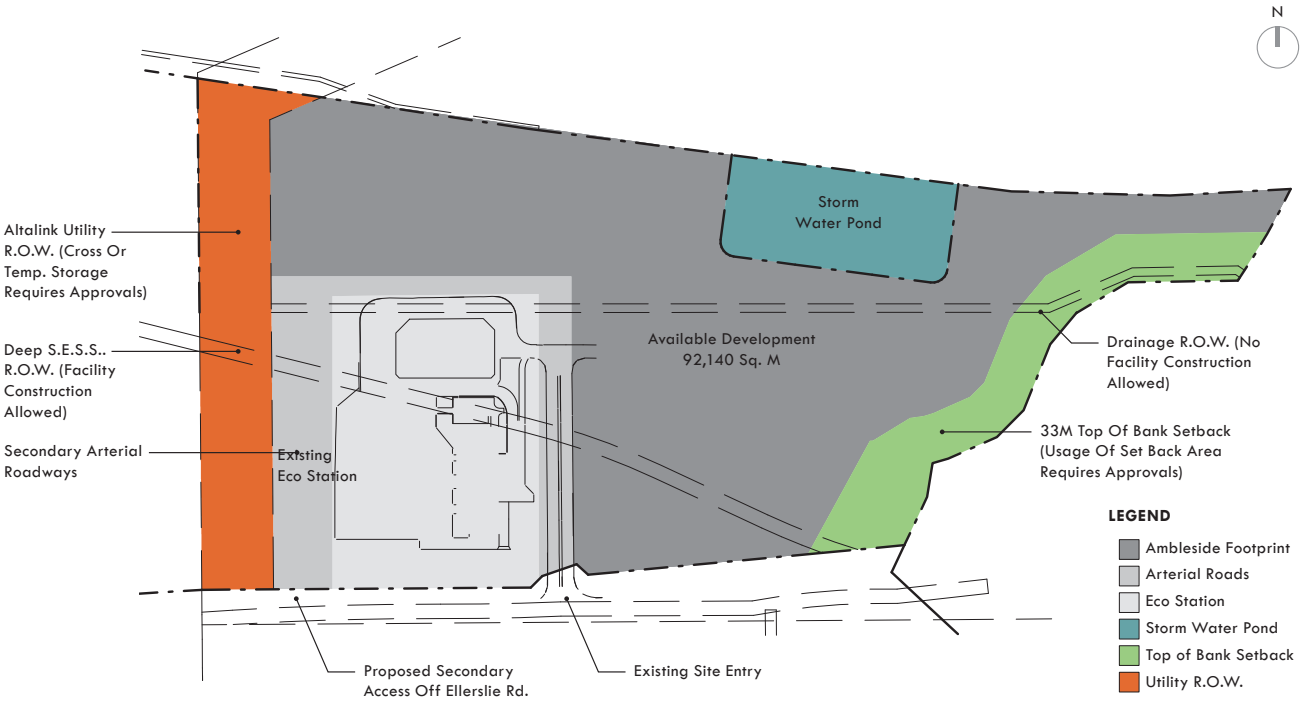


Figure 4.2e: Ambleside Site Summary

4.3 STAKEHOLDER PRESENTATION 1

Following analysis of the integrated strategies and conceptual schemes (refer to Section 3.0), the design team prepared a presentation for the CoE AIS Steering Committee on July 28, 2017. In addition to the Integrated Planning and Programming analysis, four Test Fits, each with a unique strategy for building program, form, and site layout, were presented and discussed with the intention of arriving at a final scheme for the Master Plan that meets the needs of all the various Operations Groups.

This study provides the evidence that an integrated model benefits the City and City Operations fiscally and in terms of efficiency, flexibility and future adaptability. Previously, City Operations have developed independent facilities. In reviewing the independent program compared to an integrated program, there are illustrated reductions in overall program square footage while continuing to meet comparable requirements. This is due to shared program and site amenities, ranging from meeting rooms to site circulation. This means that the facilities are more efficiently occupied and the City doesn't require the same amount of land or capital costs for development.

Figure 4.3a, as presented to the City Operation groups on July 28, 2017, provides an overview comparison between the total independent program area to an integrated operations program area. The total individual Operations Groups program amounts to 138,300 square metres while the same program requirements can be achieved in 115,000 square metres through an integrated model due to the sharing strategies developed in Section 3.0. Another added benefit of the integrated program is the standardization, that allows the facility to adapt and change as the needs of the Operations Groups change. In this model, any person can sit at a desk or use a locker, and the operations bays have been optimized to serve the needs of the majority of the Operations Groups (Fleet was determined to have some variances in bay typologies compared to the other groups). Applying of theory across multiple spaces provides the City flexibility with future planning and development of integrated sites.

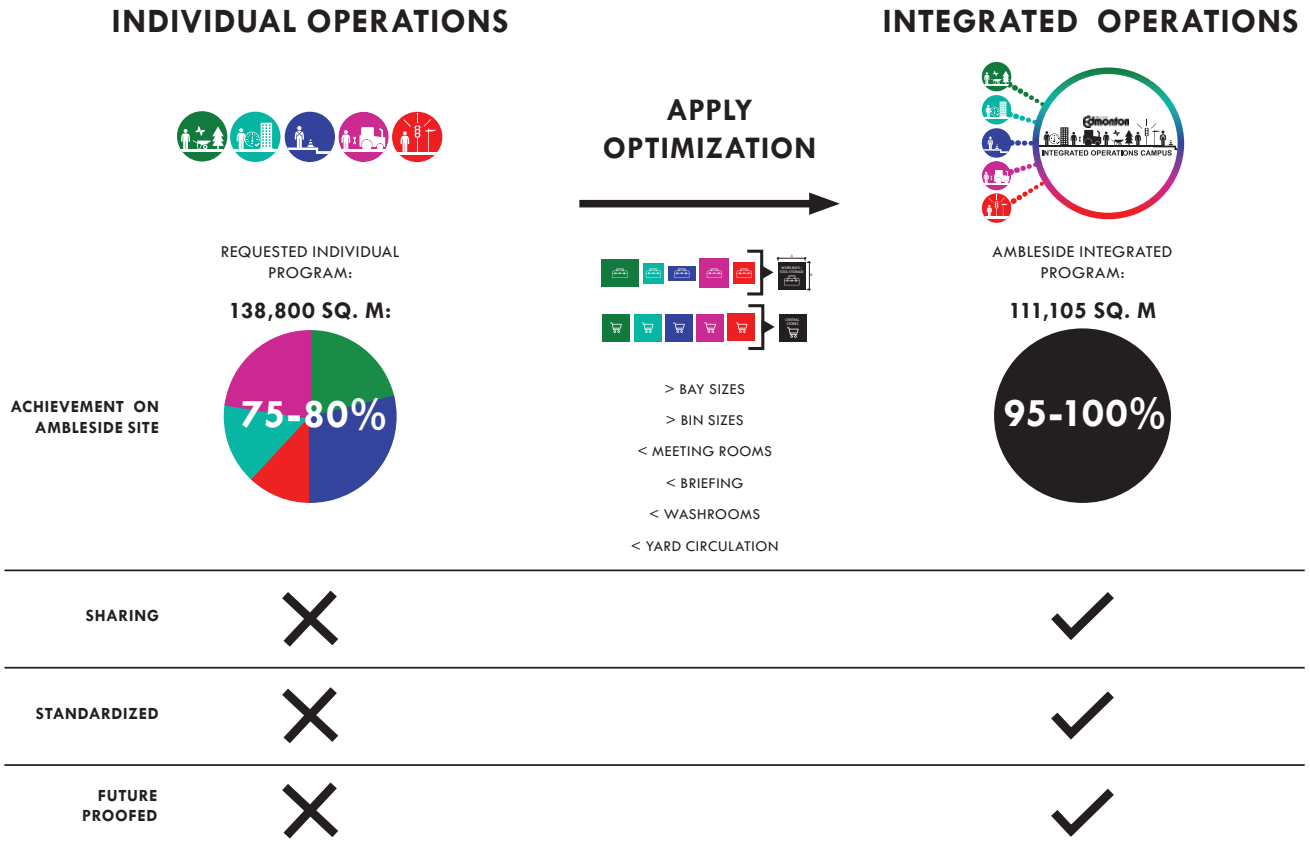


Figure 4.3a: Individual vs. Integrated Operations Program Area Comparison

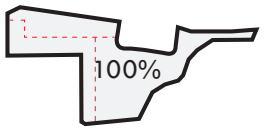
TEST FIT 1

Test Fit 1 is the highest density test fit accommodating all five program groups where Fleet has been allocated to a separate facility. As Fleet was determined to have different requirements in terms of standardization for maintenance bays and access aisles, this proposed scheme shows the potential for Fleet to operate as a separate facility on the same integrated site. FMS, Parks, Roads and Traffic remain as an integrated facility, sharing services where appropriate and with standardized space types. Two underground parkades have been implemented, one under the Fleet facility and one under the integrated facility, with the intention of accommodating both staff and light vehicle fleet parking. The highlights of this Test Fit is the achievement of 100% of the requested program with some site storage located under the AltaLink utility right-of-way (a risk that requires the service provider's approval), a high quality urban frontage, efficient workflows, and a secure operating site.

KEY CHARACTERISTICS:

2 UNDERGROUND PARKADES

ALL GROUPS ACCOMMODATED



SPLIT INTEGRATED FACILITY
OCCUPYING 100% OF SITE

NO SITE HOTELLING

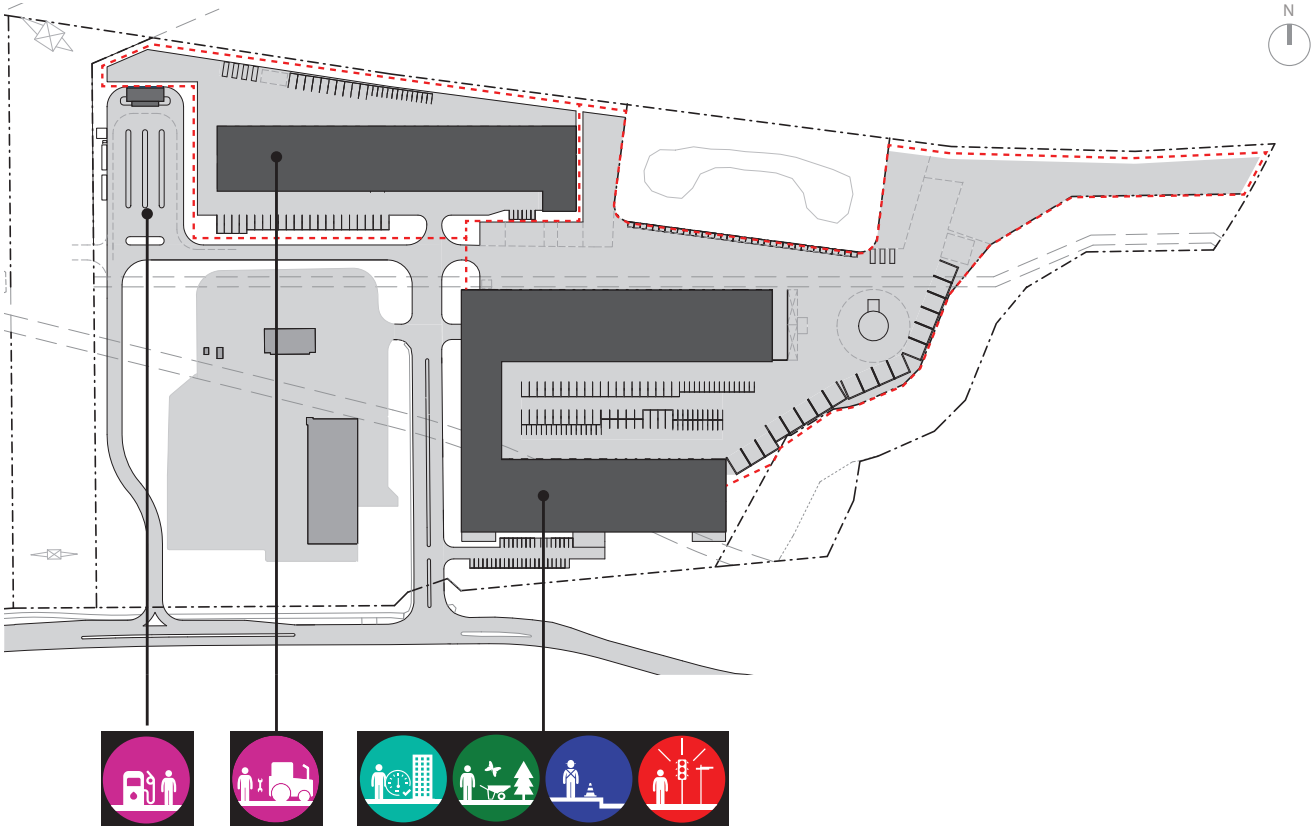


Figure 4.3b: Test Fit 1 - Operations Group Distribution

As this scheme proposes two separate operating facilities on the AIS, each has separate secure access, yards, parking, administrative functions, staff support and operations bays.

This test fit locates the public components of the South facility (administration and staff lockers) closer to Ellerslie Road. Given the inclusion of underground parking for staff and light fleet vehicles and the situation of the Administration and Staff Support Program closest to Ellerslie Road, the facility has the opportunity to express good urban frontage to the community. The layout of the South integrated facility also functions as a good neighbour, protecting views and shielding some auditory disturbance from the yard. In addition, the stacked administrative functions will benefit from views South towards a golf course and East towards the Whitemud Creek ravine. The Fleet administration in the second facility to the North will have pleasant views to the naturalized storm water pond.

The heavy programmatic functions are located at the back of the site, including bulk storage, aggregate bins, salt dome, etc. Fleet vehicle parking for heavy vehicles - ranging from oversized pick-up trucks to > 2 tons - is located at grade for both facilities.

The proposed secondary access road located on the West edge of Ambleside includes a right-in / right-out access and will support enhanced circulation throughout the site given the expected vehicle volumes.

The facilities are sited so they are not situated over top of the drainage right-of-way, but the plan does propose to build over top of the deep South Edmonton Sanitary Sewer (S.E.S.S.) right-of-way. Building over the S.E.S.S. is permitted, although will require detailed consideration of foundations.

The second floor of each facility includes predominantly administrative functions with some staff support (such as wellness or multipurpose spaces) with the opportunity to have mezzanine storage in the operations bays where appropriate.

This scheme proposes a single level of underground parking for each facility for personal staff vehicles and light fleet vehicles, ranging from 3/4 ton to 1 ton trucks.

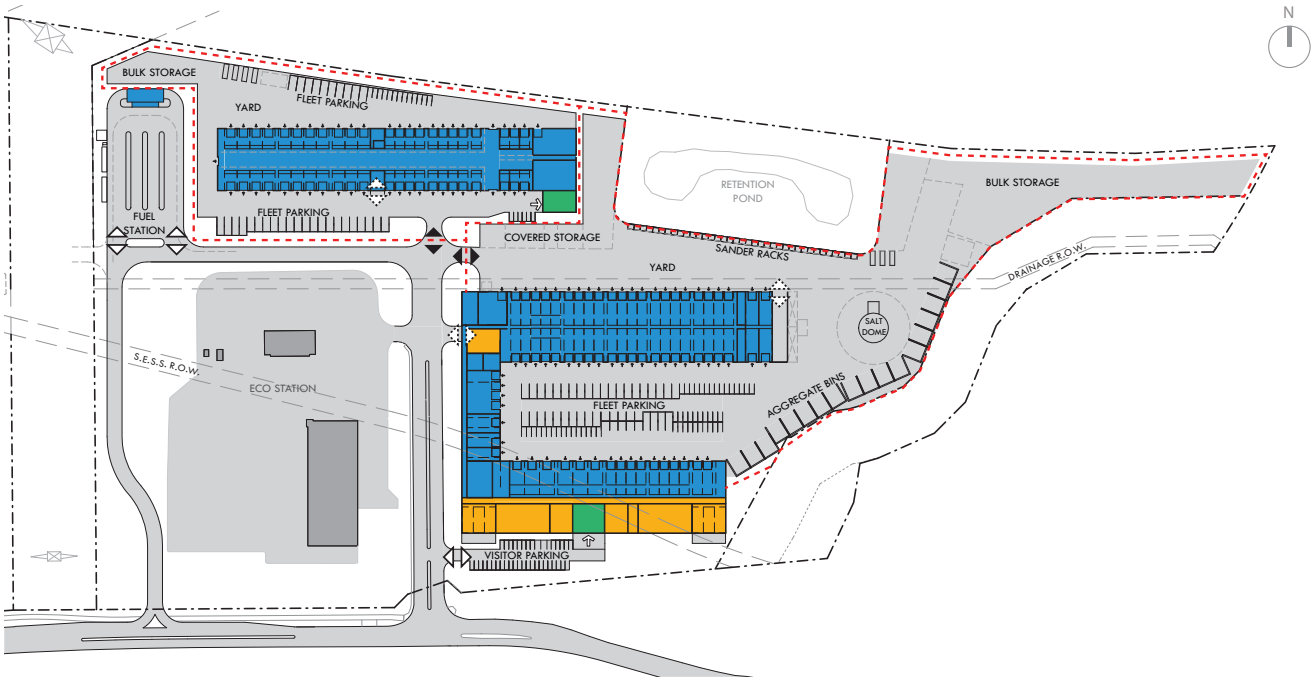


Figure 4.3c: Test Fit 1 - Main Floor Plan

Figure 4.3d: Test Fit 1 - Second Floor Plan

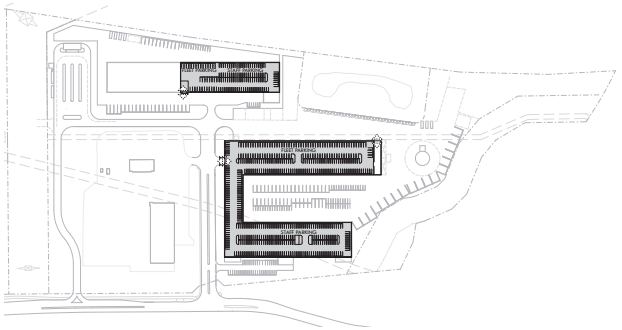


Figure 4.3e: Test Fit 1 - Below Grade Plan

LEGEND

- ADMINISTRATION
- STAFF SUPPORT
- OPERATIONS
- SECURE ENTRY
- PUBLIC ENTRY
- PARKADE ENTRY
- WORKBAY ENTRY
- MAIN PUBLIC ENTRY
- SECURE FENCING

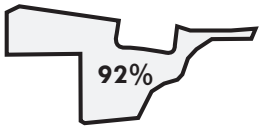
TEST FIT 2

Test Fit 2 is characterized by a single underground parkade for staff parking for the south facility and the removal of the Fleet maintenance garage. By removing the Fleet garage, 100% of the remaining operations' program is able to be achieved through a vehicle storage building (the North facility) and an integrated facility (the South facility) where service sharing and standardization occurs. This Test Fit explores an alternate building configuration to Test Fit 1 and analyzes the program achievement when only one underground parkade is implemented. Test Fit 2 provides a high quality urban frontage, efficient workflows, a secure operating site, and the use of the building as a visual barrier to the operations yard.

KEY CHARACTERISTICS:

UNDERGROUND PARKADE

FLEET REMOVED



INTEGRATED FACILITY & STORAGE BUILDING OCCUPYING 92% OF SITE

SITE HOTELLING OCCUPYING **8%** OF SITE

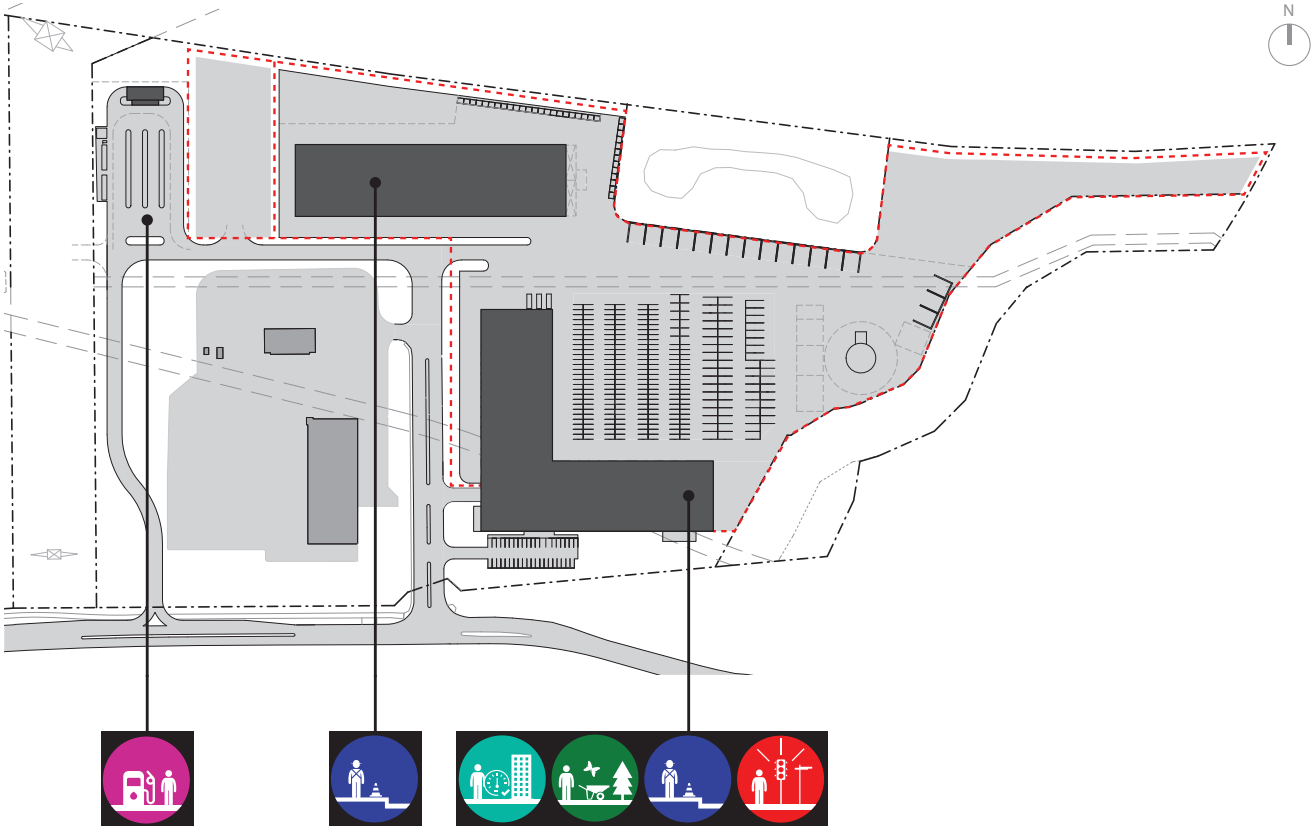


Figure 4.3f: Test Fit 2 - Operations Groups Distribution

This scheme proposes one integrated site with two facilities. One integrated facility with administration, operations functions and staff support and one vehicle storage facility with some staff support (such as lockers or multipurpose spaces).

Similar to Test Fit 1, this scheme locates the public components of the program (administration and staff lockers) closer to Ellerslie Road. Given the inclusion of underground parking for personal staff vehicles, the facility has the opportunity to express good urban frontage to the community. The layout of the integrated facility also functions as a good neighbour, protecting views and shielding some auditory disturbance from the yard. In addition, the stacked administrative functions will benefit from views South towards a golf course and East towards the Whitemud Creek ravine.

The heavy programmatic functions are located towards the back of the site, including bulk storage, aggregate bins, salt dome, etc. All the fleet vehicle parking is located at grade.

With a single point of access to the well organized yard, open sight lines are achieved increasing site safety.

The proposed secondary access road located on the West edge of Ambleside includes a right in / right out access and will support enhanced circulation throughout the site given the expected vehicle volumes.

The facilities are sited so they are not situated over top of the drainage right-of-way, but the plan does propose to build over top of the deep South Edmonton Sanitary Sewer (S.E.S.S.) right-of-way. Building over the S.E.S.S. is permitted, although will require detailed consideration of foundations.

The second floor includes predominantly administrative functions with some staff support (such as wellness or multipurpose spaces) with the opportunity to have mezzanine storage in the operations bays where appropriate.

This scheme proposes a single level of underground parking for the South facility for personal vehicles.

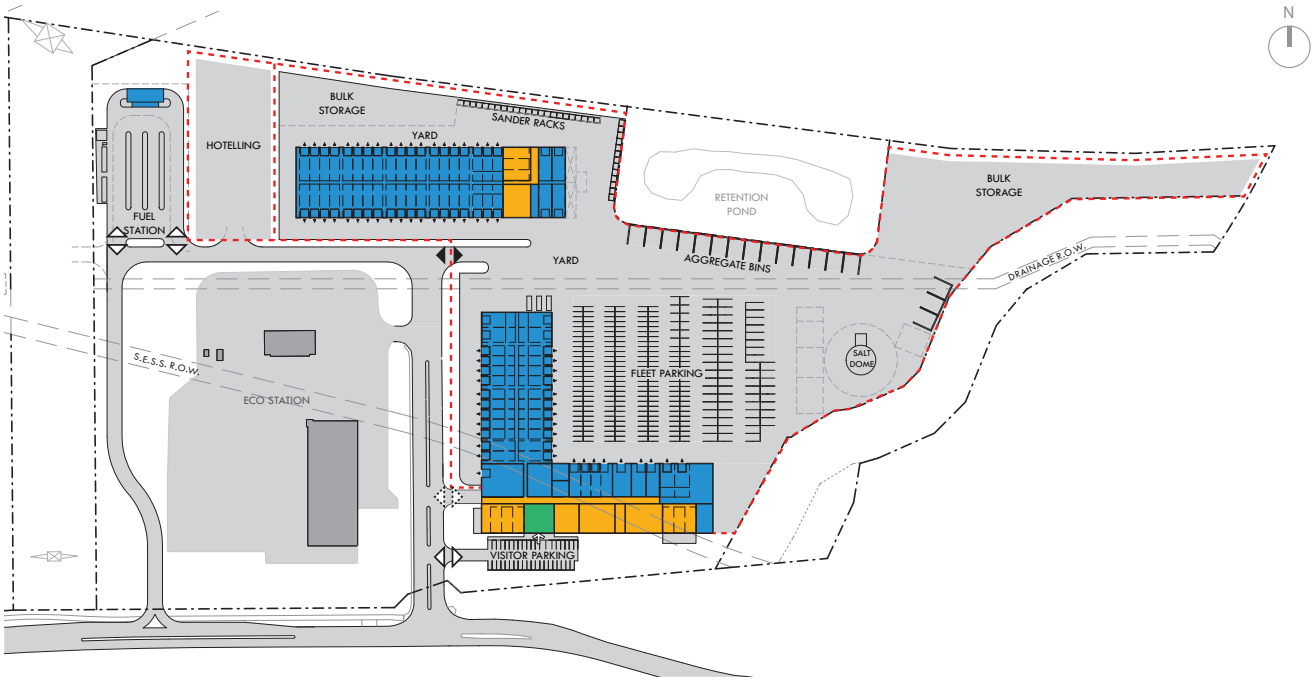


Figure 4.3g: Test Fit 2 - Main Floor Plan

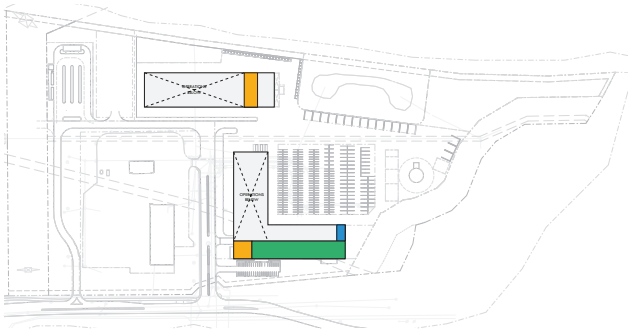


Figure 4.3h: Test Fit 2 - Second Floor Plan

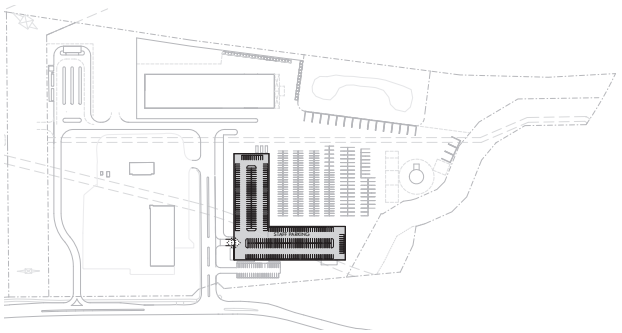


Figure 4.3i: Test Fit 2 - Below Grade Plan

LEGEND

- ADMINISTRATION
- STAFF SUPPORT
- OPERATIONS
- SECURE ENTRY
- PUBLIC ENTRY
- PARKADE ENTRY
- WORKBAY ENTRY
- MAIN PUBLIC ENTRY
- SECURE FENCING

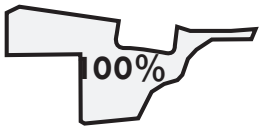
TEST FIT 3

Test Fit 3 was used to investigate how much of the integrated program could be achieved while situating all services above grade and accommodating all five of the Operations Groups. The removal of the underground parking results in a 25% reduction of the overall requested program in order to accommodate at-grade parking. The quality of the urban frontage on the community edge is greatly reduced due to the large amount of parking located between the facility buildings and Ellerslie Road SW. The efficiency of the staff workflows are also slightly diminished because of the distance between the staff parking lot and the main staff entrance to the facility. Similar to Test Fit 2, Test Fit 3 hosts an integrated facility to the South and a vehicle storage building, predominantly for Roads operations and shared washbays, to the North.

KEY CHARACTERISTICS:

NO UNDERGROUND PARKADES

ALL GROUPS ACCOMMODATED



INTEGRATED FACILITY & STORAGE BUILDING
OCCUPYING 100% OF SITE

NO SITE HOTELLING

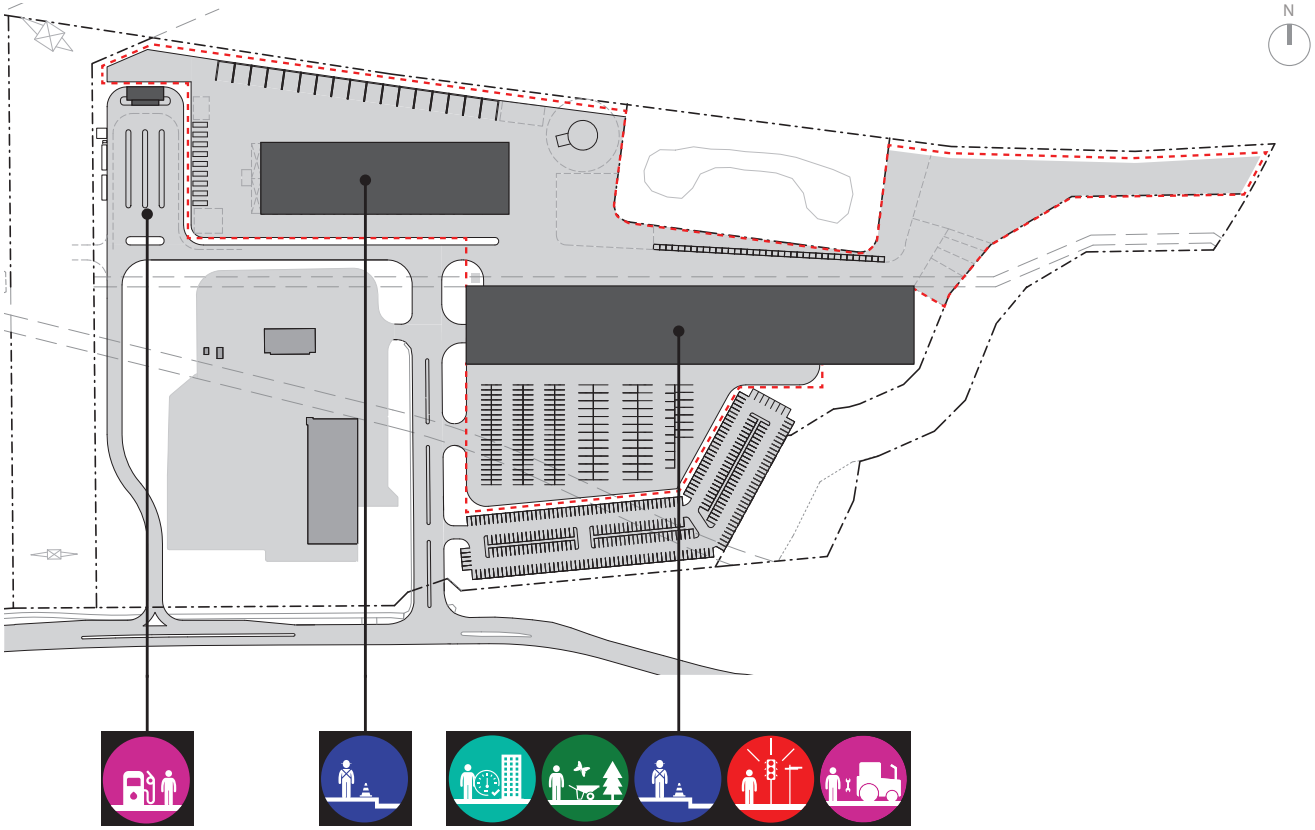


Figure 4.3j: Test Fit 3 - Operations Groups Distribution

Similar to Test Fit 2, this scheme includes one integrated site with two facilities: One integrated facility with administration, operations functions and staff support to the South and one vehicle storage facility with some staff support (such as lockers or multipurpose spaces) to the North.

As mentioned, the community edge on Ellerslie Road is diminished with the expansive parking, although the location of the staff support and stacked administration adjacent to the top of bank set back would benefit from beautiful views into Whitemud Creek ravine.

The heavy programmatic functions are located towards the back of the site, including bulk storage, aggregate bins, salt dome, etc with the South facility shielding these functions from the public view.

This scheme includes multiple secure points of access that although not ideal, function well to separate fleet parking and yard.

The proposed secondary access road located on the West edge of Ambleside includes a right-in / right-out access and will support enhanced circulation throughout the site given the expected vehicle volumes.

The facilities are sited so they are not situated over top of the drainage right-of-way, but the plan does propose to build over top of the deep South Edmonton Sanitary Sewer (S.E.S.S.) right-of-way. Building over the S.E.S.S. is permitted, although will require detailed consideration of foundations.

The second floor includes predominantly administrative functions with some staff support (such as wellness or multipurpose spaces) with the opportunity to have mezzanine storage in the operations bays where appropriate.

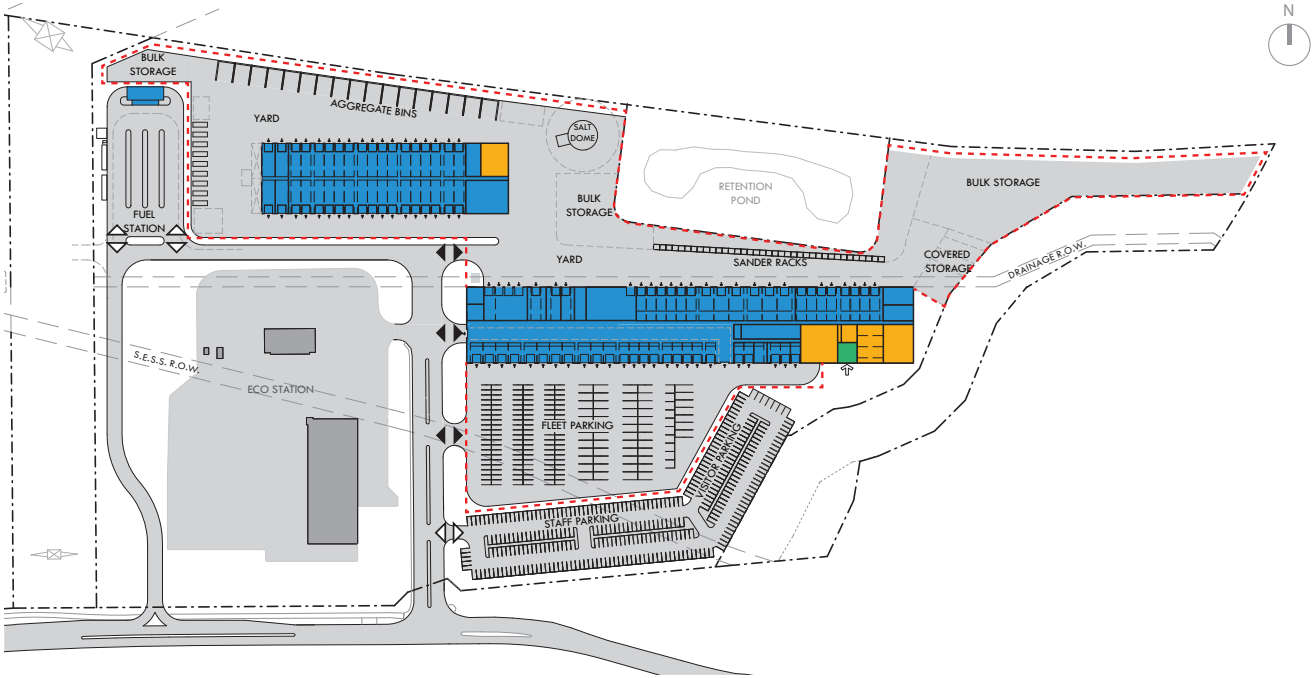


Figure 4.3k: Test Fit 3 - Main Floor Plan

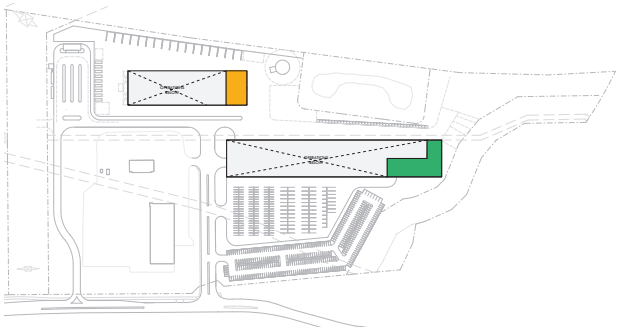


Figure 4.3l: Test Fit 3 - Second Floor Plan

LEGEND

- ADMINISTRATION
- STAFF SUPPORT
- OPERATIONS
- SECURE ENTRY
- PUBLIC ENTRY
- PARKADE ENTRY
- WORKBAY ENTRY
- MAIN PUBLIC ENTRY
- SECURE FENCING

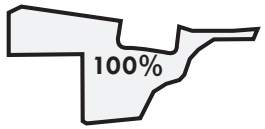
TEST FIT 4

Because of the slight differences between the requirements of the Fleet garage and remaining groups' workbays it was considered worthwhile to conduct an investigation with the removal of an operation group other than Fleet. Test Fit 4 examines the implications of removing the FMS operations while situating the remaining program above grade. This Test Fit is able to achieve a high quality urban frontage along the community edge by locating the staff parking to the North side of the integrated facility; however, by doing so the workflows between the parking and building have lower efficiencies. The integrated program for the Parks, Roads, Fleet, and Traffic operations was reduced by 20% considering a full built out Ambleside site with no underground parking.

KEY CHARACTERISTICS:

NO UNDERGROUND PARKADES

FMS REMOVED



INTEGRATED FACILITY & STORAGE BUILDING
OCCUPYING 100% OF SITE

NO SITE HOTELLING

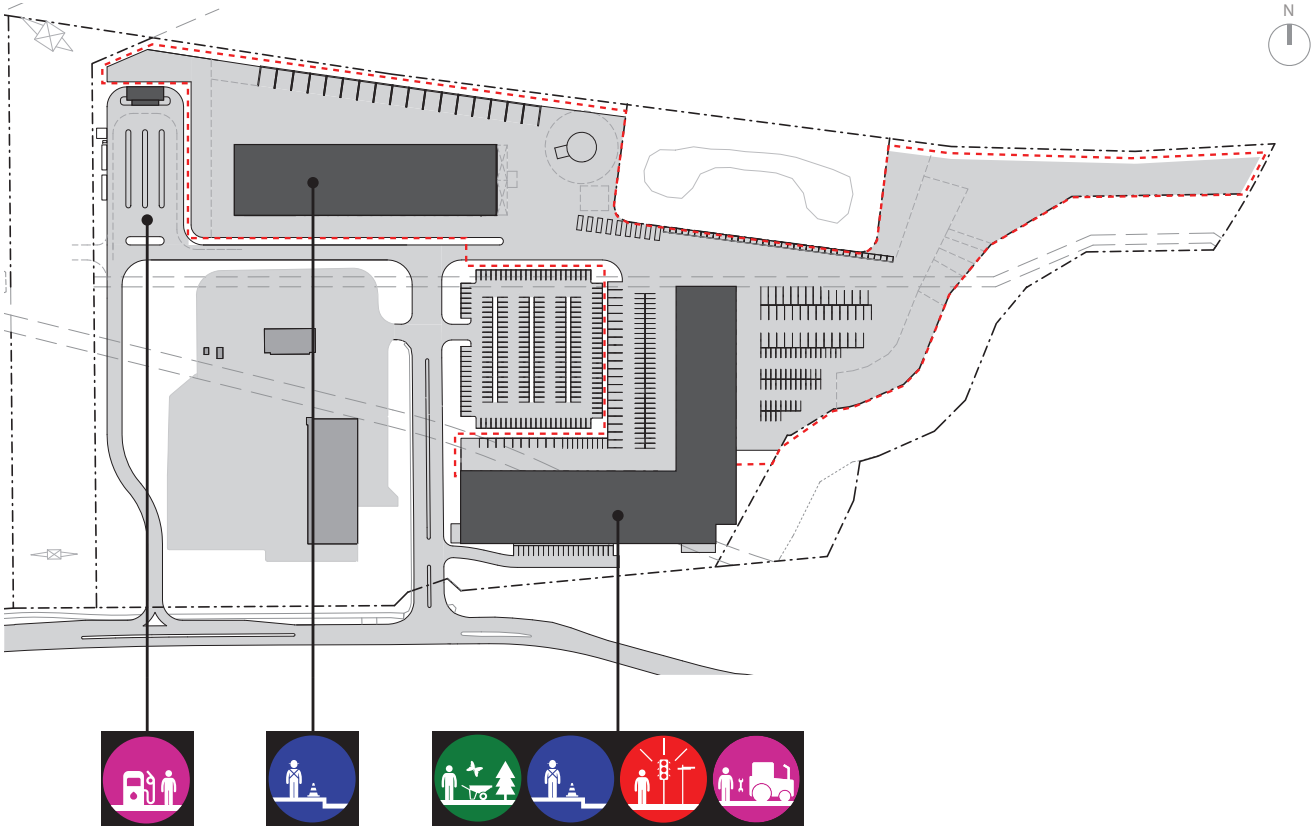


Figure 4.3m: Test Fit 4 - Operations Groups Distribution

Similar to Test Fits 2 and 3, this scheme includes one integrated site with two facilities: One integrated facility to the South with administration, operations functions and staff support and one vehicle storage facility to the North with minor staff support, such as washrooms.

Similar to Test Fit 1, this scheme locates the public components of the program (administration and staff lockers) closer to Ellerslie Road. Given that personal staff vehicles are located to the North, the facility has the opportunity to express good urban frontage to the community. The layout of the integrated facility also functions as a good neighbour, protecting views and shielding some auditory disturbance from the yard. In addition, the stacked administrative functions will benefit from views South towards a golf course and East towards the Whitemud Creek ravine.

The heavy programmatic functions are located towards the back of the site, including bulk storage, aggregate bins, salt dome, etc. All the fleet vehicle parking is located at grade and within a single yard.

With a single point of access, the yard is functional although less consolidated than Test Fit 2. This would result in some reduced workflow efficiencies.

The proposed secondary access road located on the West edge of Ambleside includes a right-in / right-out access and will support enhance circulation throughout the site given the expected vehicle volumes.

The facilities are sited so they are not situated over top of the drainage right-of-way, but the plan does propose to build over top of the deep South Edmonton Sanitary Sewer (S.E.S.S.) right-of-way. Building over the S.E.S.S. is permitted, although will require detailed consideration of foundations.

The second floor includes predominantly administrative functions with some staff support (such as wellness or multipurpose spaces) with the opportunity to have mezzanine storage in the operations bays where appropriate.

STAKEHOLDER PRESENTATION 1 SUMMARY

Following the presentation of the four Test Fits it was determined that due to the weight of the operations program, the peripheral location of the site, and the condition of the site soils, underground parking was not an appropriate solution for the site parking requirements. This resulted in Test Fits 1 and 2 being unfeasible for the stakeholders. Test Fit 3 had situated all the parking at grade; however, the lower quality of the scheme's urban frontage and the proposed split operations yard resulted in Test Fit 3 being less desirable for the stakeholders than Test Fit 4. Test Fit 4 had also situated all the parking at grade and had a single, continuous operations yard. The main criticisms with Test Fit 4 were the circuitous shape of the operations yard which could result in inefficiencies and the location of the staff parking lot which required the staff to either travel a relatively long distance to the facility or cross busy operations roadways. Both of these factors are safety concerns.

After the presentation it was agreed that the Test Fits 3 and 4 were considered to be the most desirable due to the at-grade parking, but that the layout of Test Fit 2 was the most desirable with reference to general site layout. It was determined that Test Fit 2 and 4 would be revised and presented again with the underground parking in Test Fit 2 changed to at-grade parking. It was also decided that all Operations Groups should be included in the Test Fits for the remaining portion of the Master Plan.

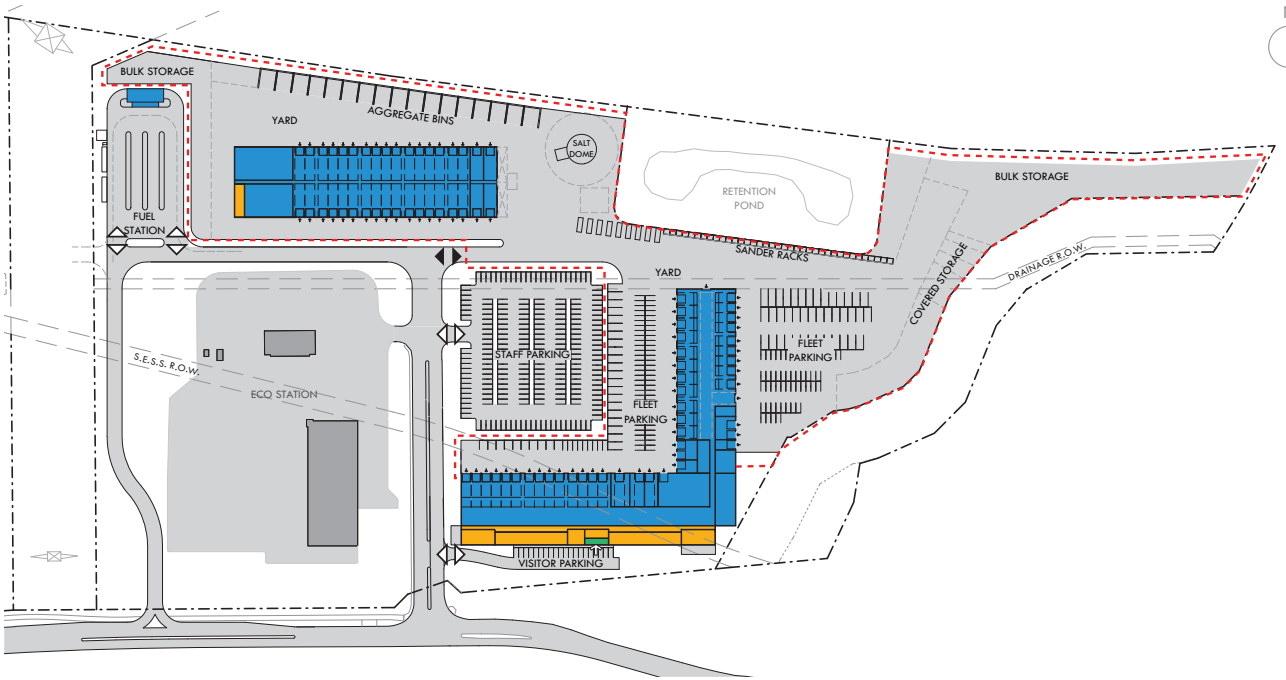


Figure 4.3n: Test Fit 4 - Main Floor Plan

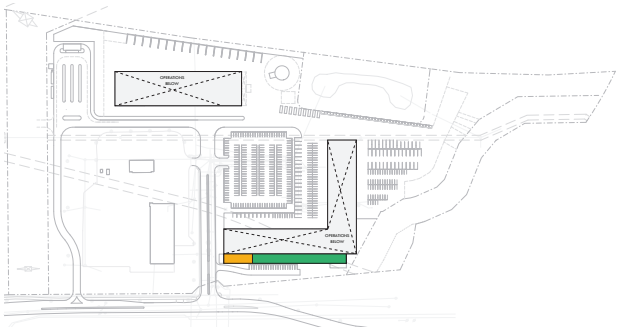


Figure 4.3o: Test Fit 4 - Second Floor Plan

ADMINISTRATION
STAFF SUPPORT
OPERATIONS
SECURE ENTRY
PUBLIC ENTRY
PARKADE ENTRY
WORKBAY ENTRY
MAIN PUBLIC ENTRY
SECURE FENCING

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4.4 STAKEHOLDER PRESENTATION 2

Following the Test Fit presentation on July 28, 2017 to the CoE AIS Steering Committee, it was determined that in order to achieve a suitable scheme for the AIS, the required storage capacity for stormwater management had to be strategized based on current requirements; the retention pond was designed in 2007 and constructed in 2011 with the City of Edmonton Design Standards being updated in 2015. This resulted in the retention pond no longer meeting the minimal requirements. The consultant team engaged civil consultants (Matrix Solutions Inc.) to explore possible stormwater solutions and to provide a summary evaluating the potential order of magnitude costs and required storage for each solution (refer to Figure 4.4a). The chart on the right summarizes the proposed solutions (refer to Appendix G.3 for the full report).

Following the proposal of stormwater solutions, the design team prepared three Test Fits, one for each of the main stormwater solutions. The first scheme, a modification of Test Fit 2 retained the stormwater pond in it's original location with increased capacity met with underground storage. The second scheme proposes a shifted stormwater pond that was moved as far East as possible while still maintaining access to the most Northeastern corner of the site. The shifted stormwater pond would be constructed at the new required capacity. This shift in the stormwater pond allowed for a brand new scheme to be explored: Test Fit 5. Test Fit 5 proposes a single integrated building that is connected at the top floor, linking the administration and staff support program across the two operation program bases to create a single building that bridges the utility right-of-way. The final scheme, Test Fit 5B, is a larger variation of Test Fit 5 and has removed the stormwater completely from the site with the intention that all stormwater management would be met through underground storage.

The three final Test Fits were presented to the City Operations Groups on November 15, 2017 along with five subsequent meetings with each of the Operations Groups representatives to gain a individual perspective of the Test Fits.

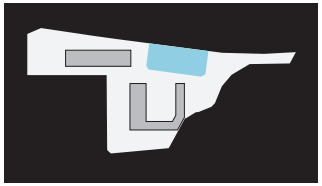
	INCREASED REQUIRED CAPACITY MET THROUGH:	DESCRIPTION	BENEFITS	LIMITATIONS	POTENTIAL ORDER OF MAGNITUDE COST*
EXISTING STORMWATER POND 	**A) UNDERGROUND STORAGE**	The increased required capacity would be met through the implementation of underground storage.	- the stormwater pond does not increase in size so yard area is not reduced	- the pond does not meet the required permanent pooling capacity - the current stormwater pond location reduces site efficiency	
	i) PLASTIC CHAMBERS	Prefabricated, plastic, hollow cylinders with open bottoms and perforated sides	- cheaper than the box culvert	- requires a larger area than the box culvert option	$1.1 Million
	ii) CONCRETE BOX CULVERT	Prefabricated 2.4m x 3.0m box culvert sections.	- requires smaller area than the plastic chamber option	- more expensive than the plastic chambers	$2.8 Million
	PATIAL GREEN ROOF	The amount of underground storage required would be reduced through the implementation of a partial green roof.	- provides high quality ammenity space for staff off the ground level - legible stewardship of sustainability	- a partial green roof will only reduce the required storage volume from 15,240m^3 to 14,700m^3	i) $22.8 Million ii) 24.0 Million
	B) POND MODIFICATIONS	The increased required capacity would be met through modification of the pond. This could include berming, increasing the depth of pond, and changing the holding cell type.	- uses the existing infrastructure	- highest risk option	Not Available
SHIFTED STORMWATER POND 	**A) SHIFTED STORMWATER POND WITH HIGHER CAPACITY**	Relocating the stormwater pond as far east as possible and increasing the size to meet City of Edmonton requirements that were revised in 2015	- cheapest option - increases site efficiency - pond meets permanent pool capacity	- stormwater becomes slightly larger (~400m^2) than it currently is reducing yard area	$0.7 Million
	B) SHIFTED STORMWATER POND + GREEN ROOF	Option A + incorporation of a green roof. Two scenarios were explored: the first scenario looked at a green roof on top of the second floor and the second scenario looked at a full green roof	- provides high quality ammenity space for staff off the ground level - legible stewardship of sustainability	- a full green roof will only reduce the required storage volume from 15,240m^3 to 14,300m^3 (partial:14,700m^3)	Partial: $20.7 Million Full: $34.6 Million
REMOVED STORMWATER POND 	**A) UNDERGROUND STORAGE**	The stormwater pond would be completely removed and the site stormwater requirements would be meet through underground storage options.	- significantly increases site efficiency - 95% to 100% of the requested program can be achieved	- most expensive option	
	i) PLASTIC CHAMBERS	Prefabricated plastic hollow cylinders with open bottoms and perforated sides	- cheaper than the box culvert	- requires a larger area than the box culvert option	6.6 Million
	ii) CONCRETE BOX CULVERT	Prefabricated 2.4m x 3.0m box culvert sections.	- requires smaller area than the plastic chamber option	- more expensive than the plastic chambers	Not Available

Figure 4.4a: Stormwater Summary

* Cost estimate includes pond infill and product cost only

TEST FIT 2B

Test Fit 2B, based on Test Fit 2 from the July 28, 2017 presentation and incorporating the stakeholder feedback has the potential of achieving the greatest amount of program while bringing all parking to grade and maintaining the current location of the stormwater pond. Test Fit 2B differs from Test Fit 2 by the addition of an East wing to the south building and the incorporation of all five Operations Groups. In Test Fit 2B, two separate facilities are proposed where the Fleet Operations group would occupy the North building and the four remaining operations group would occupy the South integrated operations building. Test Fit 2B between 80-85% of the requested operations group program and 100% of the requested program for the fuel station.



EXISTING STORMWATER POND

FLEET + INTEGRATED BUILDING

80-85%

PROGRAM ACHIEVED

100%

FUEL STATION

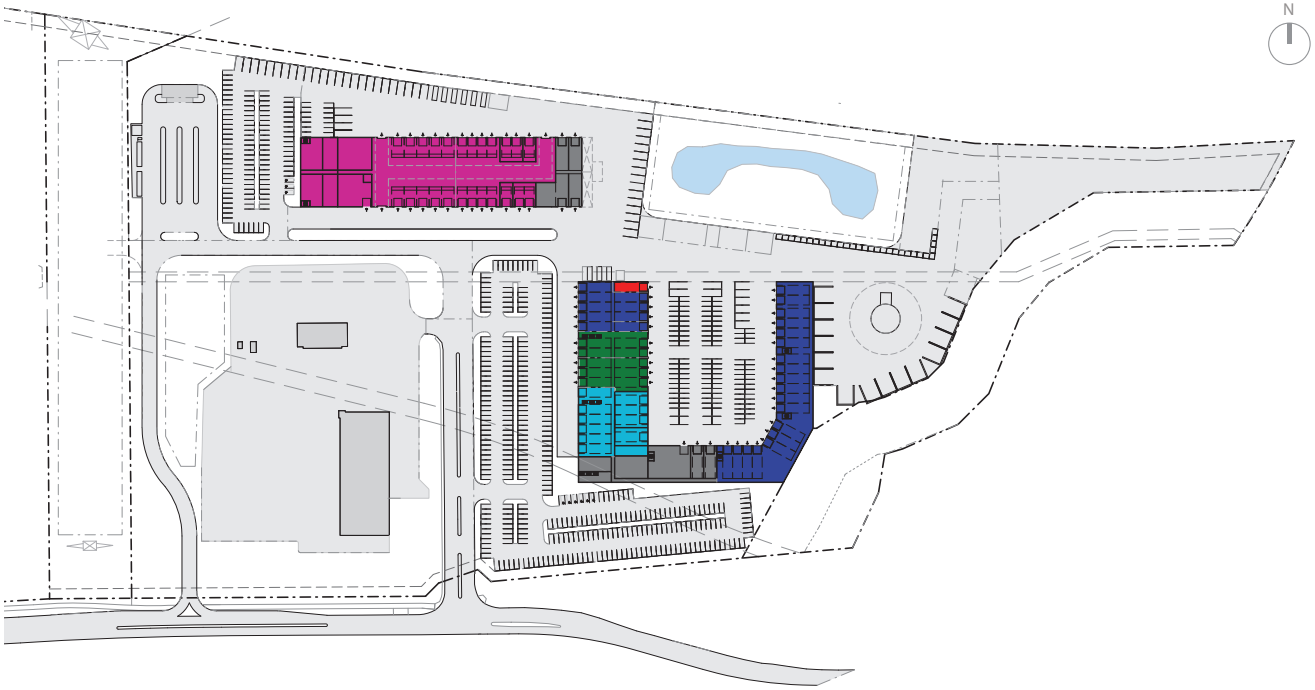


Figure 4.4b: Test Fit 2B - Operations Groups Distribution

The administration and staff support is situated over the single storey spaces for the Fleet facility resulting in the overall building being a two-storey structure with the operation bays having an open two-storey section. The integrated facility located the administration and staff support above the operations bays resulting in a three-storey structure due to the need for the operations bays to be two-stories. By situating the administration and staff support above the operations bays, the operations staff is provided with efficient workflows between these program types and the operation group spaces can easily grow or reduce in size providing flexibility.

With the exception of some staff parking located South of the integrated facility, this scheme produces a high quality urban frontage by locating the public components of the program (administration and staff support) closer to Ellerslie Road along the community. The layout of the integrated facility also functions as a good neighbour, protecting views and shielding some auditory disturbance from the yard. In addition, the stacked administrative functions will benefit from views South towards a golf course and East towards the White Mud Creek ravine.

Two points of access to the yard are proposed for the Fleet Operations Group with the most Northern access point acting as the primary entry point. A single point of access was proposed for the integrated facility. Given the layout of the buildings the operations yard is segmented and programmed with heavy yard functions and bulk storage located towards the back of the site. The fleet parking is located closer to the facilities to ensure efficient workflows.

The proposed secondary access road located on the West edge of Ambleside includes a right-in / right-out access and will support enhance circulation throughout the site given the expected vehicle volumes.

The facilities are sited so they are not situated over top of the drainage right-of-way, but the plan does propose to build over top of the deep South Edmonton Sanitary Sewer (S.E.S.S.) right-of-way. Building over the S.E.S.S. is permitted, although will require detailed consideration of foundations.

This scheme proposes at-grade parking for staff and operations parking.

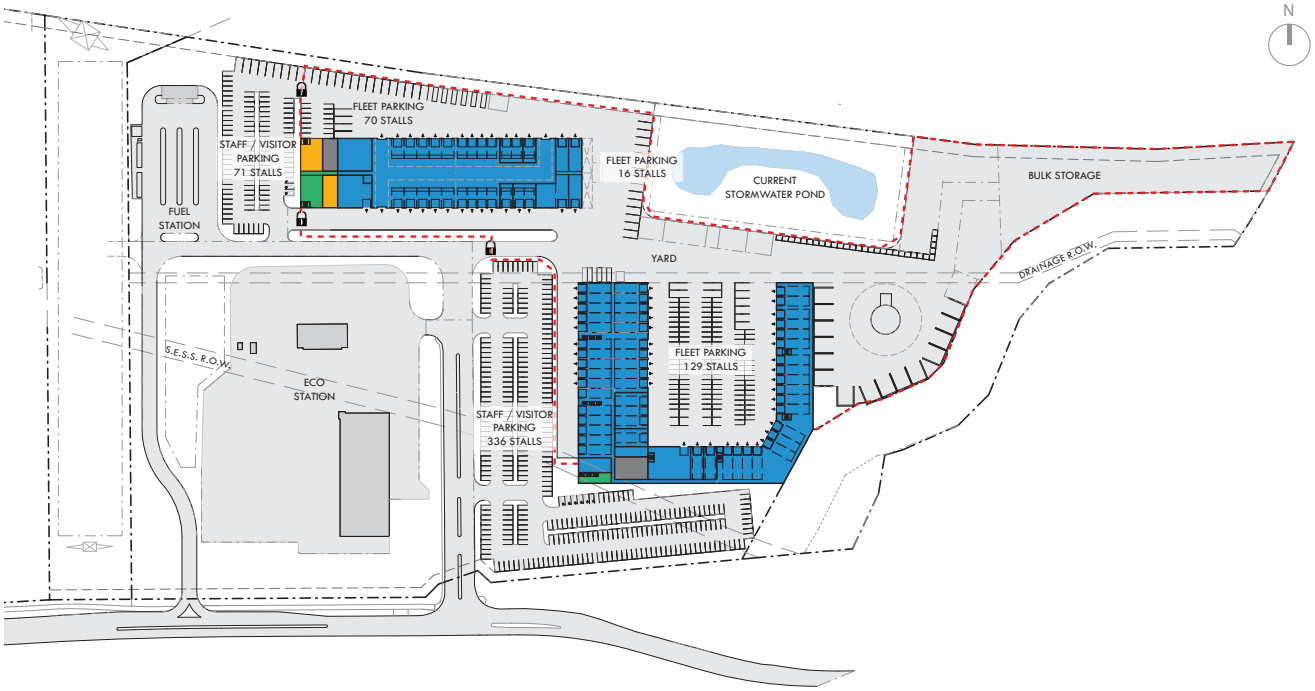


Figure 4.4c: Test Fit 2B - Main Floor Plan

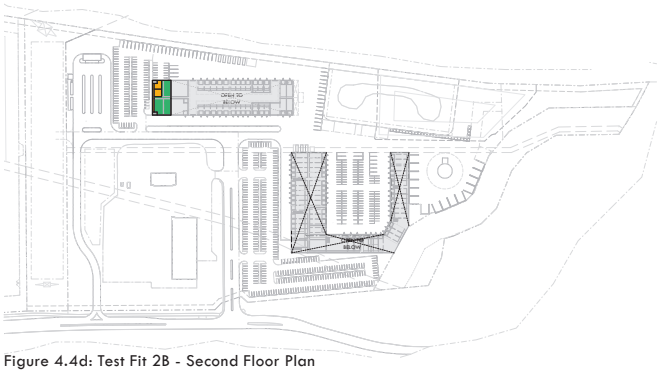


Figure 4.4d: Test Fit 2B - Second Floor Plan

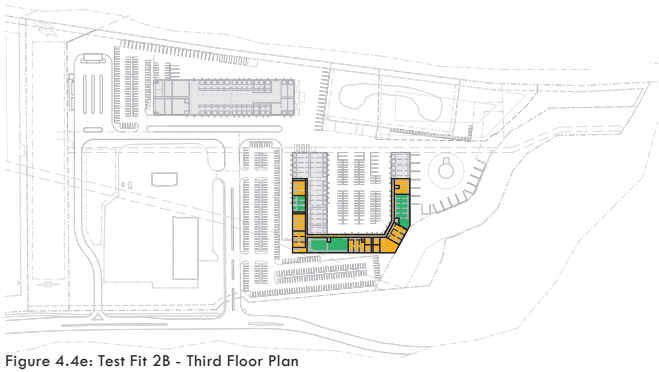


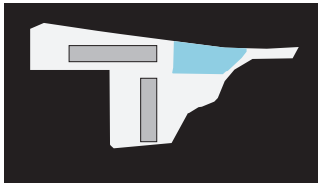
Figure 4.4e: Test Fit 2B - Third Floor Plan

LEGEND

- SECURE ENTRY POINT
- ADMINISTRATION
- STAFF SUPPORT
- OPERATIONS
- SERVICES
- MAIN ENTRY
- SECURE FENCING

TEST FIT 5

Test Fit 5 explores shifting the stormwater pond as far East on the site while maintaining access to the Northeast corner of the site to optimize yard space. By shifting the stormwater pond a new building layout is able to be tested that was not previously possible with the current location of the stormwater pond. This scheme proposes a single integrated building that is connected at the top floor, linking the administration and staff support program across the two operation program bases that bridges the utility right-of-way. The new building layout achieves 85-90% of the requested operations group program and 100% of the requested program for the fuel station.



SHIFTED STORMWATER POND

INTEGRATED BUILDING

85-90%

PROGRAM ACHIEVED

100%

FUEL STATION

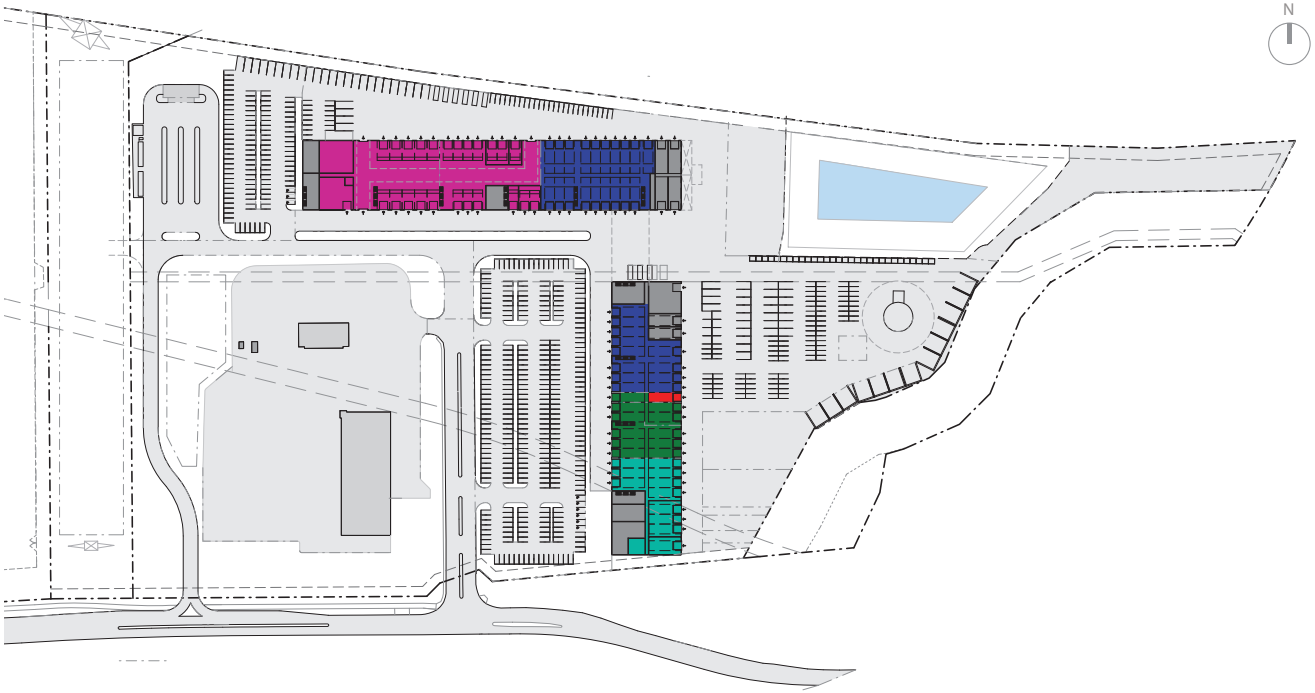


Figure 4.4f: Test Fit 5 - Operations Groups Distribution

Like the South building in Test Fit 2B, the integrated facility locates the administration and staff support above the operations bays resulting in a three-storey structure. By situating the administration and staff support above the operations bays, the operations staff is provided with efficient workflows and the operation group spaces can easily grow or reduce in size providing flexibility.

This scheme situates a large amount of parking close to Ellerslie Road; however, it is expected that a high quality urban frontage can be achieved through landscaping strategies. Some bulk storage is situated along the South property line, but it is expected this will be not easily visible to the public due to the lower elevation of Ellerslie Road as it continues East. The layout of the integrated facility also functions as a good neighbour, protecting views and shielding some auditory disturbance from the yard.

The main point of access into the operations yard is located Northeast of the Eco Station, off the proposed secondary access road. Two additional points of access are provided West of the North operations program base with the understanding that these would likely act as the main points of access for the Fleet operations group and client base. The layout of the facilities results in a large, open, operations yard that provides good sight lines, efficient workflows and future flexibility. The heavy yard program and bulk storage is located further from the facilities with fleet parking generally located adjacent to the facilities optimize workflow between the highly active program types.

The proposed secondary access road located on the West edge of Ambleside includes a right-in / right-out access and will support enhance circulation throughout the site given the expected vehicle volumes.

The facilities are sited so they are not situated over top of the ground surface of the drainage right-of-way, but the plan does propose to build over top of the deep South Edmonton Sanitary Sewer (S.E.S.S.) right-of-way. Building over the S.E.S.S. is permitted, although will require detailed consideration of foundations.

This scheme proposes at-grade parking for staff and operations parking.

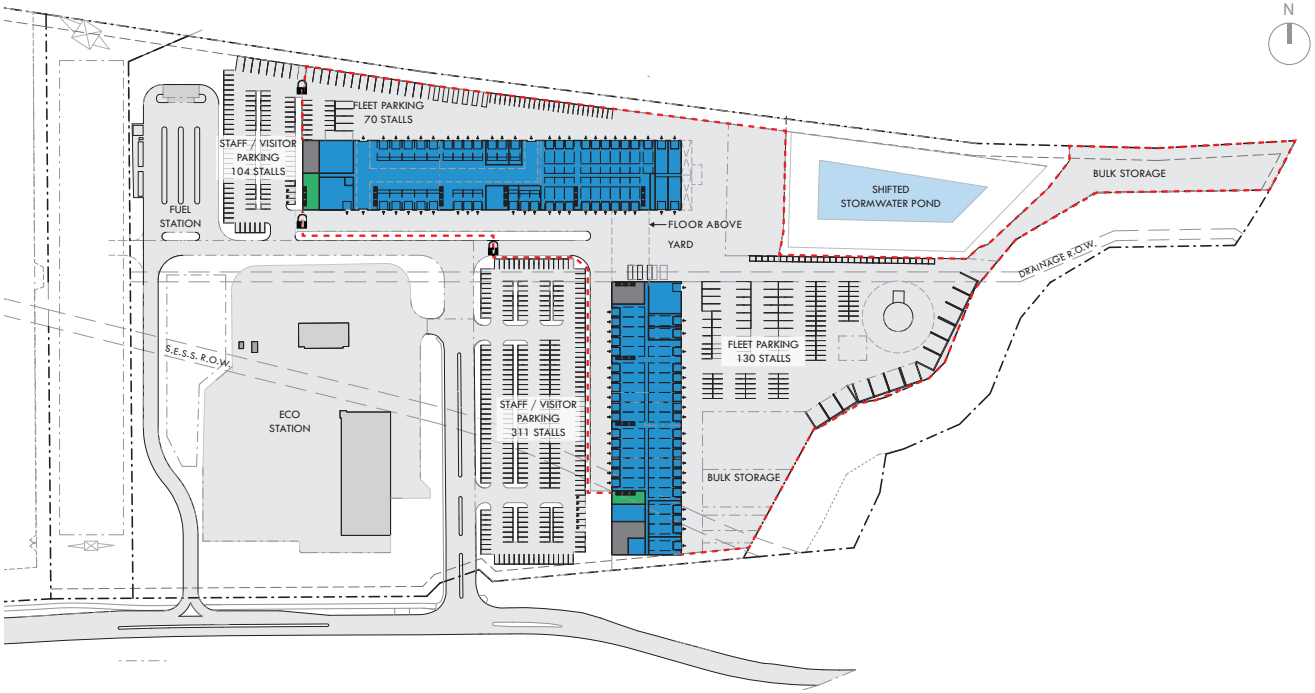


Figure 4.4g: Test Fit 5 - Main Floor Plan

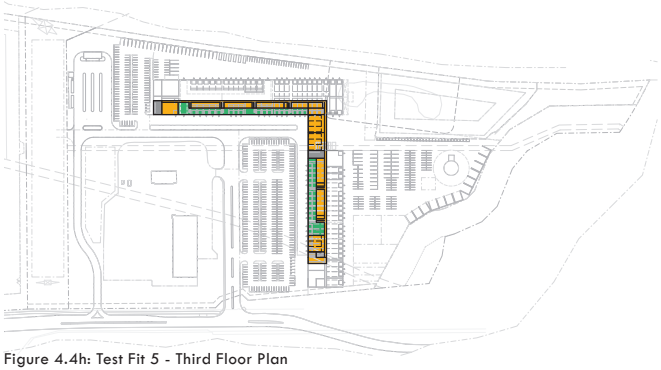


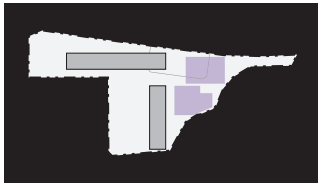
Figure 4.4h: Test Fit 5 - Third Floor Plan

LEGEND

- SECURE ENTRY POINT
- ADMINISTRATION
- STAFF SUPPORT
- OPERATIONS
- SERVICES
- MAIN ENTRY
- SECURE FENCING

TEST FIT 5B

Test Fit 5B explores the implications of removing the stormwater pond and meeting stormwater requirements with underground cisterns. Test Fit 5B is a modification of Test Fit 5 with the difference being a larger facility, larger parking lots, and a larger, completely open operations yard. This scheme proposes a single integrated building that was connected at the top floor, linking the administration and staff support program across the two operation program bases that bridges the utility right-of-way. The integrated building layout achieves 95-100% of the requested operations group program and 100% of the requested program for the fuel station.



REMOVED STORMWATER POND
UNDERGROUND STORAGE

INTEGRATED BUILDING

95-100%

PROGRAM ACHIEVED

100%

FUEL STATION

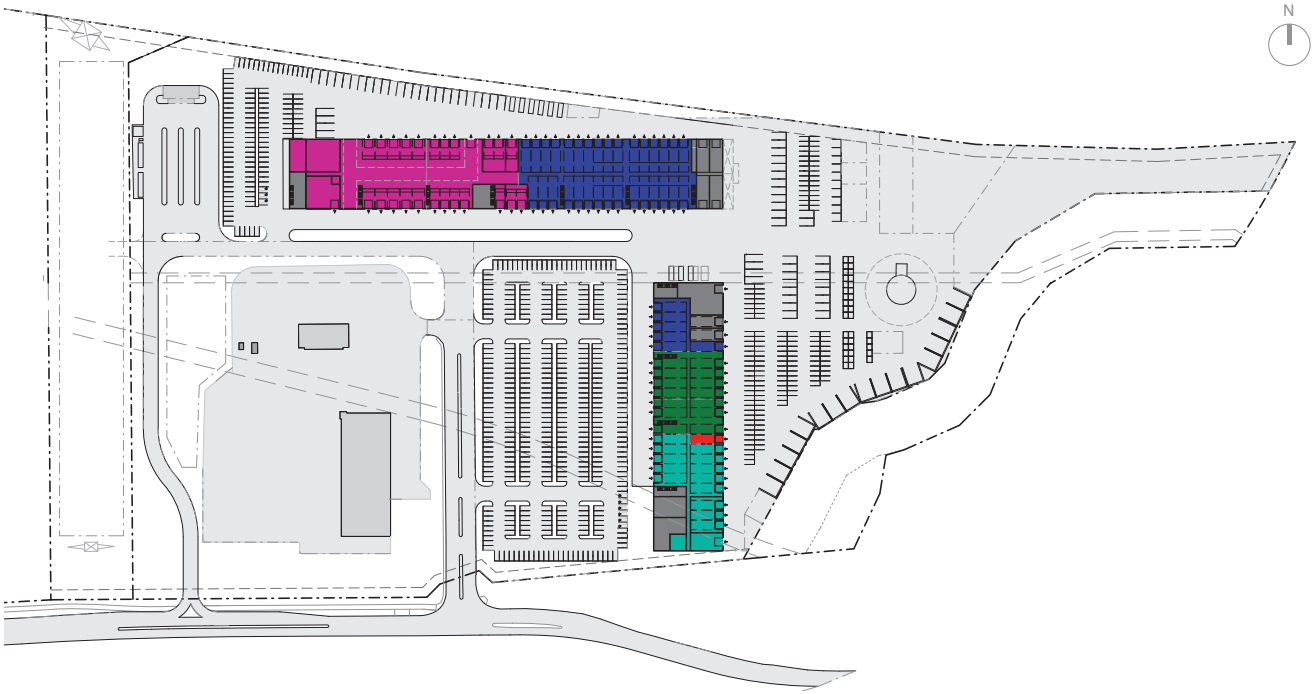


Figure 4.4i: Test Fit 5B - Operations Groups Distribution

As with Test Fit 5, the integrated facility locates the administration and staff support above the operations bays resulting in a three-storey structure. By situating the administration and staff support above the operations bay, the operations staff is provided with efficient workflows and the operation group spaces can easily grow or reduce in size providing flexibility.

The scheme situates a large amount of parking close to Ellerslie Road; however, it is expected that a high quality urban frontage can be achieved through landscaping strategies. Some bulk storage is situated along the South property line, but it is expected this will be not easily visible to the public due to the lower elevation of Ellerslie Road as it continues East. The layout of the integrated facility also functions as a good neighbour, protecting views and shielding some auditory disturbance from the yard.

The main point of access into the operations yard is located Northeast of the Eco Station, off the proposed secondary access road. Two additional points of access are provided West of the North operation program base with the understanding that these would act as the main points of access for the Fleet operations group and client base. The layout of the facilities results in a large, open, operations yard that provides good sight lines, efficient workflows and future flexibility. The heavy yard program and long-term storage is located further from the facilities with fleet parking generally located adjacent to the facilities optimize workflow between the highly active program types.

The proposed secondary access road located on the West edge of Ambleside includes a right-in / right-out access and will support enhanced circulation throughout the site given the expected vehicle volumes.

The facilities are sited so they are not situated over top of the ground surface of the drainage right-of-way, but the plan does propose to build over top of the deep South Edmonton Sanitary Sewer (S.E.S.S.) right-of-way. Building over the S.E.S.S. is permitted, although will require detailed consideration of foundations.

This scheme proposes at-grade parking for staff and operations parking.

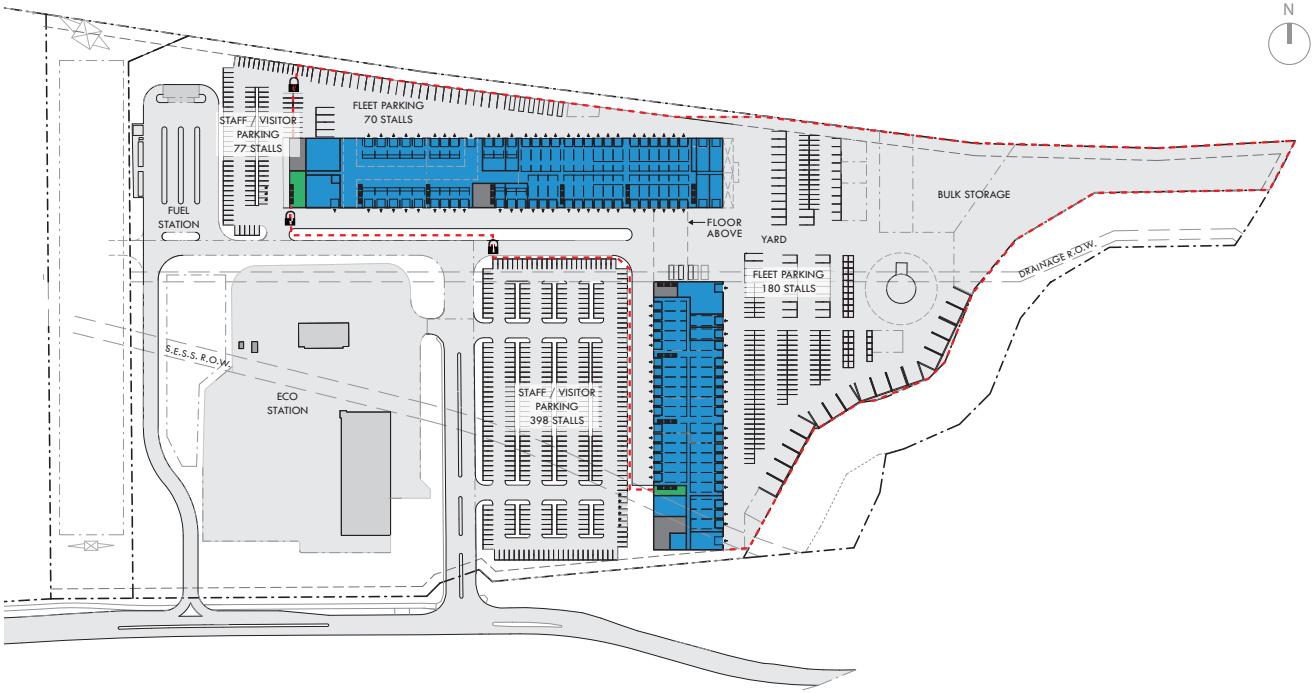


Figure 4.4j: Test Fit 5B - Main Floor Plan

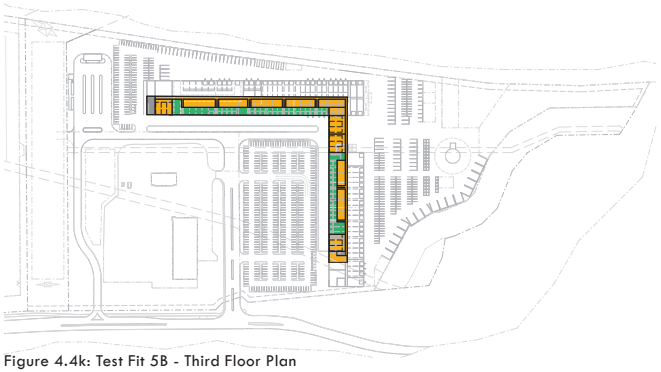


Figure 4.4k: Test Fit 5B - Third Floor Plan

LEGEND

- SECURE ENTRY POINT
- ADMINISTRATION
- STAFF SUPPORT
- OPERATIONS
- SERVICES
- MAIN ENTRY
- SECURE FENCING

STAKEHOLDER PRESENTATION 2 SUMMARY

Following the presentation of Test Fits 2B, 5, and 5B, a unanimous decision was made by the Operations Groups representatives to move forward with Test Fit 5B as the Final Master Plan Scheme as the mandate of the project was to accomplish an optimized site with the most program. Some minor changes and considerations were suggested by the Operations Groups, the first being the likelihood that the bulk storage would not be allowed by the City Development and Planning within the rear setback. Another discussed consideration was the use of stormwater as part of the operations washbays as it has been previously incorporated in an existing Fleet facility. It was decided that the reuse of stormwater would be investigated further in future design phases. During the conversation of north pedestrian access point of the South operations program base, the crossing over operations vehicle paths was highlighted as a potential safety concern. The use of a catwalk from the parking lot to the administration and staff support program located above the operations program was suggested.

The Roads Operations Group representative noted that the majority of the current Roads facilities used hard surfaces in the operations yards and that hard surfacing was required under granular storage areas to deal with run-off issues. The FMS operations group representative confirmed the shared workshop would be combined with the FMS carpentry bays considering the project's mandate to integrate and share program as much as possible. It was agreed that the shared workshop could be removed from the integrated program and all carpentry required on the site would be conducted in the FMS carpentry shops.

Given the decisions that came out of the presentation and subsequent meetings, the next steps for the Master Plan were to provide revisions to Test Fit 5B and present the final scheme on December 15, 2017.

4.5 STAKEHOLDER PRESENTATION 3

The revised Test Fit 5B was presented on December 15, 2017 to the CoE AIS Steering Committee along with a summary of the previously presented Test Fits. The CoE AIS Steering Committee unanimously agreed that Test Fit 5B would the final scheme presented in the Master Plan (refer to Section 5.0).

5.0

5.1 FINAL MASTER PLAN SCHEME

DESCRIPTION

The AIS Final Master Plan Scheme was presented and unanimously agreed to by the Stakeholders on November 15, 2017 and December 15, 2017 and illustrates a fully integrated, programmatically maximized site achieving 95-100% of the requested program from the Operations Groups. The scheme proposes a single integrated building that is connected at the top floor, linking the administration and staff support program across the two operation program bases and bridging over the drainage R.O.W.. The building clearly defines public space from the operations yard with a large staff and visitor parking lot at the Southwest corner of the site and a smaller staff parking lot located at the Northwest corner of the site for ease of access to the Fleet services component. The scheme features a large, open operations yard which produces efficient workflow, clear sight lines for the safety and flexibility of future operations. By situating the administration and staff support program above the operations bays the staff are consistently in close proximity to the resources they require.

During the December 15, 2017 Steering Committee presentation, the amount of parking stalls provided in the Final Master Plan Scheme came into question. It was discussed whether a parking stall to staff ratio of 1:1 was required and if this ratio could be modified to reduce the number of parking stalls provided on the site. It was determined that this ratio would be further explored during Schematic Design of the AIS.

After further review, the Fleet Operations Group representatives indicated the fuel station required additional in-depth design analysis. The City directed that the space allotted to the fuel station on the AIS in subsequent representations in the Master Plan should only be an illustration of location and general indication of required footprint with no specific design.

KEY CHARACTERISTICS

- 95-100% program achievement
- Single, integrated facility
- Removed stormwater retention pond with proposed underground water storage maximizing site area
- Large, open, operations yard
- Consistent close proximity between the administration, staff support, and operations program
- All parking at grade
- Accommodates all Operations Groups
- Requires development over the S.E.S.S.

TRAFFIC PLANNING

A Traffic Impact Assessment (TIA) was conducted for the AIS by Bunt & Associates Engineering Ltd. (See Appendix F). The report did not highlight any significant issues throughout the site; however, a traffic light was recommended to be installed at Ellerslie Road SW and the all-direction site access intersection. The remaining intersections are anticipated to operate well in both the AM and PM peak hours under the 2022 total traffic scenario.

STORMWATER MANAGEMENT CONSIDERATIONS

The final Master Plan scheme removes the stormwater retention pond by installing an underground storage system for stormwater management. Underground plastic chambers were recommended by the civil consultant for the required 17,000 m^3 of storage which are to be situated under the East portion of the operations yard. It is anticipated that the storage area will be divided into two subareas in order to avoid the drainage right-of-way. See Appendix G.3 for the full report.

During the November 15, 2017 Test Fit presentation it was requested by the Operations Groups representatives if the stormwater system could be incorporated into the operations program as it had been in other facilities for the use in the washbay system. It was later agreed that the incorporation of stormwater into the operations and building systems would be further explored during schematic design.

SUSTAINABLE CONSIDERATIONS

The CoE's latest amendment to its Sustainable Building Policy (Policy C532), dated May 2, 2017, establishes that all buildings meeting the requirements of the Policy shall be "designed and constructed to an environmentally sustainable standard that benefits all Edmonton residents, now and in the future."

Under this Policy, the AIS qualifies as "New Construction":

"All New Construction and Major Renovations will incorporate a Green Building Rating System framework to rate design to meet energy and environmental certification. LEED Silver will be the minimum design framework and certification standard."

It further states:

- The building must be formally certified LEED silver or higher
- The building will achieve 40% or greater energy efficiency than the Model National Energy Code for Buildings; 40% or greater greenhouse gas reduction than the NECB 2011 reference building; and shall not exceed 80 ekWh/m2 for Annual Heating Demand
- 1% of the total capital project budget of new construction will be dedicated to the incorporation of on-site renewable or alternative energy generation systems

The project will be registered with the CAGBC for LEED certification under LEED v4 as the AIS site will be LEED certified as a whole.

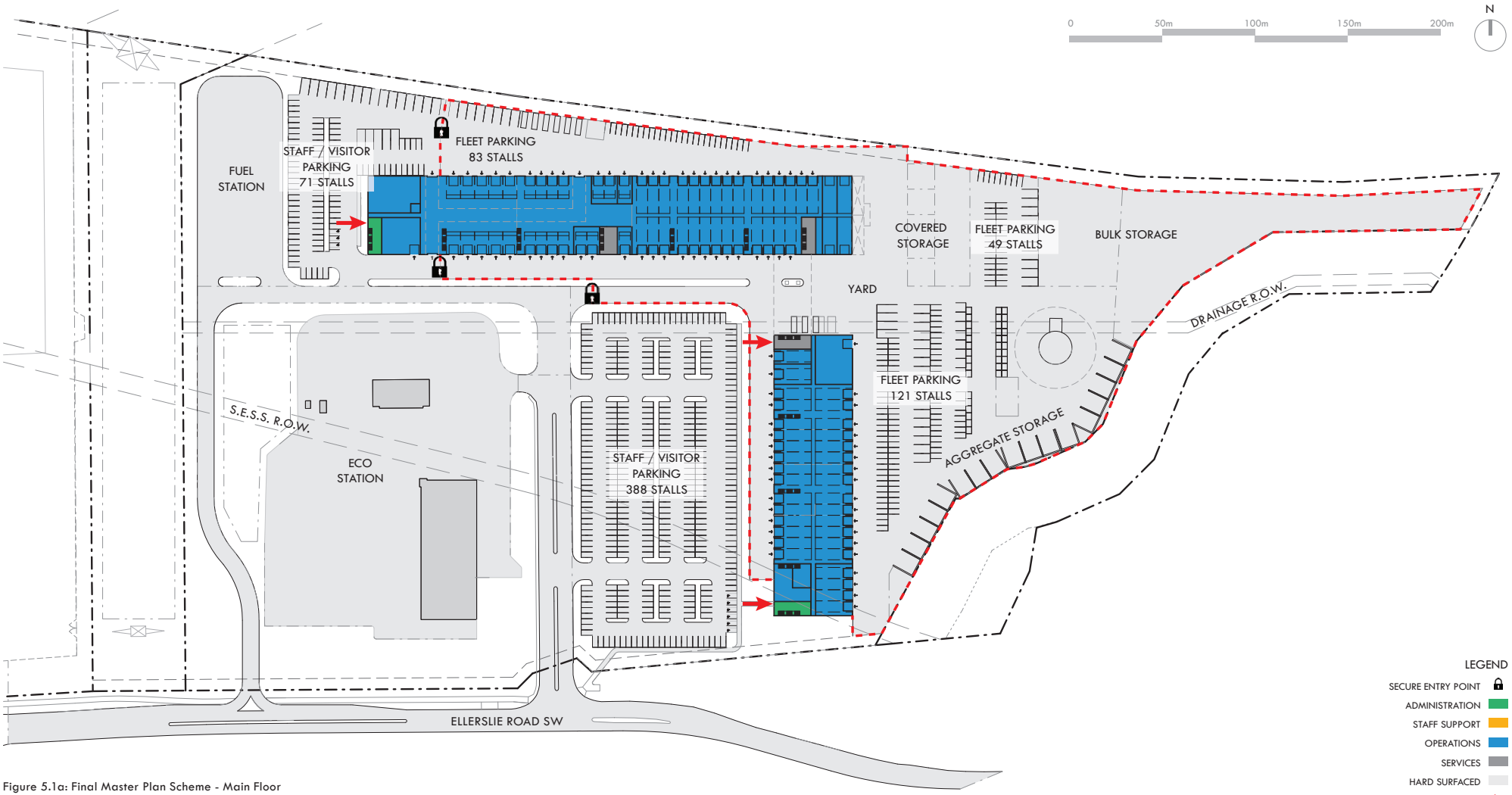


Figure 5.1a: Final Master Plan Scheme - Main Floor

Figure 5.1b: Final Master Plan Scheme - Second Floor Plan

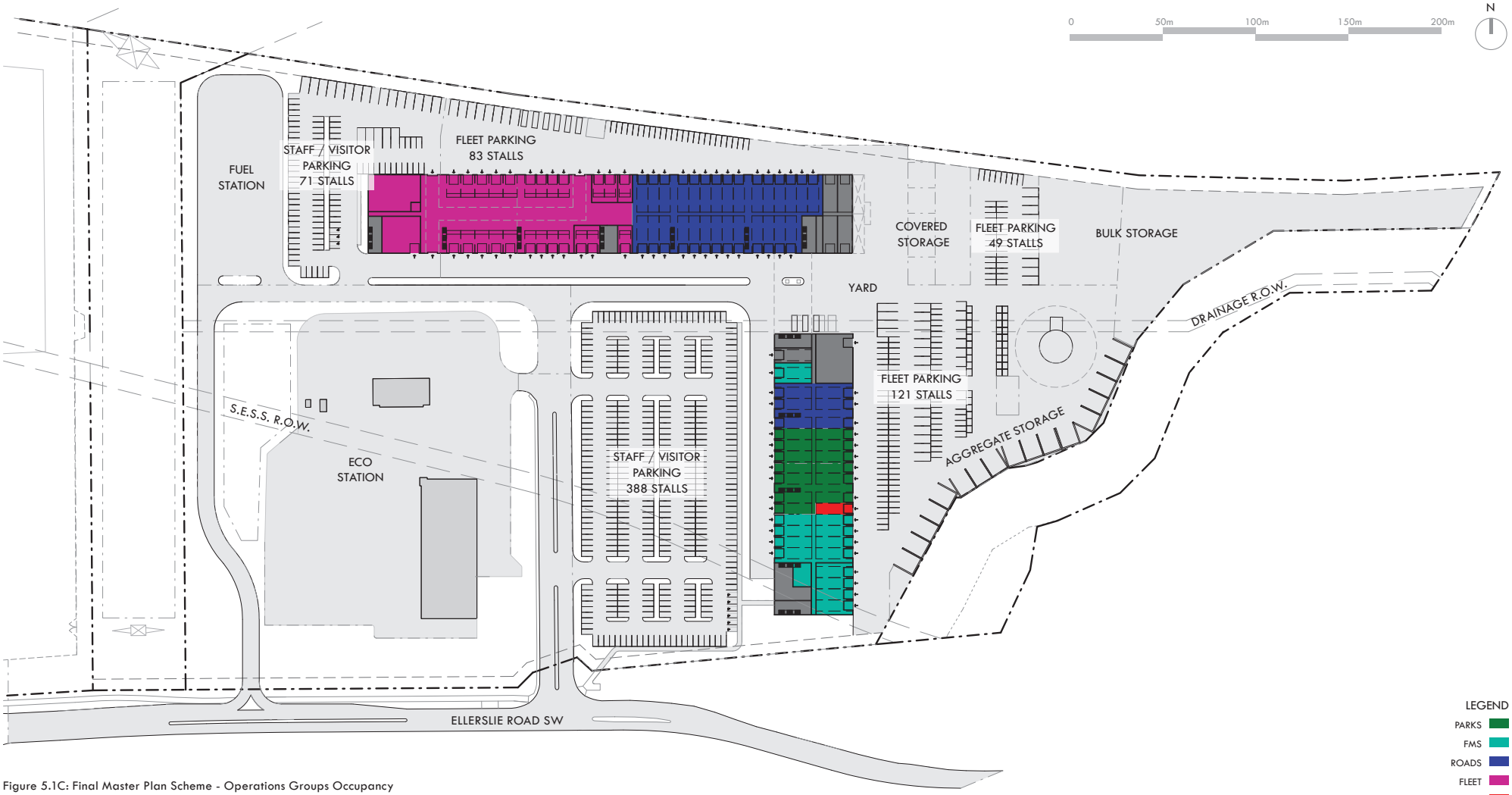


Figure 5.1C: Final Master Plan Scheme - Operations Groups Occupancy

5.2 KNOWN RISKS & OPPORTUNITIES

RISK MANAGEMENT MEETING

On December 10, 2015, a meeting was held with the CoE Risk Management department, the consultant group and the Owner Group to discuss any possible liabilities resulting from the Master Plan Scheme. Topics such as parking, traffic volume and separation of public and secure zones and mixing of public and service vehicular traffic and pedestrian flows were discussed. A number of minor risks were identified including Fleets' requirement for above ground fuel tanks and typical security risks associated with outdoor storage yards. No major risks were identified as a result of this meeting.

TOP OF BANK POLICY AND RAVINE SETBACK

Three documents were utilized to investigate the potential usage of the 33m setback (refer to Figure 5.2a) on the eastern edge of the site:

1. The Windermere Area Structure Plan: This document outlines the requirement to maintain a 33m setback from the top of bank;
2. The Geotechnical Investigation for the Proposed South West Integrated Service Site by Hoggan Engineering and Testing: This document defines the location of the top of bank (TOB); and
3. The CoE Policy C542, Development Setbacks From River Valley/Ravine Crests: This policy permits residential, public amenity, parks, trails and roadways to be located within the setback at the TOB. Non permitted uses require a public hearing and a written request per Section 606 of the MGA (Municipal Government Act).

Based on this information available, the Final Master Plan Scheme has been designed without locating any programmed area within the TOB setback. Any future proposed building within the setback or landscaping will require obtaining the required approvals with the City.

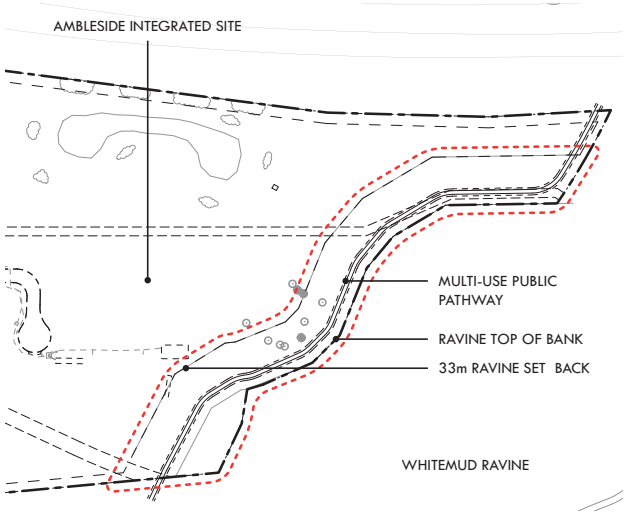


Figure 5.2a: Top of bank setback and Whitemud Creek Ravine

APPROVAL OF SECONDARY ACCESS

In the stakeholder meeting on December 8, 2015 during the Ambleside Master Plan Version 1, the decision was made by the Steering Committee that a secondary access would be incorporated to address anticipated internal traffic volume and to enhance vehicular circulation for the site, a need that was particularly important to the new fueling station. Two options were presented: one which connects directly to Ellerslie Road and the other which connects to the existing, adjacent snow dump service road.

During subsequent meetings it was determined that the direct connection to Ellerslie Road would be the best option pursued for the AIS. This option was considered to be the preferred option for several reasons, the first being in order to connect to the snow dump service road, the secondary access road would be required to cross the Altalink Utility R.O.W.; this was considered to be a high risk option to the project due to no guarantee of approvals being obtained from Altalink. Direct connection to Ellerslie Road was also preferred due to this being a more efficient option than connecting to the snow dump service road as well as a safer option due to less interaction with additional heavy vehicles.

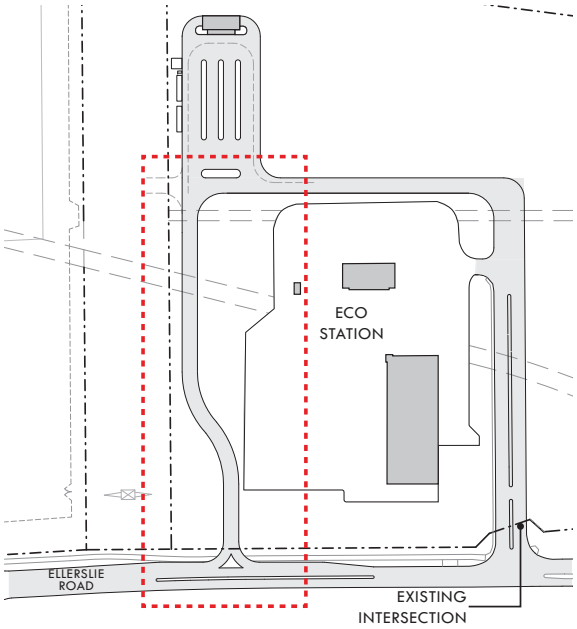


Figure 5.2b: Secondary access road with direct access to Ellerslie Road

The direct connection to Ellerslie Road was designed in consultation with Bunt, a transportation consultant, who determined the distancing required between existing intersections onto Ellerslie Road. For this reason, the secondary access has a gentle bend rather than a straight configuration between the fuel station and Ellerslie Road.

The risk associated with the secondary access is that it will require approval from the existing Eco Station. It is recommended that negotiations with the Eco Station begin as early as possible in order to provide the required secondary access. The benefit of the road as discussed by the Steering Committee is that it would provide a second access not only for the new development at Ambleside, but for the Eco Station as well.

Direct Connection To Ellerslie Road:

Figure 5.2b proposes a right-in/right-out intersection at Ellerslie Road SW. A four-way intersection is not possible at this location due to the close proximity of the existing Jagare Ridge Golf Course and AIS intersections.

This is currently proposed in the Final Master Plan Scheme with some adjustments made to maximize site area usage. The schope of this work includes the following:

- Development of a right turn bay
- Removal and relocation of surface utilities, boulevard trees and shared use path
- Development of a median
- Widening of Ellerslie Road to the south to accommodate the median

UTILITY RIGHT-OF-WAYS

The Final Master Plan Scheme avoids locating buildings within any of the registered utility right-of-ways other than the S.E.S.S. R.O.W.. An agreement between the City and the utility owner has not yet been established to permit construction on the S.E.S.S. utility right-of-way R/W PLAN 142 2246. However, an agreement is registered for the adjacent property to the West (Lot 1 Block 2 Plan 072 1202) Alberta Government Services Land Titles Office Document 142138840 Section 5.4 states:

The Owner may, Pursuant to section 5.1 of this Agreement, construct and maintain improvements on or below the surface of the Right-of-way subject to the following conditions:

4. the construction or maintenance of the Owner's improvements shall not interfere with the operation or maintenance of the Tunnel;
5. the Owner's improvements or any part of them shall not extend below an elevation equal to five times the external diameter of the Tunnel, measured from the top of the Tunnel;
6. the Owner shall take all necessary steps, including, without limitation, retaining a professional engineer, to satisfy itself that the presence of the Tunnel will not have any adverse effect on the Owner's improvements nor on the bearing capacity of the ground above the Tunnel and settlement of the ground above the Tunnel; and
7. the City's permission hereunder shall not be deemed or construed to be an approval of, without limitation: compliance of the Owner's improvements with municipal bylaws, building code or other applicable laws, regulations, guidelines, codes or policies; nor suitability or compatibility of the Owner's improvements with the Tunnel in the Land.

Additional information will be required to facilitate the possibility of a future agreement with the utility owner and to execute such a potential agreement for the AIS.

LAND ACQUISITION

The secondary access road, in both options, is located on land that was purchased for the Ambleside Eco Station development in 2009. The parcel was acquired to address

current and anticipated growth in the Eco Station program and future service level changes in the SW by the Waste Services Branch. Further discussion and negotiation is required with Utility Services Branch regarding property acquisition prior to approval of the secondary access road.

LAND PURCHASE

The current Land Management Strategy is such that the land at Ambleside will need to be purchased at book value. See Appendix E.2 for current holding ownership and book costs provided during the AMPV1. Currently the land is held by Transportation. However, the Land Management Strategy is currently under re-development and part of this discussion includes considering land transfers rather than land purchases between departments. Whether land at Ambleside will need to purchased or transferred will impact project budgets and will be ongoing in the next phase of the project.

LANDSCAPING

Given the amount of program on the ground level of the AIS Final Master Plan Scheme it is expected that achieving the required landscaping requirements as stated by the CoE bylaws (Appendix C) will be a challenge. Some preliminary solutions have been explored to mitigate these challenges:

- Section 55.3d of the Edmonton Zoning Bylaw 12800 (refer to Appendix C.2) states the Development Officer may vary the required trees and shrubs on a site for a Public Park Use. This is a potential solution and would rely on the discretion of the Development Officer.
- The 33m Top of Bank setback is also a potential planting area to achieve the required landscaping; however, the use of the setback would require the approval of the CoE and potentially require additional studies to assess the condition of the soil in the setback to ensure that landscaping would not compromise the stability of the bank.

These potential solutions will be further explored during schematic design of the AIS with the support of a landscape architect.

UNDERGROUND STORMWATER STORAGE SYSTEM

Matrix Solutions Inc. provided recommendations and preliminary costing for the Cultec Recharger 902HD stormwater chamber system for the replacement of the stormwater pond located on the Ambleside site (refer to Appendix G.3). Through review of the product information it was discovered that the maximum weight the chamber system could support was 40,000 lbs per vehicle axle (refer to Appendix H). The initial review of the vehicles to be used on the AIS indicated that the system should be sufficient for the vehicles' weight; however, a detailed analysis of the current and future vehicles to be used at the integrated facility should be conducted during schematic design to ensure the appropriate system is installed on the AIS.

EXISTING SOIL MOUNDS

Four Soil mounds are located in the northwest area of the site. There is the potential to use these soil mounds as infill for the stormwater pond; however, the content of the soil must be confirmed. If reports describing the content of the mounds currently exist a review is required and if no assessments have been conducted a study will have to be organized in upcoming phases of the project.

A

City Operations

Business Model Principles

We continually balance cost and citizen satisfaction across all services.

We design our services with empathy for the citizen experience.

Our services are integrated.

We design our services with a systems view.

We invest in ideas and innovation that bring exponential improvement.

Predictability and efficiency are the basis of our credibility.

Empowered and accountable leaders and staff produce results.

We keep Edmonton working, moving and thriving - a place citizens are proud of.

City Operations
Business Model Principles Details

We continually balance cost and citizen satisfaction across all services.

- We adjust the distribution of services and resources to maximize their value to citizens; we're willing to make choices and tradeoffs to maximize citizen value.
- We deliver services as a Department, not Branches.
- We take an interest-based approach to decision-making.

We design our services with empathy for the citizen experience.

- We seek input from citizens on how to define and determine value.
- Citizen satisfaction drives our service standards.
- The design of our services is informed by citizens. We proactively engage them.
- We use a principle-based approach (not only a rule-based approach) as we serve.

Our services are integrated.

- We go beyond coordination and are collaborative in our decision-making.
- We work horizontally across lines of business, processes, functions and departments to achieve outcomes for the City as a whole.
- Integration is hardwired into processes, roles, and decision-making across departments.
- We are coordinated in our service delivery and believe in a "once and done" approach.

We design our services with a systems view.

- We are committed to the best way of delivering a service.
- We leverage our skills and efforts and those of others in the best interests of the citizen, City and Department.
- We share our knowledge and best practices across the Department.

We invest in ideas and innovation that bring exponential improvement.

- We are attentive to our changing world and evolve with the times.
- We seek to bring new ideas and innovation into our business.
- We seek to disrupt old models and assumptions and embrace contemporary ones.
- We take informed risks by piloting new ideas and scaling our approach.

Predictability and efficiency are the basis of our credibility.

- Citizens and Council has trust and confidence in City Operations to "be there" when it counts.
- Our licence to innovate is grounded in our track record of delivery.
- Assessment of our performance is independent from delivery.

Empowered and accountable leaders and staff produce results.

- Clearly defined roles and responsibilities are the basis of accountability.
- Leadership roles are focused on "working on the business" (vs. "in the business").
- Leadership is built daily, not in a day.
- We take responsibility for our actions, commitments and behaviours.

city operations

our VISION

We keep Edmonton working, moving and thriving – a place citizens are proud of.

our MISSION

We are municipal service delivery leaders who operate with the trust and confidence of Council and citizens.

We take an integrated, innovative and efficient approach to everything we do.

We are leaders in environmental stewardship.

We demonstrate value through openness, honesty and by taking responsibility.

We celebrate our successes and learn from our experiences.

our COMMITMENTS

SAFETY
We have an uncompromised commitment to the safety of employees and citizens.

RESPECT
We always treat each other and citizens with the utmost respect.

EXCELLENCE
We achieve results through innovation, engagement, collaboration and a relentless pursuit of service excellence.

ADAPTABILITY
We are flexible, allowing us to respond to a changing environment and anticipate evolving needs.

our LEADERSHIP PRINCIPLES

A leader with the City of Edmonton is a visionary, credible and trusted role model who inspires and challenges others to achieve their full potential.

We are one city

We are proud to serve the public

As stewards we lead

We do as we say

I make a difference every day

APPENDIX B: COE VISIONING SESSION

B

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the marc boutin architectural collaborative inc.
marc boutin, Architect, AAA, Principal
www.the-mbac.ca

Ambleside Integrated Site

Visioning Workshop Summary

PROJECT:	**Ambleside Integrated Site**
OWNER/OWNER'S REPRESENTATIVE:	Ferdinand Sobernig, City of Edmonton, Project Officer Facility and Landscape Infrastructure
PRIME CONSULTANT:	the marc boutin architectural collaborative inc.
MEETING DATE:	November 25, 2016
APPROXIMATE TIME:	10:00PM – 2:00PM
MEETING LOCATION:	Commonwealth Community Recreation Centre, Green & Gold Room
LIST OF ATTACHMENTS (IF REQUIRED):	
ATTENDEES:	City Of Edmonton: **Integrated Infrastructure Services** Ferdinand Sobernig Nicole Howard Ashley Hoogenboom Barb Ireland **Sustainable Development** Scott Varga **City Operations - Parks + Roads Services** Gord Cebryk Peter Millar Howard Holowach Darryl Mullen Dwayne Cunningham **City Operations - Fleet and Facility Services** Steve Rapanos Paul Specht **City Operations - Utility Services** Chris Ward Ryan Kirstiuk Consultant Team: **The Marc Boutin Architectural Collaborative** Marc Boutin, Kristin St.Arnault **Perkins+Will** Marc Haberli

A new City Operations vision has been developed by the City of Edmonton which aims at to realize an integrated approach for the delivery of services and for the development of City Operation sites. A visioning workshop was held on November 25th, 2016 to bridge this new vision and the design of future operations sites. This workshop was attended by the City of Edmonton Operations Leadership Team, potential City Operations site tenants, the City of Edmonton Ambleside project team, Perkins + Will, and The Marc Boutin Architectural Collaborative.

The visioning workshop was structured into three separate sections; 1) Provoke Thinking, 2) Exchange Information, and 3) Bridging to Tomorrow Exercise. Below is a summary of the content shared and a synopsis of the discussions that followed.

1) Provoke Thinking;

   Following a brief workshop introduction and round table discussion, an analysis of the Ambleside Integrated Site was presented by the consultant. This site analysis provided context to the location, access, geography, adjacencies, existing infrastructure, challenges and opportunities of the Ambleside Site.

   The Operations Leadership Team then addressed the group in describing and reinforcing the goals, relevance, and importance the recently developed City Operations Vision Statement, Mission Statement, and business model principles.

   The fundamental message that was communicated was that of an integrated approach towards the development of operations sites. It was expressed that the previously segregated approach to towards development is no longer supported. Efficient, creative, and collaborative means of delivering services which maximize site use, reduce redundancy, and increase future flexibility will be the goals for future City Operations developments. The Ambleside Integrated Site is trusted to be a model for this new city vision.

   This message was greeted with unanimous support by all attendees. It was generally acknowledged that this new vision offered opportunities that would reduce inefficiencies, facilitate better delivery of services, and promote a more holistic and forward manner of thinking about city operations development.

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2) Exchange Information;

The consultant shared a diagrammatic comparison of the Ambleside Integrated Site alongside existing City of Edmonton Operations facilities. This comparison was aimed at providing the stakeholders with a better understanding of the available site area in order to assess, at a high level, if the stakeholder's desired site use could be accommodated on this site. This diagrammatic comparison instigated an unexpected, but robust and productive, conversation about why the City of Edmonton no longer wants to develop operations sites in the existing and conventional manner. Again, the concept of integration and collaboration was reinforced.

Further lessons learnt from the previous Ambleside Integrated Site Master Plan process were shared by the consultant. The following points were shared and discussed:

- Site boundary and existing infrastructure predetermines possible building locations.
- Single current site access with potential for a secondary site access.
- Importance of funding structure that is aligned with project goals.
- Commitment of stakeholder groups prior to the master planning process.
- Support & clear direction from leadership empowered the steering committee, and enabled the project to move forward.
- Clarity of program, user needs & work flow facilitates the quality and stability of design decisions.
- Realization of a broader site vision necessitates the alignment of individual stakeholder goals.

City Operations stakeholder groups whom have expressed interest in occupying the Ambleside site were invited to share their reasons for the choice of the Ambleside Integrated Site. The reasons described by all City Operations groups were similar in that there is a clear need to service south Edmonton, a need that will continue to increase in the future. It was further clarified that the Ambleside Integrated Site location will reduce travel distance and response times.

The broader City needs were discussed. It was questioned whether the Ambleside Integrated Site was best suited to serve south Edmonton. It was also suggested that City Operations should evaluate their business models and assess how services need to be delivered. It was acknowledged that the way the City operates and serves it`s citizens will continue to evolve towards improvement; as such the Ambleside Integrated Site should be designed to anticipate and facilitate change in order to future-proof this City investment. This discussion was in alignment with, and further supported, the recently developed City Operations Vision Statement, Mission Statement, and business model principles.

3) Bridging to Tomorrow

Stakeholders were posed three different questions with the purpose to frame and broaden their thinking about City Operations. The three questions positioned the participant as either a neighbour, an employee or the Mayor of Edmonton. The goal was to put the participant 'into someone else's shoes' in order to derive themes and insights about future operations facilities. A summary of this exercise is included in Appendix A.

A discussion around next steps concluded that a Synergy and Gap Analysis would be undertaken to assess the needs, challenges, and opportunities with current Operations programmatic uses and workflows. Through this process a roadmap could be developed for the future development of all City of Edmonton Operations sites ensuring alignment with the new City Operations Vision Statement, Mission Statement, and business model principles.

Prepared by: Kristin St.Arnault on behalf of the marc boutin architectural collaborative inc. and Perkins+Will.

Appendix A

Bridging to Tomorrow Exercise Summary

AMBLESIDE

INTEGRATED SITE MASTER PLAN

The following pages summarize the comments from the Stakeholder Visioning Session held on November 25, 2016. The participants included:

- CoE Integrated Intrastructure Services [Ashley Hoogenboom, Barb Ireland, Ferdinand Sobernig, Nicole Howard]
- CoE Sustainable Development [Scott Varga]
- CoE City Operations - Parks + Roads Services [Gord Cebryk, Peter Millar, Howard Holowach, Darryl Mullen, Dwayne Cunningham]
- CoE City Operations - Fleet and Facility Serivces [Steve Rapanos, Paul Specht]
- CoE City Operations - Utility Services [Chris Ward, Ryan Kirstiuk]

Session Moderators

- the marc boutin architectural collaborative inc. [Marc Boutin, Kristin St. Arnault]
- Perkins+Will [Marc Haberli]

Stakeholders were posed three different questions with the purpose to frame and broaden their thinking about City Operations. The three questions positioned the participant as either a neighbour, an employee or the Mayor of Edmonton. The goal was to put the participant into someone else's shoes in order to derive themes and insights about future operations facilities. Some comments are duplicated as they were either mentioned more than once or fit into multiple categories.

THEME SUMMARY

A NEIGHBOUR:

Good Neighbour
- » Reduce Negative Impacts: Sight, Smell + Sound
- » Reduce Negative Impacts: Traffic + Safety

Positive Public Perception
- » Approachable + Transparent
- » Community Events + Public Space

Exceptional Service Provider
- » Consistent + Dependable
- » Delivery Improvement

Environmental Leader

AN EMPLOYEE:

Quality Work Environment
- » Staff Empowerment
- » High Quality Facility + Site
- » Location + Access

Operational Innovator
- » Collaborative Environment
- » Progressive Operations

Career Development
- » Career Development Opportunities
- » Employee Appreciation

Open Communication

THE MAYOR OF EDMONTON:

Quality Work Environment
- » Staff Empowerment
- » High Quality Facility + Site

Operational Innovator
- » Collaborative Environment
- » Progressive Operations

Exceptional Service Provider
- » Consistent + Dependable
- » Delivery Improvement

Environmental Leader

Good Neighbour
- » Reduce Negative Impacts: Traffic + Safety

Positive Public Perception

Career Development
- » Employee Appreciation

Staff Health + Wellness

Life Cycle Design

NEXT STEPS The themes, sub-themes and comments from this Stakeholder Visioning Session Summary will be utilized in conjunction with future stakeholder engagement to continue to develop project Design Principles. The goal of the Design Principles will be to find synergy and alignment with City Operations' Business Model Principles in order to achieve the Business Model Principles through design.

LEGEND:

THEME

Theme summary description

» *Design consideration*

SUB-THEME

» Stakeholder comment

AMBLESIDE

INTEGRATED SITE MASTER PLAN

A NEIGHBOUR

Consider that you are writing a positive letter to your local newspaper about your impressions of the Ambleside Integrated Site.

GOOD NEIGHBOUR

As a Good Neighbour, facilities shoud integrate into the community in a safe and respectful manner, preventing a negative impact of visual, auditory and odour issues.

The design of the site + facility should:

- *create an organized and safe environment*
- *prevent views into yard*
- *minimize impacts of noise + odours*
- *provide respectful site lighting*
- *mitigate negative impact to traffic*

REDUCE NEGATIVE IMPACTS: SIGHT, SMELL, SOUND

- Aesthetically pleasing facility
- Transparent
- View into the site: organized, clear, instill confidence
- Designed so that the yard is not disruptive to community
- Yard fits into neighbourhood
- Not extravagant but well organized
- Don't notice that yard is there – doesn't impact negatively
- Respectful integration of public facilities
- Clean and tidy yards separated by barrier
- They are a good neighbour
- Back-up signals minimized / noise wall
- No smells and noises

REDUCE NEGATIVE IMPACTS: TRAFFIC + SAFETY

- No negative impacts
- No traffic or safety issues
- No traffic impacts to community
- Efficient traffic flow - deliveries

POSITIVE PUBLIC PERCEPTION

Beyond the commitment to provide exceptional operational services, facilities should become a part of their communities, first through their legibility as a service provider, and second, through their community engagement initiatives.

The design of the site + facility should:

- *be welcoming*
- *foster an understanding of how services are delivered and benefit citizens*
- *incorporate public spaces for community use*

APPROACHABLE + TRANSPARENT

- Good communication with other neighbours: a "good neighbour" policy
- Proud of community: "I live here"
- Feel comfortable to go to them for any issue
- I feel I can go to them for any issue
- Became part of my neighbourhood
- I have greater appreciation for what the City does for me
- Regular community engagement

COMMUNITY EVENTS / PUBLIC SPACE

- BBQ sessions / public use space
- Regular community engagement

EXCEPTIONAL SERVICE PROVIDER

City Operations should be committed to providing the community with consistent, dependable services that are continually improved upon.

The design of the site + facility should:

- *facilitate highly organized work flow*
- *allow for clear, effective circulation + access*
- *be adaptive and flexible, allowing for the continual improvement of services*

CONSISTENT + DEPENDABLE

- Consistent service; timely
- Confidence in the services; dependable and reliable
- Quick snow removal (good service)
- Services are meeting my expectations
- Proud of the efficiency of how my tax dollars are spent
- Efficient traffic flow - deliveries

DELIVERY IMPROVEMENT

- Improved service response times
- Services are improved
- Response to service requests faster

ENVIRONMENTAL LEADER

Leading by example, City Operations should encourage the protection and respect of the environment, first, through the design and construction of facilities, and second, through day-to-day operational processes.

The design of the site + facility should:

- *incorporate sustainable practices*
- *minimize impacts of noise + odours*
- *encourage sustainable operations*
- *protect natural areas*

ENVIRONMENTAL STEWARDSHIP

- Sustainability of facility - quality
- Back-up signals minimized / noise wall
- No smells and noises

AMBLESIDE

INTEGRATED SITE MASTER PLAN

AN EMPLOYEE

Consider you are applying for a job in numerous cities. What would make you choose City of Edmonton Operations?

QUALITY WORK ENVIRONMENT

Facilities should foster an empowering, organized and safe working environment where staff have pride and ownership in day-to-day operations.

The design of the site + facility should:

- *create an organized, safe and high quality working environment*
- *become emblematic of the commitment to quality services*
- *provide clear and effective work flow*
- *encourage ownership + empowerment*
- *consider staff input*

STAFF EMPOWERMENT

- Empowered
- Pride + Passion
- More access to better resources
- Good working culture
- Built with input from staff

HIGH QUALITY FACILITY + SITE

- Amazing work place and site conditions
- Great work environment – Safe, organized, clean, comfortable, good amenities – “People know what they are doing”
- Dynamic working environment
- Well organized + impressive working environment
- Working in state of the art workplace
- Great workplace environment
- Providing safe, efficient and quality facility

LOCATION + ACCESS

- Ease of getting to work

OPERATIONAL INNOVATOR

As an innovator, City Operations should become a leader in collaborative and progressive operations, serving as an exemplary model to other institutions.

The design of the site + facility should:

- *be adaptive and open*
- *encourage collaborative operations*
- *foster continual operational improvements*
- *support innovative technology + equipment*

COLLABORATIVE ENVIRONMENT

- Collaboration
- Collectively awesome
- Cross-pollination of exposure to new tasks

PROGRESSIVE OPERATIONS

- City is progressive
- An innovative employer

CAREER DEVELOPMENT

With a focus on employee satisfaction, City Operations should support career growth and development.

The design of the site + facility should:

- *allow employees flexibility and control to improve upon day-to-day operations*
- *incorporate staff amenities and training spaces*
- *create an organized, safe and high quality working environment*

CAREER DEVELOPMENT OPPORTUNITIES

- Career profession
- Opportunity
- Stability yet flexibility
- Networking
- Employer supports employees towards fulfillment
- Best work force through employee development
- Training opportunities
- Job mobility
- A great reputation as an employer
- Value added personal services + programs

EMPLOYEE APPRECIATION

- Award – Top Employee
- Employer values their employees
- Input is valued and actioned

OPEN COMMUNICATION

City Operations should encourage communication between employer and employee. Open discussion of ideas and expectations will allow for the continual improvement of how services are provided to the community.

The design of the site + facility should:

- *provide adaptive and transparent working environments*
- *optimize ease of access, functional clarity and intuitive circulation between departments*
- *incorporate formal + informal meeting spaces*

EMPLOYEE~EMPLOYER COMMUNICATION

- Open discussion on ideas + results
- Understand broader philosophy and role in that structure
- Clear job description
- Workload is manageable
- Expectations are clear

AMBLESIDE

INTEGRATED SITE MASTER PLAN

THE MAYOR OF EDMONTON

Consider you are the Mayor of Edmonton seeking more funding from the Premier of Alberta. You use the new Ambleside Integrated Site as a successful, innovative model in making your agrument for additional funding.

QUALITY WORK ENVIRONMENT

Facilities should foster an empowering, organized and safe working environment where staff have pride and ownership in day-to-day operations.

The design of the site + facility should:

- *create an organized, safe and high quality working environment*
- *become emblematic of the commitment to quality services*
- *provide clear and effective work flow*
- *encourage ownership + empowerment*
- *consider staff input*

STAFF EMPOWERMENT

- Empower staff – better service, better city
- Proud of work + serving Edmontonians

HIGH QUALITY FACILITY + SITE

- Leading edge highly integrated + efficient workforce and supporting infrastructure
- Value added by efficiencies

OPERATIONAL INNOVATOR

As an innovator, City Operations should become a leader in collaborative and progressive operations, serving as an exemplary model to other institutions.

The design of the site + facility should:

- *be adaptive and open*
- *encourage collaborative operations*
- *foster continual operational improvements*
- *support innovative technology + equipment*

COLLABORATIVE ENVIRONMENT

- Leading edge highly integrated + efficient workforce and supporting infrastructure
- Integrated Approach – One City
- Integrated “One City” – eliminate silos
- Networked system of service delivery

PROGRESSIVE OPERATIONS

- Leading edge highly integrated + efficient workforce and supporting infrastructure
- International recognition for innovation
- Change in culture for better solutions
- Ambleside is catalyst for future sites
- Edmonton can do it better
- Change culture – focus on services to citizen

EXCEPTIONAL SERVICE PROVIDER

City Operations should be committed to providing the community with consistent, dependables services that are continually improved upon.

The design of the site + facility should:

- *facilitate highly organized work flow*
- *allow for clear, effective circulation + access*
- *be adaptive and flexible, allowing for the continual improvement of services*

CONSISTENT + DEPENDABLE

- Demonstrates best practices of planning and delivery of services

DELIVERY IMPROVEMENT

- Value for money; demonstrate huge return on investment; value for tax dollars
- Networked system of service delivery

ENVIRONMENTAL LEADER

Leading by example, City Operations should encourage the protection and respect of the environment, first, through the design and construction of facilities, and second, through day-to-day operational processes.

The design of the site + facility should:

- *incorporate sustainable practices*
- *minimize impacts of noise + odours*
- *encourage sustainable operations*
- *protect natural areas*

ENVIRONMENTAL STEWARDSHIP

- Environmental sustainability
- Minimal impact to environment
- State of the art in terms of eliminating greenhouse gases, low impact site design, LEED Gold Design

GOOD NEIGHBOUR

As a Good Neighbour, facilities shoud integrate into the community in a safe and respectful manner, preventing a negative impact of visual, auditory and odour issues.

The design of the site + facility should:

- *create an organized and safe environment*
- *prevent views into yard*
- *minimize impacts of noise + odours*
- *provide respectful site lighting*
- *mitigate negative impact to traffic*

REDUCE NEGATIVE IMPACTS: TRAFFIC + SAFETY

- Community-centric sites that are safe

AMBLESIDE

INTEGRATED SITE MASTER PLAN

THE MAYOR OF EDMONTON *(continued)*

Consider you are the Mayor of Edmonton seeking more funding from the Premier of Alberta. You use the new Ambleside Integrated Site as a successful, innovative model in making your agrument for additional funding.

CAREER DEVELOPMENT

With a focus on employee satisfaction, City Operations should support career growth and development.

The design of the site + facility should:

- *allow employees flexibility and control to improve upon day-to-day operations*
- *incorporate staff amenities and training spaces*
- *create an organized, safe and high quality working environment*

EMPLOYEE APPRECIATION

- Professional recognition awards for Ambleside Site

POSITIVE PUBLIC PERCEPTION

Beyond the commitment to provide exceptional operational services, facilities should become a part of their communities, first through their legibility as a service provider, and second, through their community engagement initiatives.

The design of the site + facility should:

- *be welcoming*
- *foster an understanding of how services are delivered and benefit citizens*
- *incorporate public spaces for community use*

APPROACHABLE + TRANSPARENT

- Citizens are proud of way Ambleside model is done

STAFF HEALTH + WELLNESS

Considering that employees are at the heart of delivering quality services to the community, City Operations should support staff health and wellness from providing a safe working environment to staff amenities to a quality place to work.

The design of the site + facility should:

- *create an organized, safe and high quality working environment*
- *become emblematic of the commitment to quality services*
- *incorporate staff amenities*
- *provide views and connection to the outdoors*

EMPLOYEE HEALTH + WELLNESS

- Promote wellness of employees
- Stronger more effective employees – understand why

LIFE CYCLE DESIGN

Beyond designing a facility that will meet expectations for current service delivery models, City Operations should plan for the future. Facilities should accommodate future growth and consider the operational and maintenance impacts of design decisions.

The design of the site + facility should:

- *allow for ease of future growth*
- *incorporate sustainable, durable and high quality materials and systems that minimize impacts to operational maintenance*
- *consider short and long term savings in terms of choice of materials, systems and building components*

PLANNING FOR THE FUTURE

- Edmonton's Ambleside best to meet any growth needs
- Long and short term savings

C

C.1 SITE INFORMATION

Legal Address: Lot 1, Block 1, Plan 0721202
Municipal Address: 14320 Ellerslie Road SW, Edmonton AB
Land use designation: (PU) Public Utility Zone
Land use bylaw: Edmonton Zoning Bylaw 12800
Community: Ambleside
Ward: 76
Policy plans: Ambleside Neighbourhood Structure Plan + Windermere Area Structure Plan
Height restriction: 18.0m

C.2 LAND USE BYLAW REVIEW

The following section identifies sections of the Edmonton Zoning Bylaw 12800 that directly apply to the Master Plan.

520. (PU) PUBLIC UTILITY ZONE

520.1 General Purpose

The purpose of this Zone is to provide for a system or works that is used to provide for public consumption, benefit, convenience or use such as water or steam, sewage disposal, public transportation, irrigation, drainage, fuel, electric power, heat, waste management and telecommunications.

520.2 Permitted Uses

1. Land Treatment
2. Minor Impact Utility Services
3. Protective and Emergency Services
4. Fascia On-premises Signs
5. Projecting On-premises Signs
6. Temporary On-premises Signs

520.3 Discretionary Uses

1. Major Impact Utility Services
2. Public Parks
3. Recycled Materials Drop-off Centres
4. Freestanding Off-premises Signs, in a location where such Signs lawfully existed as of the Effective Date of this Bylaw, and that such Signs shall not be subject to the Setback provisions of this Zone
5. Freestanding On-premises Signs
6. Minor Digital Off-premises Signs, in a location where such Signs lawfully existed as of the effective date of Bylaw 15892
7. Minor Digital On-premises Off-premises Signs, in a location where such Signs lawfully existed as of the effective date of Bylaw 15892
8. Minor Digital On-premises Signs, in a location where such Signs lawfully existed as of the effective date of Bylaw 15892

520.4 Development Regulations for Permitted and Discretionary Uses

1. The minimum Front Setback shall be 6.0 m.
2. The minimum Rear Setback shall be 7.5 m.
3. The minimum Side Setback shall be 4.5 m.
4. The maximum building Height shall be 10.0 m, except that the maximum building Height shall be 18.0 m on Sites of 0.75 ha or greater. Where a building exceeds 10.0 m in Height, the subject Site shall be designed, landscaped, screened and buffered and the building shall be located so as to minimize and compensate for any objectionable aspects or potential incompatibility with development in abutting Zones.
5. Except as provided for in clause (6), developments in this Zone shall comply with the Industrial Performance Standards applicable to the IB Zone.
6. Where it is unreasonable for a development to comply with clause (1), (2), (3), (4) or (5) because of characteristics fundamental to the provision of infrastructure services, the Development Officer may relax requirements of clause (1), (2), (3) or (4), as required, and he may relax the requirements of clause (5), provided the development complies with the Performance Standards of the IM and IH Zones. In either case, a Permitted Use shall become a Discretionary Use.
7. Signs shall comply with the regulations found in Schedule 59C.

520.5 Additional Development Regulations for Discretionary Uses

1. Where a development does not comply with the requirements of subsections 520.4(1) and (2), its design, siting, landscaping, screening and buffering shall minimize and compensate for any objectionable aspects or potential incompatibility with development in abutting Zones.
2. Where this Zone abuts the A Zone, the Development Officer, in consultation with the General Manager of Community Services, may require an Environmental Impact Assessment in accordance with the requirements of subsection 540.4(5) of this Bylaw.

7. USE CLASSIFICATIONS

Ambleside Integrated Site
Minor Impact Utility Services means development for public utility infrastructural purposes which is likely to have some impact on the environment or adjacent land Uses by virtue of its appearance, noise, size, Traffic Generation or operational characteristics. Typical Uses in this Use class include vehicle, equipment and material storage yards for utilities and services; telephone exchanges; wire centres; switching centres; snow dumping sites; Light Rail Transit stations; transit bus terminals, depots and transfer facilities; surface reservoirs or storm water lakes; water towers; hydrospheres; water treatment plants; power terminal and distributing substations; communication towers and gate stations for natural gas distribution.

Fleet Service Fuel Station
Minor Impact Utility Services means development for public utility infrastructural purposes which is likely to have some impact on the environment or adjacent land Uses by virtue of its appearance, noise, size, Traffic Generation or operational characteristics. Typical Uses in this Use class include vehicle, equipment and material storage yards for utilities and services; telephone exchanges; wire centres; switching centres; snow dumping sites; Light Rail Transit stations; transit bus terminals, depots and transfer facilities; surface reservoirs or storm water lakes; water towers; hydrospheres; water treatment plants; power terminal and distributing substations; communication towers and gate stations for natural gas distribution.

44. PROJECTION INTO SETBACKS AND SEPARATIONS SPACES

The following features may project into a required Setback or Separation Space as provided for below:

7. A Parking Area when comprised of parking spaces required under this Bylaw, provided that no Parking Area in any Zone shall be located within the Front Yard. This shall not prohibit the use of a Front Yard for Driveways;

53. ACCESS TO SITES

1. All access locations and curb crossings shall require the approval of Transportation Services.
2. No person shall construct an access or egress for vehicles from a Site to a public roadway, if the public roadway, in the opinion of Transportation Services, carries or shall carry a heavy traffic volume or such access or egress would create an unnecessary traffic hazard, unless there is no other practical method of vehicular access to the Site and a turning space is provided on the Site connected to the access or egress, so that every vehicle leaving the Site by the egress shall face the public roadway which the access or egress enters.

54. PARKING, LOADING AND PASSENGER DROP-OFF

Given the proposed stakeholder and buildings do not clearly fall into defined use in section 55 schedules 1, 2 or 3 the vehicle parking counts and loading spaces and bicycle parking have been defined based on the programmatic requirements of each stakeholder (see section C.1). These parking counts are subject to review by Development Officer. Parking for people with Disabilities has been provided in accordance with the 2014 Alberta Building Code.

54.1 OFF-STREET PARKING AND LOADING REGULATIONS

2. General Requirements

   c. Where Schedules 1, 2 and 3 do not clearly define regulations for a particular development, the single Use Class or combination of Use Classes most representative of the proposed development shall be used by the Development Officer to determine the vehicular parking, Bicycle Parking and loading requirements.

   g. The Development Officer may use his variance power to relax the vehicular parking requirements in Schedule 1, the Bicycle Parking requirements in Schedule 2 and the loading requirements in Schedule 3, however such a variance shall only be considered in cases where the nature of the Use, the size of the Site, or other physical constraints result in a situation where the requirements cannot be met on-site without unnecessary hardship or practical difficulties.

4. Parking for People with Disabilities

   a. Parking spaces for the disabled shall:

      i. Be provided in accordance with the Alberta Building Code in effect at the time of the Development Permit application, for which no discretion exists;

      ii. Be included, by the Development Officer, in the calculation of the applicable minimum parking requirement; and

      iii. Be identified as parking spaces for the disabled through the use of appropriate signage, in accordance with Provincial standards.

54.2 REQUIRED OFF-STREET VEHICLE ACCESSORY PARKING

3. Landscaped Islands Within Parking Areas

   a. Every off-street parking or loading area required by this Bylaw to accommodate 30 or more vehicles at grade, shall incorporate landscaped

open space within the parking area, calculated on the basis of 2.0 m2 of landscaped island area per required parking and loading space. This shall be Landscaped in accordance with this Bylaw.

b. For parking areas containing required parking for 40 or more vehicles, a minimum of two landscaped islands shall be required. These islands shall be placed to provide visual relief, to assist vehicular circulation and to organize large areas of parking into smaller cells. The number of islands provided shall be to the satisfaction of the Development Officer.

4. Vehicular Parking Dimensions and Configuration

a. All required parking spaces shall be clear of any access driveways, aisles, ramps, columns, Signs or other similar obstructions, and shall conform to the following minimum dimensions:

i. Except as provided below, each required off-street parking space shall be a minimum of 2.6 m width with a minimum clear length of 5.5 m exclusive of access drives or aisles, ramps, columns. Parking spaces shall have a vertical clearance of at least 2.0 m. For parallel parking, the length of the parking spaces shall be increased to 7.0 m, except that an end space with an open end shall be a minimum length of 5.5 m.

ii. Expanded parking spaces shall be a minimum of 2.9 m in width and 5.5m in length, and shall be painted with double line markings;

iii. For parking spaces other than parallel parking spaces, up to 30% of the required parking spaces may be of a length shorter than that required above, to a minimum of 4.6 m . Such spaces shall be clearly signed as small car spaces, easily located and convenient to use;

iv. Where the use of a parking space is limited on both sides by a wall or a column, the unobstructed width from face to face of the obstructions shall be 3.0 m, and if in this case, a building door opens into the parking space on its long side, the unobstructed width shall be 3.3 m.

v. Where the use of a parking space is limited to one side by a wall or a column, the unobstructed width of the parking space shall be 2.7 m, and if in this case, a building door opens into the parking space on its long side, the unobstructed width shall be 3.0 m.

vi. Aisles shall be a minimum of 7.0 m wide for 90° parking, 5.5 m wide for 60° parking, and 3.6 m wide for 45° parking and parallel parking;

vii. Disabled parking spaces shall be a minimum of 3.7 m in width and 5.5m in length; and

viii. Where parking spaces are located with access directly off a Lane, the required width of the aisle may be reduced by the width of the Lane, but the entire parking space must be provided on the site

54.3 BICYCLE PARKING FACILITIES

2. Size and Location of Bicycle Parking Facilities

a. Each Bicycle Parking space shall be a minimum of 0.6 m in width with a minimum clear length of 1.8 m. Bicycle Parking spaces shall have a vertical clearance of at least 2.0 m.

b. Required Bicycle Parking spaces shall be wholly provided on the same Site as the building.

c. Adequate access to and exit from individual Bicycle Parking spaces shall be provided with an aisle of not less than 1.5 m in width, to be provided and maintained beside or between each R.O.W. of Bicycle Parking.

d. Required Bicycle Parking spaces and accesses shall be located on Hard-paved surfaces.

e. Bicycle parking shall be separated from vehicular parking by a physical barrier or a minimum 1.5 m of open space.

f. Bicycle Parking spaces shall be visibly located where possible and provided in one or more of the following ways:

i. Secure bicycle storage rooms, lockers, racks, railings or other such device inside the building, preferably at the ground level;

ii. Secure bicycle storage rooms, lockers, racks, railings or other such device in any Accessory parking area; or

iii. Within any Yard of a Site but not more than 15.0 m from a principal entrance of the building, except: in the case of educational services developments where the students are restricted from using the principal entrance of the building, Bicycle Parking spaces may be provided in any Yard of a Site, no more than 15.0 m from the principal entrance of the building designated for student use.

g. Where Bicycle Parking is not visibly located on site, directional signage shall be displayed indicating its location.

h. All Bicycle Parking spaces shall be situated to maximize visibility so as to discourage theft and vandalism, and shall be illuminated.

3. Design of Bicycle Parking Facilities

a. Bicycle Parking shall be designed so that bicycles may be securely locked to the rack, railing or other such device without undue inconvenience and shall be reasonably safeguarded from intentional or accidental damage, in accordance with the following standards:

i. Bicycle Parking shall hold the bicycle securely by means of the frame. The frame shall be supported so that the bicycle cannot fall or be pushed over causing damage to the bicycle.

ii. Bicycle parking shall accommodate:

a. Locking both the frame and the wheels to the rack, railing other such device with a high security U-shaped shackle lock, if the cyclist removes the front wheel;

b. Locking the frame and one wheel to the rack, railing or other such device with a high security U-shaped shackle lock, if the cyclist leaves both wheels on the bicycle; and

c. Locking the frame and wheels both to the rack, railing or other such device with a chain or cable not longer than 2.0 m without the removal of any wheels.

b. Bicycle parking racks, railings or other such device

54.4 OFF-STREET VEHICULAR LOADING FACILITIES

1. Number of Spaces

a. The number of off-street loading spaces, required for each Use is specified in Schedule 3

2. Location of Loading Spaces

a. Off-street loading spaces shall be provided entirely within the property of the development being served, and shall be subject to all Setback requirements specified elsewhere in this Bylaw.

b. Off-street loading shall be oriented away from residential developments.

c. All required loading spaces shall be clear of any access driveways, aisles, ramps, columns, Signs or other similar obstructions.

3. Size and Access

a. Each off-street loading space shall be of adequate size and accessibility to accommodate the vehicles expected to load and unload. Each required loading space shall be a minimum of 3.0 m in width, a minimum of 9.0 m in length and maintain a minimum overhead clearance of 4.0 m, unless larger dimensions are required, having regard to the type of vehicle loading and unloading without projecting into a public roadway.

b. Access to any loading area shall be provided, wherever possible, internally to the development or from a Lane abutting the development.

c. Access to any loading area shall be arranged such that no backing or turning movement of vehicles going to or from the Site causes interference with traffic on the abutting streets or Lanes.

55.3 GENERAL PLANTING REQUIREMENTS

b. For new development consisting of Residential-Related Uses, Commercial Uses, Industrial Uses, Basic Services Uses, and Community, Educational, Recreational and Cultural Service Uses, the number of trees and shrubs provided shall be determined on the basis of the following:

i. one tree for each 25 m2 and one shrub for each 15 m2 of Setback;

ii. one tree for each 20 m2 and one shrub for each 10 m2 of parking area islands, as determined by subsection 54.2(3); and

iii. in no case shall there be less than one tree per parking area island;

c. new trees and shrubs shall be provided on the following basis:

i. the proportion of deciduous to coniferous trees and shrubs shall be approximately 50:50;

ii. approximately 50% of required deciduous trees shall be minimum of 50 mm Caliper and approximately 50% shall be a minimum 70 mm Caliper;

iii. approximately 75% of required coniferous trees shall be a minimum of 2.5 m in Height and approximately 25% shall be a minimum of 3.5 m in Height; and

iv. minimum shrub size shall be 300 mm in Height for deciduous and a spread of 450 mm for coniferous;

d. Notwithstanding Section 11.3, the Development Officer may vary subsection 55.3(1)(b) and subsection 55.3(1)(c) for a Public Park Use, in consultation with Parks and Biodiversity, in which case the application shall not be a Class B Discretionary Development.

55. LANDSCAPING

55.4 GENERAL REQUIREMENTS

1. All open space including Front Yards, Rear Yards, Side Yards and Yards, at grade Amenity Areas, Private Outdoor Amenity Areas, Setback areas and Separation Spaces shall be landscaped with trees, shrubs, flower beds, grass, ground cover or suitable decorative hardsurfacing, in accordance with the Landscape Plan submitted pursuant to subsection 55.3 and approved by the Development Officer. This requirement shall not apply to those areas designated for parking and circulation, which shall be landscaped in accordance with subsection 55.8 of this Bylaw.

3. Any parking lot having eight or more parking spaces that is visible from an adjoining Site in a Residential or Commercial Zone, or from a public roadway other than a Lane, or from a Light Rail Transit line, shall have perimeter planting. The location, length, thickness and height of such perimeter planting at maturity shall, in conjunction with a change in Grade or other natural or man-made features, be sufficient to provide substantial interruption of the view of the parking area from any adjoining Residential or Commercial Zone, and enhance the view of the parking area from any adjacent public roadway or Light Rail Transit line.

C.3 REFERENCE TO OTHER BYLAWS

57.1 GENERAL PERFORMANCE STANDARDS FOR INDUSTRIAL DEVELOPMENTS

Any development or Site used for any Permitted or Discretionary Use in the IB, IL, IM or IH Zones shall comply with the performance standards of this Section.

1. Any Use or activity in the IB or IL Zones shall comply with the following appearance standards:

   a. All Uses and activities, except those noted in clauses (b) and (c) below, shall be located and carried on within an enclosed building and there shall be no outdoor display areas, except for Automotive and Minor Recreational Vehicle Sales/Rentals and Convenience Vehicle Rentals;

   b. All loading, service, trash collection and Accessory storage areas, and trucking yards shall be located to the rear or sides of the principal building, and shall be screened from view from any public roadway other than a Lane, and from adjacent Sites, by building walls, landscape materials, berms, fences or a combination of these;

   c. The Development Officer may require that exposed projections outside the building such as mechanical and electrical equipment, transformer ducts, cooling towers and materials handling equipment be screened from view from any public roadway other than a Lane, and from adjacent Sites if such projections are inconsistent with the character and appearance of surrounding development or the intended visual qualities of this Zone; and

   d. All buildings shall be constructed and finished with durable materials designed to maintain the initial appearance of the development throughout the life of the project. The Development Officer may require that the appearance of metal, or concrete block walls exposed to public view from beyond the Site be improved where such walls are inconsistent with the finishing materials or appearance characteristic of surrounding development.

2. Any Use or activity in the IM or IH Zones shall comply with the following appearance standards:

   a. All outdoor service, assembly, trash collection and storage areas including the trucking yards associated with such activities shall be located to the rear or sides of the principal building. Loading and trash collection facilities serving office, warehouse and similar developments, where the handling or assembly of goods is carried on within a building, shall be allowed to the rear, sides or front of the principal building. The areas and facilities referred to in this clause shall be screened from view from any public roadway other than a Lane, and from adjacent Sites, unless the public roadway is a local road serving only Sites in an IM or IH Zone, or the adjacent Site is Zoned IM or IH. Notwithstanding the above, trash collection areas located to the front of the principal building shall be screened from view from any public roadway, including a Lane, and from any adjacent Site; and

   b. Outside display areas are allowed to be located to the side or front of the principal building, provided that such displays are limited to examples of equipment or material related to the industry or business located on the Site.

C.4 WINDERMERE AREA STRUCTURE PLAN (ASP)

OVERVIEW

The Windermere Area Structure Plan (ASP) provides a framework for development of the area under the CoE Municipal Development Plan. The ASP governs the area bordered by Anthony Henday Drive to the north, The Saskatchewan River Ravine to the west, the Whitemud Creek Ravine to the East and 41 Avenue South-West / City Limits to the South.

The purpose of this ASP is to establish a framework for land use planning by employing "Smart Growth" principles including effective and efficient land use strategies and environmentally friendly and fiscally sustainable urban development policies. These principles include intensification of development around transportation corridors and employment areas as well as conservation and integration of natural areas. The ASP provides the groundwork for the development of these lands represents an efficient, contiguous pattern of urban development and to create a vibrant and sustainable community.

TOP OF BANK POLICY

The Windermere ASP makes reference to the CoE's Top of Bank Policy and states that "only residential development, parks, amenity areas, trails and roadways will be allowed within 33m of the top-of-bank line of the Whitemud ravine within both economic development areas" (pg. 51). The CoE's policy ensures that open space is provided between the creek and ravine system and any proposed development. It not only ensures public access to the natural resource but also helps to protect development for natural erosion of the ravine banks. See Section 5.2 for more information.

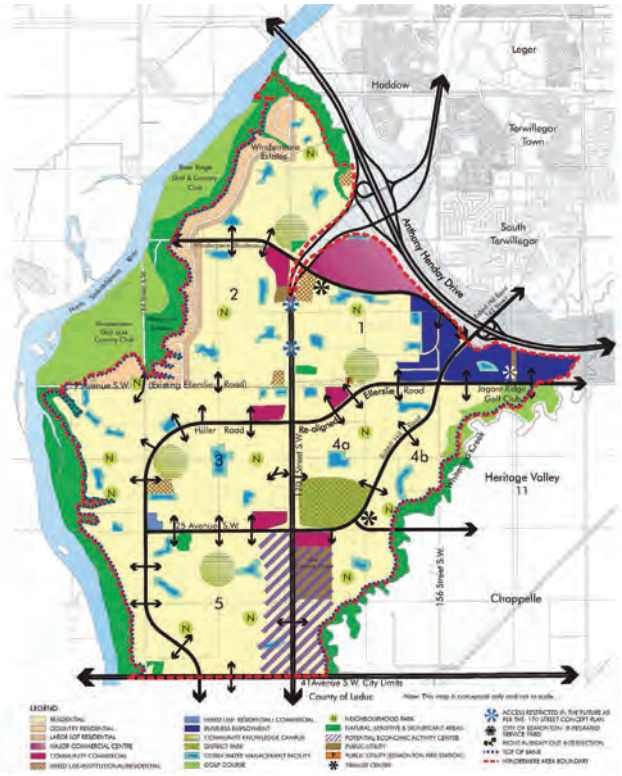

Figure C.4a: Windermere ASP Concept Development Plan

C.5 AMBLESIDE NEIGHBOURHOOD STRUCTURE PLAN (NSP)

OVERVIEW

The Ambleside Neighbourhood Structure Plan (NSP) provides general guidelines to facilitate development of neighbourhoods within the Windermere ASP plan area. The NSP governs the area bordered by Anthony Henday Drive to the north, Terwillegar Drive / 170 Street to the west, the Whitemud Creek Ravine to the East and Ellerslie Road / 9 Avenue SW to the South. It is one of 5 Neighbourhoods that falls within the Windermere ASP.

The purpose of this Neighbourhood Structure Plan (NSP) is to establish a general land use framework intended to foster future development along with contiguous, orderly growth of the community. The NSP identifies the type, density and location of residential, commercial and open space land uses, including the intensity and pattern of development, transportation networks, conceptual servicing schemes and provision of utility services and infrastructure and unique environmental areas and natural features.

The NSP seeks to establish an exciting and vibrant community in southwest Edmonton through the incorporation of a diverse mixture of land uses and transportation interconnectedness that gives rise to a "total community" concept. It has been guided by the principles of Smart Growth, Transit / Pedestrian Oriented Development, and urban planning best practices outlined within the CoE's Smart Choices report.

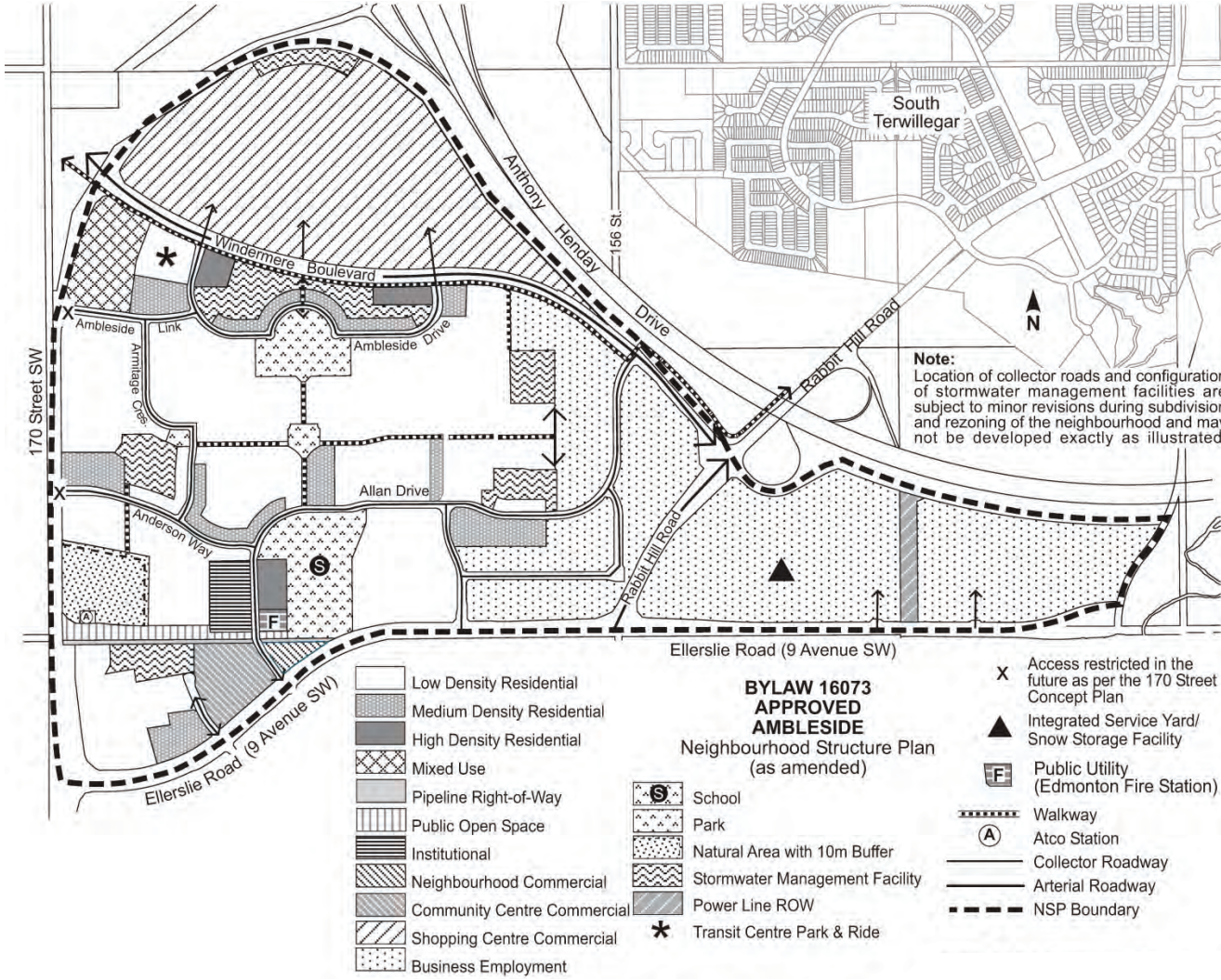

Figure C.5a: Bylaw 16073 Approved Ambleside NSP

D

D.1 SITE PROGRAM OVERVIEW

Per the Final Master Plan Scheme, the following chart is an overview of the provided building and site program areas. The program has taken into account stakeholder-provided documentation and feedback at the time of the Master Plan. The charts include areas for building footprint, supportive site program, and parking per the Final Master Plan Scheme (refer to Section 5.0).

Ambleside Master Plan - Integrated Operations Program Summary

NO	NAME	DESCRIPTION	AMBLESIDE INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
ADMINISTRATION						
1.1	ENTRY + RECEPTION					
	ENTRANCE / VEST.		1.0	15.0	15.0	
	LOBBY/WAITING	Includes waiting on main and second floor, main floor lobby and circulation	1.0	150.0	150.0	
	RECEPTION DESK	main floor reception desk	1.0	6.0	6.0	
		1.1 SUB-TOTAL			171.0	
1.2	OFFICES*					
1.2.1	WORKSTATIONS - DIRECTOR / SUPERVISOR / CLERK / DISPATCH / CONTRACT INSPECTOR / COORDINATOR / TECH	1 workstation w/ computer terminal, VOIP telephone, 1 lateral 4-drawer file cabinet -	111.0	6.0	666.0	Note: Traffic administration was not required per program requirements
		Parks	22.0			
		FMS	71.0			
		Roads	14			
		Fleet	4			
	WORKSTATIONS - FOREMEN	Open plan workstation with data drop for computer terminal, VOIP telephone, 1 lateral 4-drawer filing cabinet, task lighting	27.0	6.0	162.0	***Number of foremen is assumed and not confirmed. This is being used as a basis for design and should be confirmed by the Operations Group. Fleet foremen are included in Operations section as requested.***
		Parks	7.0			
		FMS	6.0			
		Roads	12			
		Traffic	2			
		1.2.1 Sub-Total	138.0		828.0	
1.2.2	HOTELLING - ADMIN	Touchdown Workstations	15.0	2.3	34.5	Per the Edmonton Tower precedent, 10% hotelling per staff count is provided as a basis for design Per program analysis, 57 hotelling stations are required for admin, foremen and crew touch down; Alternate hotelling for crew is proposed along main corridor b/w multipurpose, lockers + operations bays (see Staff Support section)
		1.2 SUB-TOTAL			862.5	
1.3	MEETING ROOMS	1.8 sq. m per person				
	MEETING ROOM (SM)	4-6 people	2.0	10.8	21.6	2 required per program review
	MEETING ROOM (SM)	8-10 people	5.0	18.0	90.0	7 required per program review
	MEETING ROOM (LG)	20 people	2.0	36.0	72.0	1 required per program review
	MEETING ROOM (LG)	30 people	3.0	54.0	162.0	4 required per program review
	NOW ROOM	Small Telephone Room	6.0	3.0	18.0	4% Now Rooms per open work stations per Edmonton Tower; (Towe Precedent: 106 open work stations; 4 Now stations; 1 Now Booth)
	NOW BOOTH	Small Meeting Room 2 - 4 People	2.0	7.2	14.4	
		1.3 SUB-TOTAL			378.0	***Meeting rooms are decreased as these spaces can be shared; there is also the opportunity to utilize the multifunctional rooms as alternate boardroom space; Operations Groups to confirm if further reductions are possible due to sharing capability.***
1.4	ADMIN SUPPORT					
	PRINT / COPY		2	30.0	60.0	The program analysis equates to 48 sq. m total required print/copy area; 60 sq. m is recommended per Edmonton Tower precedent; (Edmonton Tower: 2 print / copy @ 30 sq. m ea; 2 per 116 total staff)
	FILE STORAGE	Dispatch File Room; mobile high density shelving units	2	10.0	20.0	
	RESOURCE ROOM		1.0	20.0	20.0	
	STORAGE		2	5.0	10.0	
	REFRESHMENT AREA	appliances, sink, casework, seating	1	126.0	126.0	Per Edmonton Tower precedent, provide 50% per staff count
	WASHROOMS - MALE**		1.0	24.0	24.0	4 water closests required per the ABC 2014 Basis for Design: Edmonton Tower
	WASHROOMS - FEMALE**		1.0	28.0	28.0	4 water closests required per the ABC 2014 Basis for Design: Edmonton Tower
	STAFF CLOSET	Included in casework in Refreshement Area	3	2.0	6.0	
		1.4 SUB-TOTAL			294.0	
1.5	AUXILLARY / BUILDING SERVICES					
	JANITOR	Cart - Shelves for supplies storage - floor sink; Floor finish to be antiskid and easily cleaned	1.0	5.0	5.0	
	PUBLIC BARRIER FREE WASHROOMS		1.0	6.0	6.0	
		1.5 SUB-TOTAL			11.0	
		SUB TOTAL, NSM			1,716.5	
		Net to Gross Space Conversion Factor			496.5	
		ADMIN SUB TOTAL, GSM			2,213.0	

Ambleside Master Plan - Integrated Operations Program Summary

NO	NAME	DESCRIPTION	AMBLESIDE INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
STAFF SUPPORT						
2.1	BRIEFING, TRAINING + LUNCH ROOM					***PEAK CREW ASSUMPTIONS FOR BASIS OF DESIGN:*** ***Parks: 80*** ***Roads: 125*** ***Traffic: 14*** ***Fleet: 40*** ***FMS: 79*** ***Total Peak: 340*** ***This assumption allows for cross over between shifts***
2.1.1	TRAINING / MULTIPURPOSE ROOM / LUNCH ROOM	150 person capacity per block; 450 total person capacity assumed for basis of design; 1.8 sq. m per person; Resilient flooring, acoustic ceiling, easily maintainable c/w durable finishes; daylighting + exterior access recommended; black-out blinds	3.0	270.0	810.0	This value accounts for 340 peak internal staff as well as additional space for external staff and/or spreading out for shift briefing purposes
	KITCHENETTE	Per divisible space: refigerator, microwaves, ice machine, lower casework, computer tower c/w secure lower casework, ceiling mounted projector and screens, pin up boards, wipeable 'whiteboard' wall finish, double basin sink; Per block: 3 vending machines	3.0	12.0	36.0	
	STORAGE ROOM	Vending Machine	3.0	5.0	15.0	
	STORAGE ROOM	Tables + Chairs	3.0	10.0	30.0	
	CATERING ROOM	Lowercase cabinets, refigerator, stove, dishwasher, double basi sink	3.0	15.0	45.0	
					335.0	Additional room
		2.1.1 Sub-Total			1,271.0	Divide into blocks; recommendation of 3 blocks
	WELLNESS ROOM	Rubber mats/flooring; Size per Roads Central District	1.0	128.0	127.0	
	HOTELLING	Locate hotelling as standing bench along main corridor; 500mm depth counter c/w power + data plug in; 85 stations total	78.0	1.65	128.0	Each station to allow for 1.1m wide x 1.5 m deep (includes .5m deep counter) = 1.65 per station Basis for design: FMS utilized 25% hotelling per staff count; 25% of total peak staff of 300 is recommended for a basis of design (Fleet mechanics have allocated hotelling in each bay); total hotelling to be confirmed by Owner
	KEY BOXES	Locate along main corridor; count and equipment type to be determined by Owner				
		2.1 SUB-TOTAL			1,526.0	
2.2	LOCKERS + CHANGE ROOMS					The basis for design proposes gendered lockers and washrooms; consideration should be given to shared lockers + gender neutral individual shower and barrier free washrooms within locker / change room block; If shared lockers are proposed, separate male / female change areas are required
	MALE					
	LOCKERS - MALE	24" x 24" X 72" H locker; benches;	449	1.85	830.7	Locker counts represents a full sized locker; half sized lockers are included in the total count
		PARKS	49.0			
		FMS	56.0			
		ROADS	300			
		FLEET	34			
		TRAFFIC	10			
	WASHROOMS - MALE**	Include vestibule within washroom design	1.0	36.0	36.0	Based on the program analysis, total male washrooms eqates to 165.3 sq. m. Per the ABC 2014, Table 3.7.2.2C for Industrial Occupancy, 11 male water closets are required (or 2 WC + 3 urinals) This considers 28 / 72 % female / male ratio split as a determined average of male / female across all groups;***the requirement to increase washrooms should be directed by the Operations Groups***
	SHOWERS - MALE		7.0	2.0	14.0	
	SHOWERS - MALE - BF	Barrier Free	1.0	4.0	4.0	
		MALE SUBTOTAL			884.7	
	FEMALE					
	LOCKERS - FEMALE	24" x 24" X 72" H locker; benches;	148.0	1.85	273.8	Locker counts represents a full sized locker; half sized lockers are included in the total count
		PARKS	40.0			
		FMS	23.0			
		ROADS	75			
		FLEET	6			
		TRAFFIC	4			

Ambleside Master Plan - Integrated Operations Program Summary

NO	NAME	DESCRIPTION	AMBLESIDE INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
	WASHROOMS - FEMALE**	Include vestibule within washroom design	1.0	40.0	40.0	Based on the program analysis, total female washrooms eqates to 115 sq. m. Per the ABC 2014, Table 3.7.2.2C for Industrial Occupancy, 5 female water closets are required. This considers 28 / 72 % female / male ratio split as a determined average of male / female across all groups;***the requirement to increase washrooms should be directed by the Operations Groups***
	SHOWERS - FEMALE		5.0	2.0	10.0	
	SHOWERS - FEMALE - BF	Barrier Free	1.0	4.0	4.0	
		FEMALE SUBTOTAL			327.8	
		2.2 SUB-TOTAL			1,212.5	
		Circulation gross-up (30%)			357.5	
		2.2 SUB-TOTAL			1,570.0	
2.3	CLEANING + JANITOR					
	LAUNDRY AREA	1 commercial grade washer and 1 commercial grade dryer (220 VAC power supply required - Counter; Floor finish to be antiskid and easily cleaned	3.0	10.0	30.0	
	MUD ROOM	Grated walk-off mat; hose-down area; laundry dry rack; laundry sink; Floor finish to be antiskid and easily cleaned	3.0	10.0	30.0	
	JANITOR	Cart - Shelves for supplies storage - floor sink; Floor finish to be antiskid and easily cleaned	3.0	5.0	15.0	
		2.3 SUB-TOTAL			75.0	
		Circulation gross-up (30%)			21.0	
		2.3 SUB-TOTAL			96.0	Divide into blocks; recommendation of 3 blocks
2.4	OUTDOOR SPACE					
	OUTDOOR STAFF GATHERING SPACE	Courtyard spaces provided on the third level for staff gatherings	4.0	166.0	664.0	
		2.4 SUB-TOTAL			664.0	Not to be included in the staff support CGSM
		STAFF SUPPORT SUB TOTAL, CGSM			**3,192.0**	

Ambleside Master Plan - Integrated Operations Program Summary

NO	NAME	DESCRIPTION	AMBLESIDE INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
OPERATIONS SHOPS, FLEET STORAGE + VEHICLE MAINTENANCE						
3.1	CENTRAL STORES					
	CENTRAL LOADING + RECEIVING	16' X 16' Overhead Door	1.0	50.0	50.0	
	STORAGE AREA	typical to oversized shelving	1.0	853.0	853.0	***Per the program analysis, storage area equates to 853.8 sq. m for Central Stores. The recommendation is to utilize this as a basis of design and reduce storage area as recommended by the Operations Groups***
	RECEPTION / VESTIBULE	reception counter; secure point; included in Storage Area	1.0	10.0	10.0	
	WORKSTATION/OFFICE	required to be a closed office due to dust and debris	1.0	6.0	6.0	
		3.1 SUB-TOTAL			919.0	Central Stores should be maintained as one program space in an integrated facility
3.2	WORKBAYS					
3.2.1	PARKS					
	Standard Fabrication Bay	16' x 16' Overhead Door; includes tool crib + material storage; 2 b	9.0	120.0	1080.0	
		Turf Materials Storage	1.0	47.0	47.0	
		Turf Tool Crib	1.0	15.0	15.0	
	Drive Through Bay	16' x 16' Overhead Door; Forestry	2.0	252.0	504.0	
		Forestry Materials Storage	1.0	47.0	47.0	
		Forestry Tool Crib	1.0	15.0	15.0	
		3.2.1 Sub-Total	15.0		1708	
3.2.2	FACILITY MAINTENANCE					
	Standard Fabrication / Maintenance Bay	16' x 16' Overhead Door; includes tool crib + material storage; open bays; 1 bay ea: Refigeration, Plumbing, Air Handling, Electrical, Roofing	8.0	120.0	960.0	20m x 9m bay changed to standardized 20m x 6m and therefore the required 6 bays have been changed to 9 bays equally the same amoun of area
		3.2.2 Sub-Tota			960	
3.2.3	ROADS					
	Standard Blade Change Bay	16' x 16' Overhead Door; includes tool / material storage in bay area; blade change	2.0	120.0	240.0	
	Standard Vehicle Storage	16' x 16' Overhead Door	26.0	120.0	3,120.0	***The overall number of bays is proposed to be reduced to 75% of 38 bays. Per the program analysis, 38 single bays are required for vehicle storage. Existing Roads bay varry in length from 13 m to 16m long. Median lengh equates to 14.5. Based on the median length, 3 existing bay lengths are comparable to two proposed bay lengths. As such, the standard bay can store the equipment as 1.38 bays. Roads Operations Group to review and confirm if assumptions are ok.***
	Standard Storage Bay	16' x 16' Overhead Door; 1 Auxillary + 1 Bridge bay	2.0	120.0	240.0	
	Dirve Through Bay	16' x 16' Overhead Door	2.0	252.0	504.0	Reduced to two pull through bays as Roads users noted drive through is not a requirement
		3.2.3 Sub-Tota	32		4104	
3.2.5	FLEET					
	Light Repair Bay	16' x 16' Overhead Door	8.0	72.0	576.0	12m x 6m bay (per Westwood facility)
	Light Aisle Circulation	18' h X 16'w speed rolling overhead door	1.0	616.0	616.0	6m wide (per Westwood facility precedent)
	Heavy Repair Bay	16' x 16' Overhead Door	10.0	91.2	912.0	12m x 7.6m bay (per Westwood facility)
	Heavy Aisle Circulation	18' h X 16'w speed rolling overhead door	1.0	964.0	964.0	8m wide (per Westwood facility precedent)
	Lube Storage Bay	16' x 16' Overhead Door	1.0	72.0	72.0	12m x 6m bay
	Storage		1.0	533.0	461.0	
	Fleet Administration	1 LVB Foreman, 1 HVB Foremen,	2.0	6.0	12.0	
		3.2.5 Sub-Tota			3613	
3.2.3	TRAFFIC					
	Standard Fabrication Bay	16' x 16' Overhead Door; includes tool crib + material storage	1.0	120.0	120.0	
		3.2.3 Sub-Total			120.0	
		3.2 SUB-TOTAL			10,505.0	
3.3	WORKSHOPS					
	FMS					
	Carpentry Shop	16' x 16' Overhead Door; drive through capacity requested; enclosed; dedicated to FMS	4.0	120.0	480.0	
	Paint	16' x 16' Overhead Door; enclosed; included flamable storage; dedicated to FMS	1.0	180.0	180.0	***Integrated Site Recommendation: FMS operated shop for all group; FMS Operations Group to review and comment on whether this could be a consideration for a future integrated site***
	Locksmith	Dedicated to FMS	1.0	120.0	120.0	
	FLEET					
	Welding	OH Door: 16' W x 16' H	2.0	72.0	144.0	
	Small Engine Repair	OH Door: 16' W x 16' H	1.0	72.0	72.0	
	Oil Change	OH Door: 16' W x 16' H	2.0	72.0	144.0	
	Fleet Administration	1 Oil Change Foreman	1.0	6.0	6.0	
	SHARED WORKSHOP					

Ambleside Master Plan - Integrated Operations Program Summary

NO	NAME	DESCRIPTION	AMBLESIDE INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
	Workshop	floor drain; specialized ventilation; workbenches/ casework; secure storage (materials + tools); equipment; enclosed;1 6' W x 16' H overhead exterior door; 3 x 10' x 10' interior doors; overhead 115 VAC power		150.0	0.0	Per program analysis, Parks requires 112 sq. m; Roads requires 120 sq. m. Proposed shared workshop of 150 sq. m; ***Recommended alternate option: operate 1 workshops managed by FMS (alternate to be reviewed and confirmed by FMS). Basis for design currently proposes two workshops (1 shared; 1 carpentry dedicated to FMS). During the November 16, 2017 meeting with the FMS representative it was decided that the Workshop would be incorporated into the FMS carpentry workshops in order to adhere to the integration mandates.***
	General Shop	floor drain; interceptor; specialized ventilation; workbenches/ casework; secure storage (materials + toos); equipment; 16' W x 16' H overhead exterior door; 10' x 10' interior door; overhead 115 VAC power	1.0	120.0	120.0	
		3.3 SUB-TOTAL			1,266.0	
3.4	STORAGE					
	OVERSIZED STORAGE	secure and enclosed	1.0	237.0	237.0	
	HAZARDOUS WASTE	secure; ventilated; exterior wall; enclosed	1.0	20.0	20.0	
		3.4 SUB-TOTAL			257.0	
3.5	SAFETY					
	FIRST AID		1.0	20.0	20.0	
		3.5 SUB-TOTAL			20.0	
3.6	WASHBAY					
	Washbay	16' x 16' overhead doors; drive-through capability; chlorinated oversized water line(s) c/w valved quick connects; oversized water hose(s) c/w wall mounted storage hook(s); drainage trenc c/w oil interceptor; mezzanine cat-walk both sides c/w stairs; compressed air; enclosed w solid walls resistant to water damage	2.0	312.0	624.0	***Operations Groups to review and confirm if two drive through washbays (as illustrated in the standardization diagrams) will suite the needs of an integrated site***
	Washbay Equipment	Vacuum equipment	2.0	2.0	4.0	
	Washbay Equipment Room	Pressure washing equipment	2.0	15.0	30.0	
					658.0	
		SUB TOTAL, NSM			**13,625.0**	
		Net to Gross Space Conversion Factor: 20%			2,661.0	
		OPERATIONS SUB TOTAL, CGSM			**16,286.0**	
		TOTAL CGSM			**21,691.0**	
		Total Building Gross Up Conversion Factor			4,067.0	18.7% of Total CGSM
		TOTAL BUILDING, BGSM			**25,758.0**	
		MAIN FLOOR GROSS			17596.0	
		SECOND FLOOR GROSS			8162.0	Excluding staff gathering spaces

Ambleside Master Plan - Integrated Operations Program Summary

NO	NAME	DESCRIPTION	AMBLESIDE INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
YARD						
5.1	EXTERIOR WORK AREA					
	FABRICATION	Included in Yard Circulation				
		5.1 SUB-TOTAL				
5.2	STAFF GATHERING					
	MUSTER	Included in Yard Circulation				
	TRAINING	Included in Yard Circulation				
		5.2 SUB-TOTAL				
5.3	AGGREGATE STORAGE					
5.3.1	AGGREGATE BINS	Overall dim: 12.0 m x 11.2 m; interior clearance 10.0 m min,; loading clearance required: 13m				
	ORGANICS	Trees, branches, etc.; shared	1.0	127.0	127.0	
	20mm GRAVEL	Shared	2.0	127.0	254.0	
	SAND	Shared	1.0	127.0	127.0	
	WASTE/APPLIANCES	Shared	2.0	127.0	254.0	
	PARKS					
	MULCH/CHIPS		1.0	127.0	127.0	
	LOAM		1.0	127.0	127.0	
	ROADS					
	OIL MIX		3.0	127.0	381.0	
	PAP		1.0	127.0	127.0	
	SWEEPINGS		1.0	127.0	127.0	
	25 mm RECYCLED CONCRETE		1.0	127.0	127.0	
	PEA GRAVEL		0.5	127.0	63.5	
	BLACK DIRT		0.5	127.0	63.5	
	EZ STREET		0.5	127.0	63.5	
	MASONRY SAND		0.5	127.0	63.5	
	RED SHALE ROCK		0.5	127.0	63.5	
		5.3.1 Sub total	16.5		2095.5	
	ROADS					
5.3.2	SAND PILE	Covered (i.e. sprung or canvas structure); Dedicated to Roads	1.0	250.0	250.0	Capacity to be be confirmed during Schematic Design
5.3.3	SALT DOME	Enclosed structure; 1,300 ton capacity; Dedicated to Roads	1.0	250.0	250.0	Capacity to be be confirmed during Schematic Design
		5.3 SUB-TOTAL			2595.5	
5.4	BULK STORAGE (OPEN)					
5.4.1	PALLET / BULK STORAGE					
	PARKS	Asphalt laydown area; secure	1.0	1220.0	1220.0	
	FMS	C-can storage	1.0	100.0	100.0	
	ROADS	Asphalt laydown area; secure	1.0	2434.0	2,434.0	
	FLEET	Asphalt laydown area; secure	1.0	100.0	100.0	
	TRAFFIC	Asphalt laydown area; secure	1.0	6378.0	6,378.0	
		5.4.1 Sub Total			10232.0	
5.4.2	GARBAGE BINS	40 yard bins; asphalt area				
	STEEL	Shared	1.0	51.0	51.0	
	ALUMINUM	Shared	1.0	51.0	51.0	
	RECYCLING	Shared	1.0	51.0	51.0	
	FLEET					
	RECYCLING		2.0	51.0	102.0	
	WASTE		2.0	51.0	102.0	
	STEEL		1.0	51.0	51.0	
	FILTER		1.0	51.0	51.0	
		5.4.2 Sub Total	9.0		459.0	
5.4.3	SANDER RACKS	Roads; 3.785 m W each unit; 138m lineal m required	36.0	13.0	468.0	
		5.4 SUB-TOTAL			11159.0	
5.5	YARD SUPPORT / MISC. MATERIALS	Roads				
	DE-ICING	Containment Compound	1.0	46.8	89.0	
	CALCIUM CHLORIDE	6m W x 16.8m L; exterior concrete pad c/w drainage; adjacent to de-icing equipment	2.0	102.5	205.0	
	BLUE USED OIL TANK		1.0		5.0	
	CONTAINMENT STORAGE AREA		1.0		6.0	
		5.5 SUB-TOTAL			305.0	
5.6	COVERED STORAGE					
	COLD STORAGE	Secure storage; Parks (fertilizer, etc.)	1.0	340.0	340.0	
	COVERED STORAGE	Blade change; compressed air, water; Parks	1.0	200.0	200.0	
	COLD STORAGE	Secure storage; FMS	1.0	220.0	220.0	
	COLD STORAGE	Secure storage; Roads	1.0	200.0	200.0	
	COVERED STORAGE	Secure storage; Fleet	1.0	17.0	17.0	
	HAZARDOUS SHED - Shared	Secure storage for hazardous materials; shared	1.0	30.0	30.0	

Ambleside Master Plan - Integrated Operations Program Summary

NO	NAME	DESCRIPTION	AMBLESIDE INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
5.7	SECURE VEHILCE PARKING					
	STALL A - 4.5 m x 11 m	Oversized vehilces; asphalt parking; one stall c/w concrete curbs for herbicide containment	**8.0**	49.5	396.0	
		Parks	4.0			
		Fleet	4.0			
	STALL B - 4.75 m x 8.8 m	Tractors, chippers, 1/2 ton, 1 ton, 2 ton	**52.0**	41.8	2173.6	
		Parks	28.0			
		Fleet	24.0			
	STALL C - 3.0 m x 6.0 m	Skid steer, stump grinder, trailers	**174.0**	18.0	3132.0	
		Parks - 1/2 ton - 1 ton trucks; parked inside or outside	50.0	18.0	900.0	
		Parks - Skid steer, stump grinder, trailers; parked outside	10.0	18.0	180.0	
		FMS - Utility Vans	64.0	18.0	1152.0	
		Roads - Fleet Trucks	6.0	18.0	108.0	
		Fleet	38.0	18.0	684.0	
		Traffic - Fleet Trucks	6.0	18.0	108.0	
	STALL D - 5.0 m x 6.0 m	Mowers	**10.0**	30.0	300.0	
		Parks	10.0			
		5.7 SUB-TOTAL	**244.0**		**6001.6**	
5.8	YARD MISCELLANEOUS					
	GARBAGE / RECYCLING BINS	Included in yard circulation				Design is to meet COE Bylaw
	YARD CIRCULATION	Yard circulation value per Integrated Option plan analysis			27524.9	
		5.8 SUB-TOTAL			27524.9	
		YARD SUB TOTAL, NSM			**48593.0**	
		YARD TOTAL, GSM			**48593.0**	

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NO	NAME	DESCRIPTION	AMBLESIDE INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
LIGHT VEHICLE PARKING						
6.1	VISITOR PARKING					
	STANDARD STALL - 2.6m x 5.5m		**44.0**	23.4	1029.6	
		Parks	24.0			
		FMS	9.0			
		Roads	6.0			
		Fleet	5.0			
		Traffic	0.0			
	BARRIER FREE STALLS 3.7m x 5.5m		**2.0**	33.3	66.6	
		6.1 SUB-TOTAL	**46.0**		**1096.2**	
		VISITOR VEHICLE PARKING, NSM			**1096.2**	
6.2	PERSONAL VEHICLE PARKING					
	STANDARD STALL - 2.6m x 5.5m		**409.0**	23.4	9570.6	
		Parks	139.0			
		FMS	126.0			
		Roads	77.0			
		Fleet	61.0			
		Traffic	6.0			
	BARRIER FREE STALLS 3.7m x 5.5m		**7.0**	33.3	233.1	
		6.2 SUB-TOTAL	**416.0**		**9803.7**	
6.3	MOTORCYCLE PARKING STALLS		10.0			
6.4	BICYCLE PARKING / COVERED STORAGE		22.0			
		PERSONAL VEHICLE SUB TOTAL, NSM			**9803.7**	
		VEHICLE SUB TOTAL, NSM			**10899.9**	
		Roadways / Hardscape Gross-Up			6,567.1	
		VEHICLE TOTAL, GSM			**17467.0**	

Ambleside Master Plan - Integrated Operations Program Summary

NO	NAME	DESCRIPTION	AMBLESIDE INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
SITE SERVICES						
7.1	FUEL STATION					
	FUEL ISLANDS	3 pumps per island; 7m aisle width 3m x 44m island	3.0	139.0	417.0	
	STORAGE TANK - GASOLINE	Underground gasoline tank preferred; 100,000 litre capacity; Basis for programming: 3m dia x 15.080m length tank; clearance assumed at 50% tank dia.; excavation dimension: 6m x 18.08m	1.0	108.5	108.5	
	STORAGE TANK - DIESEL	Underground diesel tank perferred; 100,000 litre capacity; Basis for programming: 3m dia x 15.080m length tank; clearance assumed at 50% tank dia.; excavation dimension: 6m x 18.08m	1.0	108.5	108.5	
	GENERATOR + WINDSHIELD FLUID TANK BU	Building for generator and fuel monitoring system; washer fuild 1360 litre capacity; 1 barrier free WC; Note: Kennedale Fuel Facility Central Fuel Building utilized as basis for programming	1.0	38.0	38.0	
	DEF DISENSING SYSTEM	1900 litre capacity; tank dim: 1.250 x 2.0 m; locate on concrete pad: 2.5 m x 3.25	1.0	8.1	8.1	
	AISLE	44m L x 7m width	4.0	308.0	1,232.0	
		7.1 SUB-TOTAL			1912.1	
7.2	TOUCHLESS CARWASH					
	WASHBAY - TOUCHLESS	For City-Wide Fleet use as well as exteral clients For light vehicles (trucks, cars)	1.0	176.0	176.0	
	SERVICES	Equipment rooms, mechanical / electrical	1.0	48.0	48.0	
	ACCESS DRIVE AISLE	14 m L x 8 m W	2.0	112.0	224.0	
		7.2 SUB-TOTAL			448.0	
		SITE SERVICES, NSM			**2360.1**	
		Roadways / Hardscape Gross-Up			2,157.9	Per precedent analysis, significant gross-up for the fuel station is required considering large turning radius and movement of heavy vehicles
		SITE SERVICES TOTAL, GSM			**4518.0**	
		LANDSCAPING			**14769.0**	
		TOTAL PROGRAM			**111104.9**	

NOTES:

* Size / configuration to be per the City of Edmonton Space Standards

** Size / configuration / quantity to be per the Alberta Building Code

*** Size / configuration / quantity to be per the City of Edmonton Zoning / Land Use Bylaw

** Per the Alberta Building Code 2014, Industrial Occupancy, Table 3.7.2.2C requires 9 water closets per each sex, considering a total staff count of 340 @ 50%

Staff Female to Male Ratios:

Parks: 45% Female, 55% Male
Roads: 25% Female; 75% Male
FMS: 28% Female; 72% Male
Traffic: 29% Female; 71% Male
Fleet: 15% Female; 85% Male
Average: 28 % Female; 72% Male

Considering a staff split of the average, 11 male water closets + 5 female water closets are required. Per ABC 2014, 2 water closests + 3 urinals are required for males

APPENDIX E: COST ESTIMATE

E.1 ORDER OF MAGNITUDE (CLASS D) ESTIMATE

BTY provided a Order of Magnitude (Class D) estimate for the AIS on December 19, 2017. The report provided costing for Test Fit 5B in two phases, the first phase including the fuel station, secondary access road, and removal of the soil mounds with the second phase providing costing for the remainder of the integrated site. The report was presented as follows:

Ambleside Masterplan: Test-Fit 5 - Phase 1 & 2

Edmonton, AB

December 15, 2017

Order of Magnitude Estimate # 4

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Calgary, AB
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TABLE OF CONTENTS

1.0 INTRODUCTION

The estimate presented in this report provides an assessment of the direct and indirect project costs for test fit options for the proposed Ambleside project located in Edmonton, Alberta

The estimated costs contained in this report are based on schematic design drawings prepared by the marc boutin architectural collaborative inc. as per Appendix III. The documents provided are not sufficiently detailed to allow the project to proceed for a fixed-price tender call. The estimate provides a reasonable cost envelope within which the project design can be developed. Further estimates based on more detailed design information may, however, vary from this baseline.

The project estimates include both the hard construction cost and the projects "soft' costs. The soft costs on a project typically includes; professional fees/disbursements, planning, administrative, financing costs, project commissioning, development dost levies, permits, testing, field analysis, site servicers connection fees, project management fee, owner's planning/administration cost, project insurance, furnishings, fittings & equipment, food services equipment, payable GST and soft cost contingency. A general rule of thumb is soft cost are 22-25% of the hard cost.

Detailed/outline specifications were not available at the order of magnitude design stage and therefore, cost assumptions for the anticipated final design products had to be made. As well, final design decisions will be made during the design process and preparation of tender documents. The order of magnitude estimate (Class D) estimate reflects those drawings and information made available at the time the estimate was prepared and may not totally reflect the final tender package.

A complete description of each phase, including the associated cost, is summarized under the “Cost Plan” Appendix I (Phase One) and Appendix II (Phase Two) in this report. The purpose of the cost plans are to identify to The City of Edmonton and the marc boutin architectural collaborative inc.; the project cost for each phase. In simplicity, the cost plan is a large shopping list of each building type, GFA and unit rates, with the associated site development costs, and land costs. If items in the order of magnitude estimate are not required or desired, the items may be removed from the estimate/design and the cost will be reduced. If additional items are required or desired, which are currently not included in the estimate, then either additional funds will be required, or savings must be incorporated elsewhere in the design to offset the cost increase. As well the gross floor areas for each components may be adjusted accordingly to reduce or increase the overall project cost.

The estimate is not representative of the low bid that will be received at the time of tendering. An indication of the range of bids expected can only be estimated at the time of the tender based on the final contract documents, specific market conditions at the time of tender, including number of other projects out to tender at the same time, interest in project and availability of specified materials in local market. The current estimate represents a fair and reasonable value for what is currently shown on the conceptual drawings (appendix III), design reports and those requirements as discussed with the marc boutin architectural collaborative inc.: assuming adequate coverage from both the General Contractors and associated sub trades.

In order to maintain the budget parameters established in this report, BTY strongly recommends that a final cost estimates be prepared just prior to going to tender to review the final contract documents and current

Should you have any queries regarding the content of this report, please do not hesitate to contact:

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2.0 PROJECT COST SUMMARY

The estimated project cost of each phase may be summarized as follows:

Description	Test Fit 5 Three Storey Phase One	Test Fit 5 Three Storey Phase Two	Total Project Cost
Building Costs	$524,000	$93,359,000	$93,883,000
Site Development Costs	$4,720,000	$24,586,000	$29,306,000
Total Construction Cost	**$5,244,000**	**$117,945,000**	**$123,189,000**
Land Costs	$0	$0	$0
Net Project Cost	**$5,244,000**	**$117,945,000**	**$123,189,000**
Soft Costs (25%)	$1,311,000	$29,486,000	$30,797,000
Total Project Cost	**$6,555,000**	**$147,431,000**	**$153,986,000**
Site Area (m²)	31,642 m²	97,400 m²	129,042 m²
Gross Floor Area (m²)	263 m²	26,422 m²	26,685 m²
Cost per m² based on Site Area	$207/m²	$1,514/m²	$1,193/m²
Cost per sf based on Site Area	$19/sf	$141/sf	$111/sf
Cost per m² based on GFA	$24,924/m²	$5,580/m²	$5,770/m²
Cost per sf based on GFA	$2,315/sf	$518/sf	$536/sf

3.0 SEPARATE PRICES

The following separate price is **NOT** included in the current estimate.

Description	Amount$
1. Traffic Signal [1]	$378,000
2. Land Costs	$12,100,000
TOTAL	$12,478,000

[1] *The cost include general requirements & fees, design & construction contingencies and the 25% soft cost allowance.*

Ambleside Masterplan: Test-Fit 5 - Phase 1 & 2
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December 15, 2017

4.0 PROJECT ESTIMATE: TEST FIT 5 (3 Storey & Surface Parking) - Phase One

Project Mark-Ups		Rate
Z11	General Requirements	10.0%
Z12	Profit	3.0%
Z21	Design Contingency	10.0%
Z22	Construction Contingency	5.0%
Z23	Escalation Contingency (28 months)	2.7%

Location / Description		Quantity	Rate	Cost
4.1	Land cost	110,000 m²		*see separate prices*
4.2	Building Cost			
a)	Car Wash Building	225 m²	$1,791 /m²	$403,000
b)	Storage Building	38 m²	$3,184 /m²	$121,000
4.3	Site Development Cost			
a)	Fuel Stations	6,600 m²	$368 /m²	$2,429,000
b)	North/South & East/West Arterial Roads	6,960 m²	$185 /m²	$1,286,000
c)	Remove Soil Mounds	40,506 m³	$25 /m³	$1,005,000
4.4	Soft Costs	25%	$41 /m²	$1,311,000
Total Estimated Cost: TEST FIT 5 (3 Storey) - Phase One		**31,642 m²**	**$207 /m²**	**$6,555,000**

Total Estimated Cost: TEST FIT 5 (3 Storey) - Phase One	**340,600 sf**	**$19.25 /sf**	**$6,555,000**

Possible Estimate Variance

If proper cost control is used through the design process by a Professional Quantity Survery; the variance of our estimate to the probable cost at the contract document stage is -5% to +10% or $6.2M to $7.2M

If proper cost control is not used through the design process; the variance of our estimate to the probable cost at the contract document stage is -5% to +25% or $6.2M to $8.2M

5.0 PROJECT ESTIMATE: TEST FIT 5 (3 Storey & Surface Parking) - Phase Two

Project Mark-Ups		Rate
Z11	General Requirements	10.0%
Z12	Profit	3.0%
Z21	Design Contingency	10.0%
Z22	Construction Contingency	5.0%
Z23	Escalation Contingency (28 months)	2.7%

Location / Description		Quantity	Rate	Cost
5.1	Land cost	110,000 m²		*see separate prices*
5.2	Building Cost			
a)	First Floor	17,596 m²	$3,500 /m²	$61,587,000
b)	Third Floor	8,826 m²	$3,600 /m²	$31,772,000
5.3	Site Development Cost			
a)	Site Preparation	97,400 m²	$3.90 /m²	$384,000
b)	Hard Surfaces	68,510 m²	$128.70 /m²	$8,815,000
c)	Site Improvements	79,800 m²	$31.20 /m²	$2,488,000
d)	Landscaping	11,000 m²	$35.50 /m²	$390,000
e)	Site Demolition & Trailer Relocation	97,400 m²	$1.30 /m²	$125,000
f)	Underground Storage Tanks	17,000 m³	$521.70 /m³	$8,869,000
g)	Mechanical & Electrical Site Servicing	26,422 m²	$74.20 /m²	$1,961,000
h)	Relocate Existing Utilities	97,400 m²	$16.00 /m²	$1,554,000
5.4	Soft Costs	25%	$369 /m²	$29,486,000
Total Estimated Cost: TEST FIT 5 (3 Storey) - Phase Two		**26,422 m²**	**$5,580 /m²**	**$147,431,000**

Total Estimated Cost: TEST FIT 5 (3 Storey) - Phase Two		**284,400 sf**	**$518.39 /sf**	**$147,431,000**

Possible Estimate Variance

If proper cost control is used through the design process by a Professional Quantity Survery; the variance of our estimate to the probable cost at the contract document stage is -5% to +10% or $140M to $162M

If proper cost control is not used through the design process; the variance of our estimate to the probable cost at the contract document stage is -5% to +25% or $140M to $184M

Ambleside Masterplan: Test-Fit 5 - Phase 1 & 2
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6.0 EXCLUSIONS

The estimate specifically excludes the following:

- Removal of contaminated soil and/or rock excavation (if applicable)
- Unforeseen ground conditions/associated extras, off-site works
- Financing costs
- Legal fees and expenses
- Phasing of the works and accelerated schedule
- Decanting & moving
- Cost escalation past the Spring of 2020

7.0 TAXES

The estimate excludes payable Goods & Service Tax (G.S.T.)

8.0 PROJECT SCHEDULE & ESCALATION

For the purpose of identifying and quantifying the escalation allowance for this project, BTY has considered the following schedule:

Activity	Start	Finish	Duration
Design	December 2017	January 2019	14 months
Tender & Award	March 2019	March 2019	2 months
Construction	May 2019	March 2021	24 months

Based on the above schedule, the mid-point of construction is: March 2020

The number of months from the date of this estimate is: 28 months

On this basis, BTY has calculated the escalation for this project to be 2.69%

Our current projected escalation rates are shown below. In the event that there is slippage in the schedule, further escalation based on the projected escalation rate per annum should be included in the estimate.

Current BTY Group Forecast	2018	2019	2020
	1%	1%	2%

9.0 PRICING

The estimate has been priced at current rates taking into account the size, location and nature of the project. The unit rates utilized are considered competitive for a project of this type, bid under a stipulated lump-sum form of tender in an open market, with a minimum of five (5) bids, supported by the requisite number of sub-contractors.

The estimate allows for labour, material, equipment and other input costs at current rates and levels of productivity. It does not take into account extraordinary market conditions, where bidders may be few and may include in their tenders disproportionate contingencies and profit margins.

10.0 RISK MITIGATION

BTY Group recommends that the Owner, Project Manager and Design Team carefully review this document, including exclusions, inclusions and assumptions, contingencies, escalation and mark-ups.

Requests for modifications of any apparent errors or omissions to this document must be made to BTY Group within ten (10) days of receipt of this estimate. Otherwise, it will be understood that the contents have been concurred with and accepted.

It is recommended that BTY Group design and propose a cost management framework for implementation. This framework would require that a series of further estimates be undertaken at key design stage milestones and a final update estimate produced which is representative of the completed tender documents, project delivery model and schedule. The final updated estimate will address changes and additions to the documents, as well as addenda issued during the bidding process. BTY Group is unable to reconcile bid results to any estimate not produced from bid documents including all addenda.

In order to maintain the budget parameters established in this report, BTY strongly recommends that further cost estimates are prepared at major design stage milestones to track and monitor the cost of the proposed design as it evolves. The major milestone estimates are typically carried out at the Program, Schematic Design, Design Development, 50% Working Drawings, 75% Working Drawings and 95% Working Drawings stages.

11.0 CONTINGENCIES

Design Allowance
A design contingency of Ten Percent (10%) has been included in the estimate to cover modifications to the program, drawings and specifications during the design. This allowance should be re-considered as the design proceeds, being ultimately reduced to zero at the tender stage.

Construction Allowance
An allowance of Five Percent (5%) has been included in the estimate for changes occurring during the construction period of the project. This amount may be expended due to site conditions or if there are modifications to the drawings/specifications.

Project Contingency
An allowance of Five Percent (5%) of the soft costs has been included in the project cost plan to cover changes to non-construction items.

12.0 APPENDICES

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APPENDIX I : Cost Plan

4.0 PROJECT ESTIMATE: TEST FIT 5 (3 Storey & Surface Parking) - Phase One

PHASE ONE: SITE DEVELOPMENT COSTS - a) Fuel Stations

Assembly / Description	Quantity	Unit Rate	Amount
D11.1 SITE PREPARATION			
D11.1.11 Strip topsoil: fuel station			
say 150mm thick x (6,600 m2 - 1,950 m2) 4.650 m2 : excluding mounds (removal measured elsewhere and includes topsoil removal)			
Strip topsoil			
Dispose excavated topsoil offsite			
Strip topsoil: fuel station	**893 m3**	**$15.92**	**$14,212**
D11.1.12 Site fill: fuel station			
allowance to fill in wetland : say average 400mm deep x 2,500m2			
Site fill: imported			
Site fill: fuel station	**1,200 m3**	**$58.20**	**$69,836**
D11.1.13 Rough grade site: fuel station			
Rough grading - site			
Rough grade site: fuel station	**6,600 m2**	**$0.55**	**$3,646**
D11.1.14 Finish grading: fuel station			
Finish grading - site			
Finish grading: fuel station	**2,100 m2**	**$1.03**	**$2,163**
D11.2 HARD SURFACES			
D11.2.12 Asphalt paving: fuel stations			
say 115mm asphalt on 150mm granular A base and 300mm granular B subbase			
Rough grading - pavement			
Finish grading - pavement			
Asphalt base : Granular "B" subbase			
Asphalt base : Granular "A" base			
Asphalt paving			
Misc. pavement markings			
Asphalt paving: fuel stations	**1,730 m2**	**$84.56**	**$146,294**
D11.2.22 Concrete slab on grade: fuel stations			
drive lanes adjacent to islands: say 150mm concrete on 200mm granular A base r/w 15M @ 450mm o.c. e.w. centered			
32 MPa concrete supply			
Place slab on grade conc.: pump			
Screed, trowel & cure			
Finish : broom			
Slab on grade edge form			
Rebar : 15M			
Expansion joints			
Sawcut control joints			

PHASE ONE: SITE DEVELOPMENT COSTS - a) Fuel Stations

Assembly / Description	Quantity	Unit Rate	Amount
D11.2.22 Concrete slab on grade: fuel stations continued…			
Granular "A" base			
Rough grading - pavement			
Finish grading - pavement			
Concrete slab on grade: fuel stations	**2,200 m2**	**$123.81**	**$272,375**
D11.2.22 Concrete slab on grade: fuel station			
to car wash: say 150mm concrete on 200mm granular A base r/w 15M @ 450mm o.c. e.w. centered			
32 MPa concrete supply			
Place slab on grade conc.: pump			
Screed, trowel & cure			
Finish : broom			
Slab on grade edge form			
Rebar : 15M			
Expansion joints			
Sawcut control joints			
Granular "A" base			
Rough grading - pavement			
Finish grading - pavement			
Concrete slab on grade: fuel station	**140 m2**	**$123.88**	**$17,343**
D11.2.22 Concrete slab on grade: fuel station			
fuel islands: 3 required x say 400mm concrete on 200mm granular A base			
32 MPa concrete supply			
Place slab on grade conc.: pump			
Screed, trowel & cure			
Finish : broom			
Slab on grade edge form			
Rebar : 50 kg/m3			
Zip strip control joints			
Granular "A" base			
Rough grading - pavement			
Finish grading - pavement			
Metal edging			
Concrete slab on grade: fuel station	**420 m2**	**$281.48**	**$118,222**
D11.2.22 Concrete slab on grade: fuel station			
car wash island: say 400mm concrete on 200mm granular A base			
32 MPa concrete supply			
Place slab on grade conc.: pump			
Screed, trowel & cure			
Finish : broom			
Slab on grade edge form			

PHASE ONE: SITE DEVELOPMENT COSTS - a) Fuel Stations

Assembly / Description	Quantity	Unit Rate	Amount
D11.2.22 Concrete slab on grade: fuel station continued…			
Rebar : 50 kg/m3			
Zip strip control joints			
Granular "A" base			
Rough grading - pavement			
Finish grading - pavement			
Metal edging			
Concrete slab on grade: fuel station	**150 m2**	**$262.64**	**$39,397**
D11.2.23 Concrete trench: fuel station			
to car wash			
32 MPa concrete supply			
Place trench concrete : pump			
Trench formwork			
Rebar : 120 kg/m3			
Trench grate & frame : 150 wd			
Trench excavation			
Trench backfill - imported			
Dispose excavated soil offsite			
Concrete trench: fuel station	**20 lm**	**$691.19**	**$13,824**
D11.2.25 Concrete curbs : fuel station			
Extruded concrete curbs			
Concrete curbs : fuel station	**210 lm**	**$54.91**	**$11,531**
D11.3 SITE IMPROVEMENTS			
D11.3.41 Exterior signage: fuel stations			
Exterior signage cash allowance			
say supply at $5,000			
Exterior signage: fuel stations	**6,600 m2**	**$1.06**	**$6,977**
D11.3.46 Steel pipe bollards: fuel stations			
Steel pipe bollards			
Steel pipe bollards: fuel stations	**16 no**	**$523.19**	**$8,371**
D11.4 LANDSCAPING			
D11.4.03 Sodding: fuel stations			
Lawn sodding			
Topsoil			
say 75mm thick			
Sodding: fuel stations	**2,200 m2**	**$15.01**	**$33,026**

PHASE ONE: SITE DEVELOPMENT COSTS - a) Fuel Stations

Assembly / Description	Quantity	Unit Rate	Amount
D12 MECHANICAL SITE SERVICES			
D12.0.00 Mechanical			
Fuel - Gasoline and diesel			
Fuel pump	9 ea.	$35,000.00	$315,000
Diesel storage tank	1 ea.	$150,000.00	$150,000
Gasoline storage tank	1 ea.	$150,000.00	$150,000
Excavation and backfill	2 no	$35,000.00	$70,000
Piping	1 sum	$75,000.00	$75,000
Power wiring	1 sum	$25,000.00	$25,000
Permits and fees	1 sum	$5,000.00	$5,000
Car wash			
Car wash system	1 sum	$150,000.00	$150,000
Dryer	1 no	$25,000.00	$25,000
Piping	1 sum	$25,000.00	$25,000
Wiring	1 sum	$10,000.00	$10,000
Utility room services	1 sum	$20,000.00	$20,000
Pit frame and cover	1 no	$5,000.00	$5,000
Washer fluid			
Holding tank with stand	1 no	$10,000.00	$10,000
Dispensing wand and hose	1 sum	$1,500.00	$1,500
DEF fluid			
Holding tank with stand	1 no	$12,500.00	$12,500
Dispensing wand and hose	1 sum	$1,500.00	$1,500
Sub-Total Fuel station	**6,600 m²**	**$273.89**	**$1,807,700**
Z11 General Requirements	10.0%		$180,800
Z12 Profit	3.0%		$59,700
Z21 Design Contingency	10.0%		$204,800
Z22 Construction Contingency	5.0%		$112,700
Z23 Escalation Contingency (28 months)	2.7%		$63,600
Total Fuel station	**6,600 m²**	**$368.03**	**$2,429,000**

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PHASE ONE: SITE DEVELOPMENT COSTS - b) North/South & East/West Arterial Roads

Assembly / Description	Quantity	Unit Rate	Amount
D11.1 SITE PREPARATION			
D11.1.11 Strip topsoil: roads			
say 150mm thick x road width + 1m each side : road x 6,000 m2 + edging x 960 lm			
Strip topsoil			
Dispose excavated topsoil offsite			
Strip topsoil: roads	**1,253 m3**	**$15.92**	**$19,943**
D11.1.14 Finish grading: roads			
along road edging x 1m wide x 960m long			
Finish grading - site			
Finish grading: roads	**960 m2**	**$2.25**	**$2,163**
D11.2 HARD SURFACES			
D11.2.12 Asphalt paving: roads			
say 150mm asphalt on 150mm granular A base and 400mm granular B subbase			
Rough grading - pavement			
Finish grading - pavement			
Asphalt base : Granular "B" subbase			
Asphalt base : Granular "A" base			
Asphalt paving			
Misc. pavement markings			
Asphalt paving: roads	**6,000 m2**	**$94.02**	**$564,142**
D11.2.22 Concrete island: road			
road divider island: say 400mm concrete on 200mm granular A base			
32 MPa concrete supply			
Place slab on grade conc.: pump			
Screed			
Trowel			
Cure & protect			
Finish : broom			
Slab on grade edge form			
Support lumber: slab edge			
Rebar : 50 kg/m3			
Zip strip control joints			
Granular "A" base			
Rough grading - pavement			
Finish grading - pavement			
Metal edging			
Concrete island: road	**200 m2**	**$327.90**	**$65,580**

PHASE ONE: SITE DEVELOPMENT COSTS - b) North/South & East/West Arterial Roads

Assembly / Description	Quantity	Unit Rate	Amount
D11.2.22 Concrete island: road			
entrance divider island: say 400mm concrete on 200mm granular A base			
32 MPa concrete supply			
Place slab on grade conc.: pump			
Screed, trowel, cure & protect			
Finish : broom			
Slab on grade edge form			
Rebar : 50 kg/m3			
Zip strip control joints			
Granular "A" base			
Rough grading - pavement			
Finish grading - pavement			
Metal edging			
Concrete island: road	**45 m2**	**$288.27**	**$12,972**
D11.2.25 Concrete curbs : roads			
Extruded concrete curb/gutter			
Concrete curbs : roads	**970 lm**	**$71.16**	**$69,024**
D11.3 SITE IMPROVEMENTS			
D11.3.41 Exterior signage: roads			
say supply at $3,000			
Exterior signage cash allowance			
Exterior signage: roads	**6,000 m2**	**$0.77**	**$4,613**
D11.4 LANDSCAPING			
D11.4.03 Sodding: roads			
1m wide strip along roads			
Lawn sodding			
say 1,300 rolls			
Topsoil			
say 75mm thick			
Sodding: roads	**960 m2**	**$15.01**	**$14,411**
D12 MECHANICAL SITE SERVICES			
D12.0.00 Mechanical storm drainage			
Catch basin: 10 no			
one catchbasin per 600m2 of roadway			
Storm line			
Mechanical storm drainage	**510 lm**	**$289.43**	**$147,611**

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December 15, 2017

PHASE ONE: SITE DEVELOPMENT COSTS - b) North/South & East/West Arterial Roads

Assembly / Description	Quantity	Unit Rate	Amount
D13 ELECTRICAL SITE SERVICES			
D13.0.00 Electrical road lighting			
allow one light standard per 800m2 of roadway rate of $4,500 each includes foundation, light standard, wiring, excavation, backfill, etc.			
Exterior lighting : road standards			
Electrical road lighting	**8 no**	**$4,607.85**	**$36,863**
D21.2 SELECTIVE SITE DEMOLITION			
D21.1.11 Demolition of existing site works: roads			
Remove asphalt paving			
Dispose asphalt paving offsite			
Sawcut asphalt			
Remove conc. sidewalk			
Sawcutting 150mm deep			
Demolition of existing site works: roads	**1,315 m2**	**$14.83**	**$19,504**
Sub-Total Roadways	**6,960 m²**	**$137.47**	**$956,800**
Z11 General Requirements	10.0%		$95,700
Z12 Profit	3.0%		$31,600
Z21 Design Contingency	10.0%		$108,400
Z22 Construction Contingency	5.0%		$59,600
Z23 Escalation Contingency (28 months)	2.7%		$33,700
Total Roadways	**6,960 m²**	**$184.77**	**$1,286,000**

PHASE ONE: SITE DEVELOPMENT COSTS - c) Remove Soil Mounds

Assembly / Description	Quantity	Unit Rate	Amount
D11.1 SITE PREPARATION			
D11.1.12 Site cut: mounds			
remove four mounds: quantity provided by marc boutin architects (+ 20% swell)			
mound 1 : 1,670 m3			
mound 2 : 7,745 m3			
mound 3 : 9,690 m3			
mound 4 : 14,650 m3			
average 2.24m high			
Site cut			
Dispose excavated soil offsite			
Site cut: mounds	**40,506 m3**	**$18.47**	**$748,225**
Sub-Total Remove Soil Mounds	**18,082 m²**	**$41.38**	**$748,200**
Z11 General Requirements	10.0%		$74,800
Z12 Profit	3.0%		$24,700
Z21 Design Contingency	10.0%		$84,800
Z22 Construction Contingency	5.0%		$46,600
Z23 Escalation Contingency (28 months)	2.7%		$26,300
Total Remove Soil Mounds	**18,082 m²**	**$55.58**	**$1,005,000**

APPENDIX II : Cost Plan

5.0 PROJECT ESTIMATE: TEST FIT 5 (3 Storey & Surface Parking) - Phase Two

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PHASE TWO: SITE DEVELOPMENT COSTS - a) Site Preparation

Assembly / Description	Quantity	Unit Rate	Amount
D11.1 SITE PREPARATION			
D11.1.11 Strip topsoil: yard			
say 150mm thick : excluding mounds (removal measured elsewhere and includes topsoil removal)			
Strip topsoil			
Dispose excavated topsoil offsite			
Strip topsoil: yard	**14,004 m3**	**$15.92**	**$222,924**
D11.1.13 Rough grade site: yards			
Rough grading - site			
Rough grade site: yards	**97,400 m2**	**$0.55**	**$53,803**
D11.1.14 Finish grading			
Finish grading - site	12,600 m2	$0.72	$9,114
Finish grading	**12,600 m2**	**$0.72**	**$9,114**
Sub-Total Site Preparation	**97,400 m²**	**$2.93**	**$285,800**
Z11 General Requirements	10.0%		$28,600
Z12 Profit	3.0%		$9,400
Z21 Design Contingency	10.0%		$32,400
Z22 Construction Contingency	5.0%		$17,800
Z23 Escalation Contingency (28 months)	2.7%		$10,100
Total Site Preparation	**97,400 m²**	**$3.94**	**$384,000**

Ambleside Masterplan: Test-Fit Options
Order of Magnitude Estimate # 2
December 15, 2017

PHASE TWO: SITE DEVELOPMENT COSTS - b) Hard Surfaces

Assembly / Description	Quantity	Unit Rate	Amount
D11.2 HARD SURFACES			
D11.2.12 Asphalt paving: yards			
say 115mm asphalt on 150mm granular A base and 300mm granular B subbase			
Rough grading - pavement			
Finish grading - pavement			
Asphalt base : Granular "B" subbase			
Asphalt base : Granular "A" base			
Asphalt paving			
Pavement markings : 6" wide			
Misc. pavement markings			
Asphalt paving: yards	**63,000 m2**	**$85.66**	**$5,396,687**
D11.2.21 Concrete sidewalks: yard			
say 2m wide x 800m long x 150mm concrete on 150mm granular A base			
32 MPa concrete supply			
Place slab on grade conc.: pump			
Screed, trowel, cure & protect			
Slab on grade edge form			
Finish : broom			
6 x 6 x 6/6 welded wire mesh			
Expansion joints			
Control joints			
Granular "A" base			
Rough grading - pavement			
Finish grading - pavement			
Concrete sidewalks: yard	**1,600 m2**	**$106.64**	**$170,628**
D11.2.22 Concrete aprons			
say 3m deep x 770m long x 150mm concrete on 200mm granular A base			
250mm wide x 300mm high edge thickening			
1200mm long x 250mm high thickening at o/h door opening			
rebar equates to 52 kg/m3			
32 MPa concrete supply			
Place slab on grade conc.: pump			
Screed, trowel, cure & protect			
Sealer & hardener			
Slab on grade edge form			
Rebar : 55 kg/m3			
Expansion joints			
Sawcut control joints			
Granular "A" base			
Rough grading - pavement			
Finish grading - pavement			
Concrete aprons	**2,310 m2**	**$163.53**	**$377,744**

PHASE TWO: SITE DEVELOPMENT COSTS - b) Hard Surfaces

Assembly / Description	Quantity	Unit Rate	Amount
D11.2.22 Concrete slab on grade: yards - covered storage			
say 20m x 65m x 200mm concrete on 200mm granular A base r/w 15M @ 300 o.c. e.w. t&b			
32 MPa concrete supply			
Place slab on grade conc.: pump			
Screed, trowel, cure & protect			
Sealer & hardener			
Slab on grade edge form			
Rebar : 15M - rebar equates to 120 kg/m3			
Sawcut control joints			
Granular "A" base			
Rough grading - pavement			
Finish grading - pavement			
Concrete slab on grade: yards - covered storage	**1,300 m2**	**$183.45**	**$238,483**
D11.2.22 Concrete slab on grade: yards - salt dome			
say 18m dia with 6m x 7m entrance x 200mm concrete on 200mm granular A base r/w 15M @ 300 o.c. e.w. t&b			
32 MPa concrete supply			
Place slab on grade conc.: pump			
Screed, trowel, cure & protect			
Sealer & hardener			
Slab on grade edge form			
Rebar : 15M - rebar equates to 120 kg/m3			
Sawcut control joints			
Granular "A" base			
Rough grading - pavement			
Finish grading - pavement			
Concrete slab on grade: yards - salt dome	**300 m2**	**$185.78**	**$55,732**
D11.2.25 Concrete curbs : yards			
Extruded concrete curbs			
Concrete curbs : yards	**5,840 lm**	**$54.91**	**$320,662**
Sub-Total Hard Surfaces	**68,510 m²**	**$95.75**	**$6,559,900**
Z11 General Requirements	10.0%		$656,000
Z12 Profit	3.0%		$216,500
Z21 Design Contingency	10.0%		$743,200
Z22 Construction Contingency	5.0%		$408,800
Z23 Escalation Contingency (28 months)	2.7%		$230,900
Total Hard Surfaces	**68,510 m²**	**$128.67**	**$8,815,000**

Ambleside Masterplan: Test-Fit Options
Order of Magnitude Estimate # 2
December 15, 2017

PHASE TWO: SITE DEVELOPMENT COSTS - c) Site Improvements

Assembly / Description	Quantity	Unit Rate	Amount
D11.3 SITE IMPROVEMENTS			
D11.3.21 Fencing			
Chain link fence : 2438mm high			
Chain link gate - automatic : 3048 x 1828mm x 4 pair			
Fencing	**1,530 m**	**$232.28**	**$355,380**
D11.3.41 Exterior signage			
Exterior signage cash allowance			
say supply at $20,000			
Exterior signage	**79,800 m2**	**$0.35**	**$27,544**
D11.3.42 Bicycle racks			
Bicycle racks			
say supply ay $350 each			
Bicycle racks	**20 no**	**$390.41**	**$7,808**
D11.3.43 Benches			
Outdoor benches			
say supply at 1,500 per bench			
Benches	**10 no**	**$1,580.83**	**$15,808**
D11.3.44 Trash receptacles			
Trash and litter receptacles			
say supply at $1,000 each			
Trash receptacles	**20 no**	**$1,040.41**	**$20,808**
D11.3.45 Flagpoles			
Ground set flagpoles			
Flagpoles	**2 no**	**$4,428.50**	**$8,857**
D11.3.46 Steel pipe bollards			
Steel pipe bollards			
Steel pipe bollards	**230 no**	**$432.12**	**$99,389**
D11.3.99 Aggregate bins			
Aggregate bins			
Aggregate bins	**17 no**	**$10,000.00**	**$170,000**
D11.3.99 Covered storage			
Covered storage	975 m2	$512.82	$500,000
say 15m x 65m			
Covered storage	**975 m2**	**$512.82**	**$500,000**

PHASE TWO: SITE DEVELOPMENT COSTS - c) Site Improvements

Assembly / Description	Quantity	Unit Rate	Amount
D11.3.99 Salt dome			
say 18m dia with 6m x 7m entrance			
Salt dome			
Electrical: S&D and lighting			
Salt dome	**270 m2**	**$1,037.04**	**$280,000**
D11.3.99 Sander racks			
Sander racks			
Sander racks	**36 no**	**$6,000.00**	**$216,000**
D11.3.99 40 yard bins			
40 yard bins			
40 yard bins	**10 no**	**$15,000.00**	**$150,000**
Sub-Total Site Improvements	**79,800 m²**	**$23.20**	**$1,851,600**
Z11 General Requirements	10.0%		$185,200
Z12 Profit	3.0%		$61,100
Z21 Design Contingency	10.0%		$209,800
Z22 Construction Contingency	5.0%		$115,400
Z23 Escalation Contingency (28 months)	2.7%		$65,200
Total Site Improvements	**79,800 m²**	**$31.18**	**$2,488,000**

PHASE TWO: SITE DEVELOPMENT COSTS - d) Landscaping

Assembly / Description	Quantity	Unit Rate	Amount
D11.4 LANDSCAPING			
assume no irrigation is required for planting beds and/or lawns			
D11.4.02 Seeding			
say 11,000 m2 landscaping			
25% sodding			
70% seeding			
5% planting beds			
Seeding			
Seeding	**7,700 m2**	**$4.32**	**$33,284**
D11.4.03 Sodding			
Lawn sodding x say 6,500 rolls			
Topsoil x say 50mm topsoil			
Sodding	**2,750 m2**	**$14.98**	**$41,189**
D11.4.11 Planting beds			
Shrubs and plant material			
Topsoil x say 450mm deep			
Planting beds	**550 m2**	**$138.75**	**$76,310**
D11.4.11 Shrubs			
Shrubs x say supply at $50 each			
Shrubs	**500 no**	**$93.69**	**$46,845**
D11.4.21 Deciduous trees (leaves)			
Medium deciduous trees x say supply at $400 per tree			
Deciduous trees (leaves)	**75 no**	**$588.99**	**$44,175**
D11.4.22 Coniferous trees (cones)			
Small coniferous trees x say supply at $175 per tree			
Coniferous trees (cones)	**150 no**	**$320.41**	**$48,062**
Sub-Total Landscaping	**11,000 m²**	**$26.35**	**$289,900**
Z11 General Requirements	10.0%		$29,000
Z12 Profit	3.0%		$9,600
Z21 Design Contingency	10.0%		$32,900
Z22 Construction Contingency	5.0%		$18,100
Z23 Escalation Contingency (28 months)	2.7%		$10,200
Total Landscaping	**11,000 m²**	**$35.45**	**$390,000**

PHASE TWO: SITE DEVELOPMENT COSTS - e) Site Demolition & Trailer Relocation

Assembly / Description	Quantity	Unit Rate	Amount
D21.0 BUILDING DEMOLITION			
D21.1.01 Demolition of existing Quonset Hut			
Demolition of existing bldgs.			
Demolition of foundation system			
Demolition of existing Quonset Hut	**180 m2**	**$68.83**	**$12,389**
D21.1.06 Trailer/container removal			
Trailer : removal			
Shipping container: removal			
Trailer/container removal	**3 no**	**$2,466.67**	**$7,400**
D21.2 SELECTIVE SITE DEMOLITION			
D21.1.11 Demolition of existing site works: phase 2			
Demolition of site works			
Sawcut asphalt			
Remove asphalt paving			
Dispose asphalt paving offsite			
Remove conc. slab			
Remove gravel paving			
Remove chain link fence			
Remove concrete curb			
Remove bollards			
Demolition of existing site works: phase 2	**97,400 m2**	**$0.75**	**$72,864**
Sub-Total Site Demolition & Trailer Relocation	**97,400 m²**	**$0.95**	**$92,700**
Z11 General Requirements	10.0%		$9,300
Z12 Profit	3.0%		$3,100
Z21 Design Contingency	10.0%		$10,500
Z22 Construction Contingency	5.0%		$5,800
Z23 Escalation Contingency (28 months)	2.7%		$3,300
Total Site Demolition & Trailer Relocation	**97,400 m²**	**$1.28**	**$125,000**

APPENDIX III : Documentation

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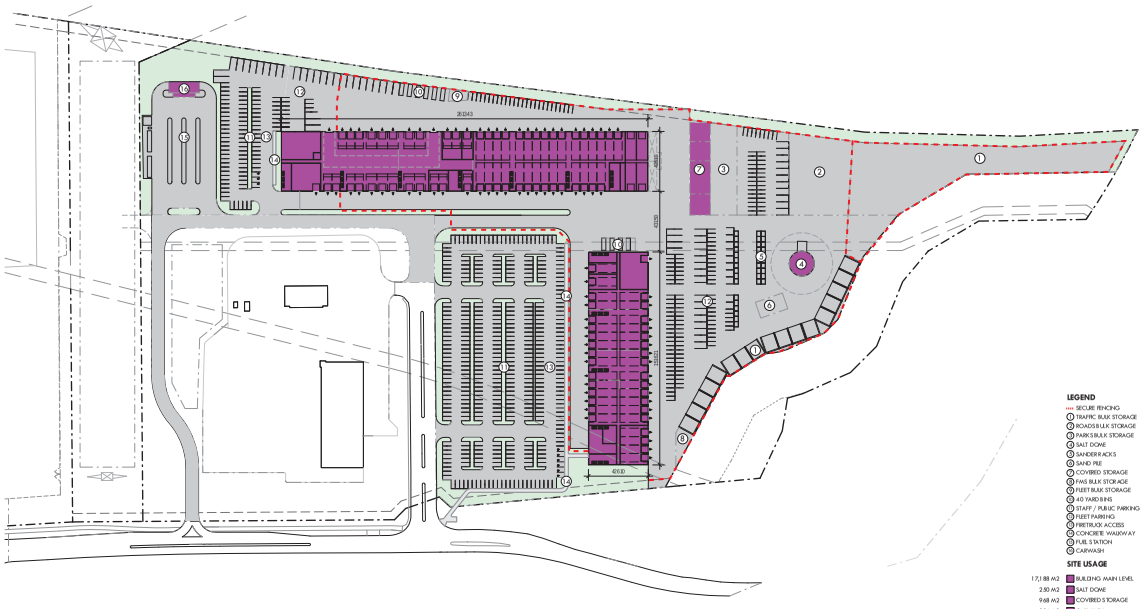

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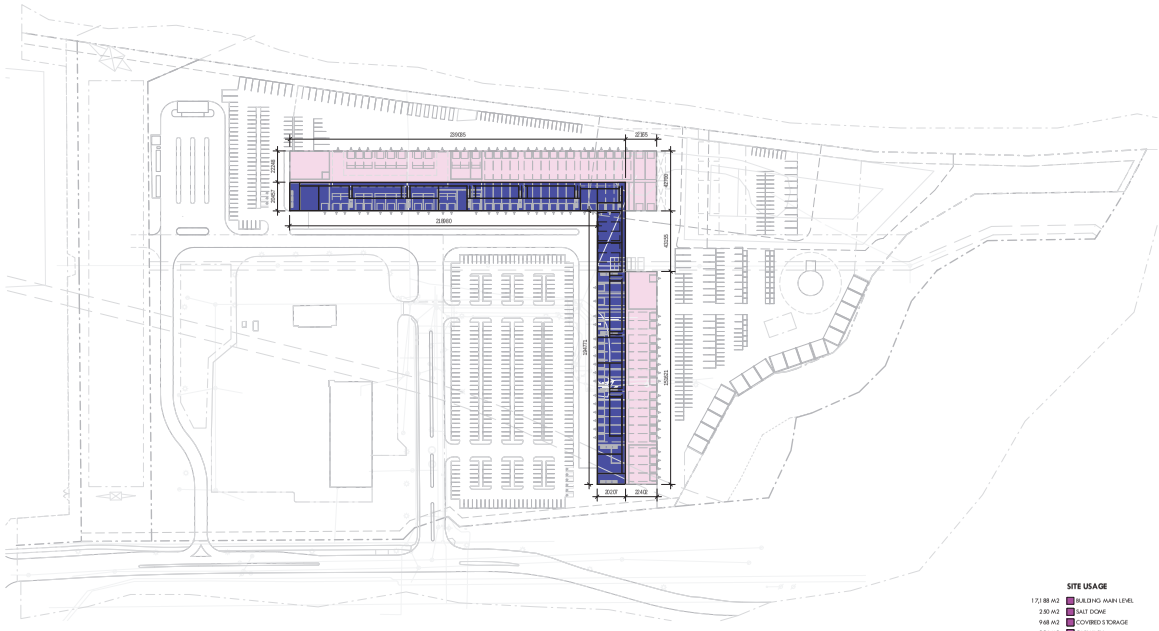
Ambleside Master Plan V2

TEST FIT 5B - MAIN FLOOR

12/04/17



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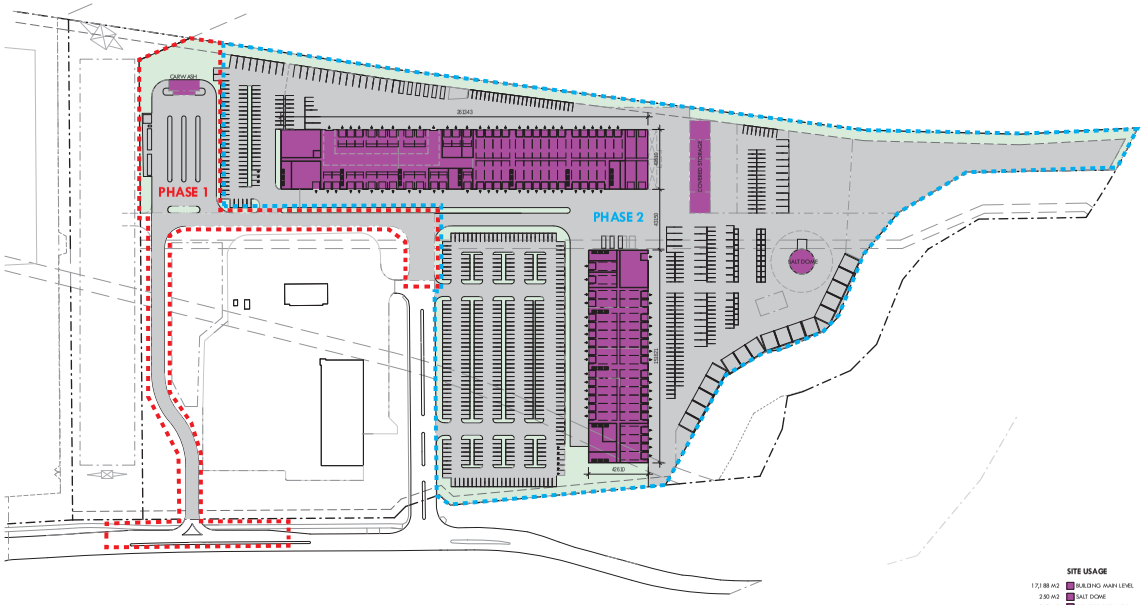
TEST FIT 5B - THIRD FLOOR

11/22/17



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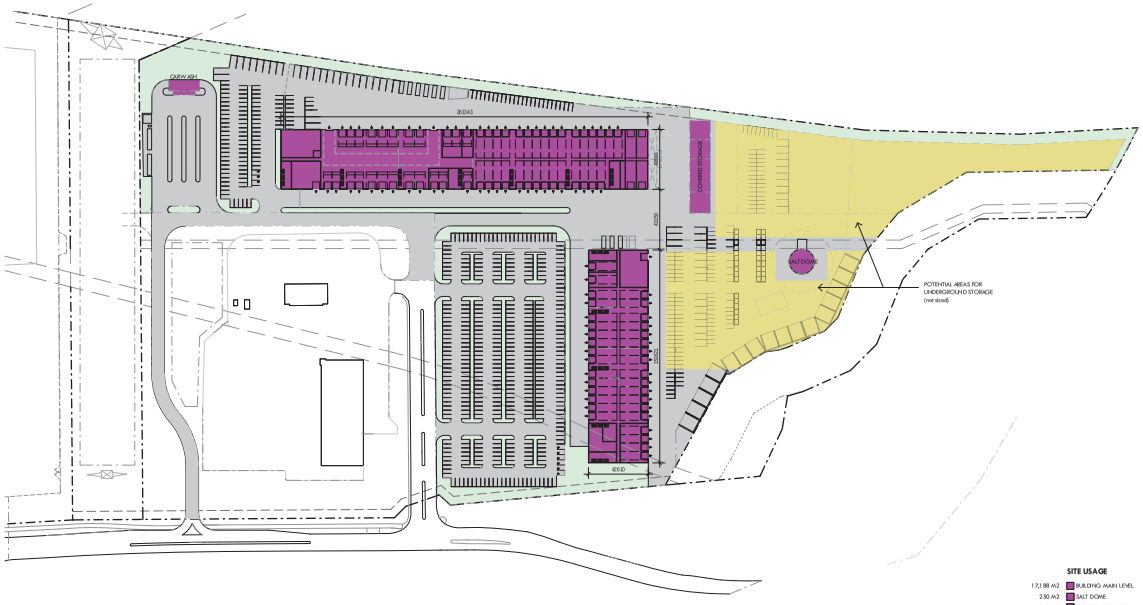
Ambleside Master Plan V2

TEST FIT 5B - MAIN FLOOR

11/22/17



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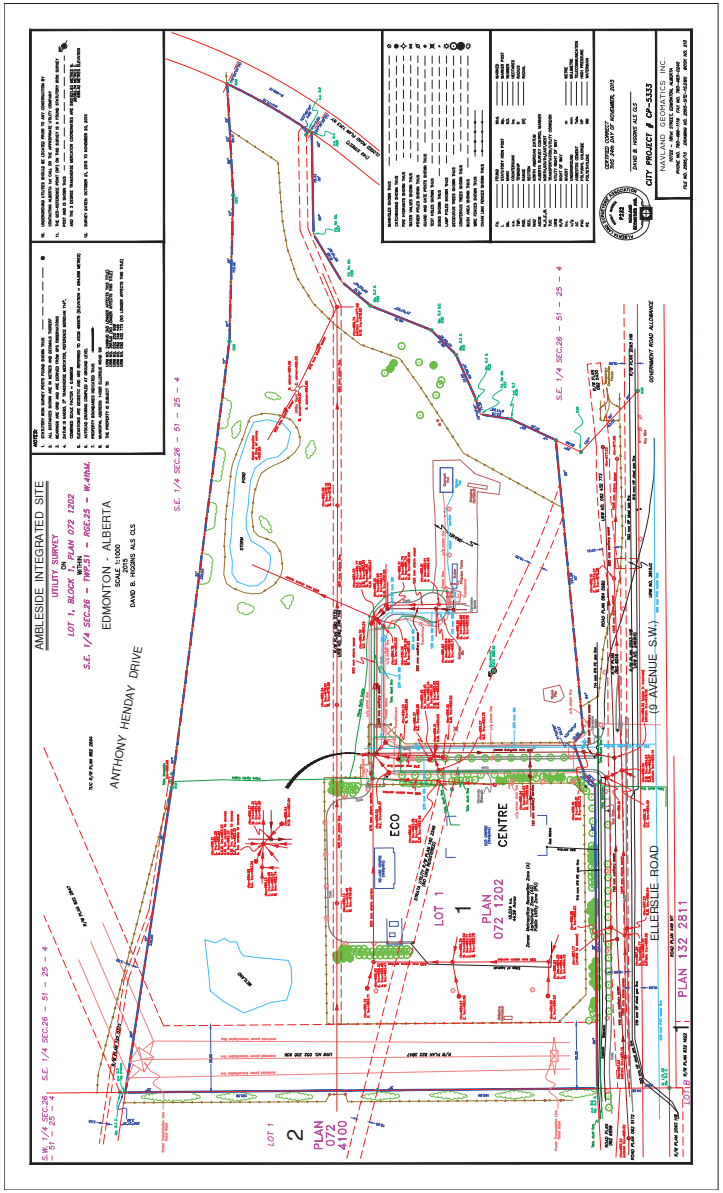
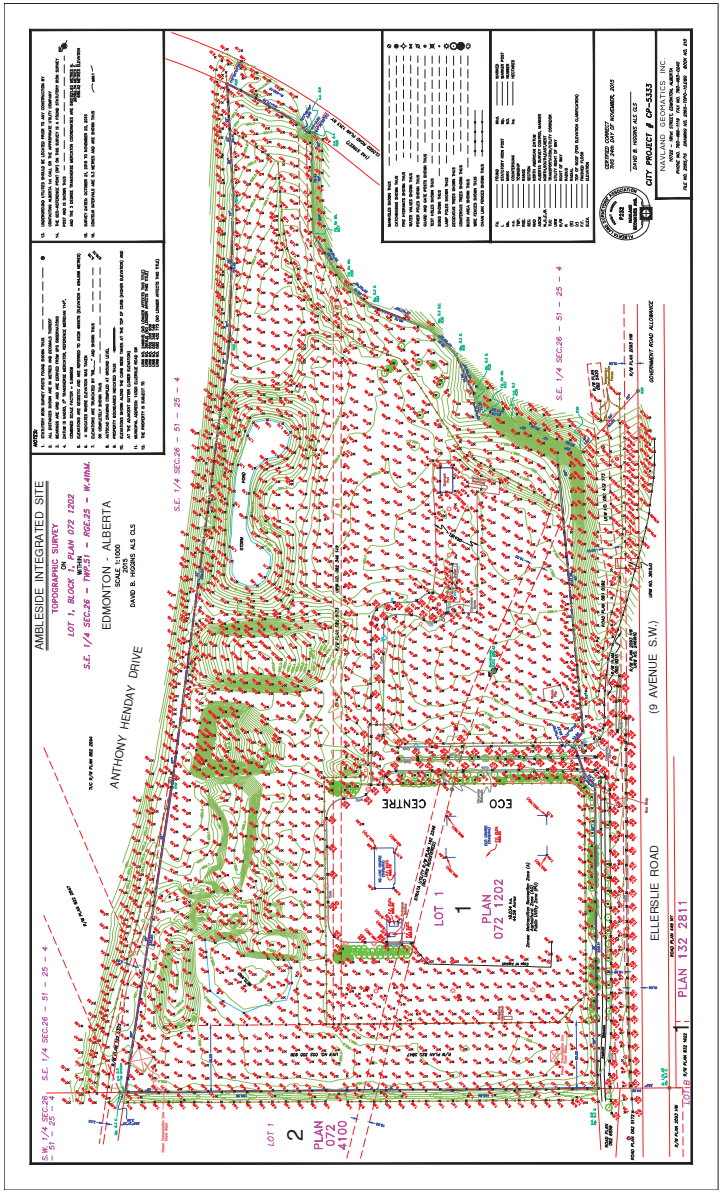
Ambleside Master Plan V2

TEST FIT 5B - MAIN FLOOR

11/22/17


AMBLESIDE INTEGRATED SITE
UTILITY SURVEY
LOT 1, BLOCK 1, PLAN 072 1202
S.E. 1/4 SEC.26 – TWP.51 – RGE.25 – W.4thM.
EDMONTON – ALBERTA
SCALE 1:1000
2015
DAVID B. HOGBEN ALS CLS
ANTHONY HENDAY DRIVE
ELLERSLIE ROAD
(9 AVENUE S.W.)
ECO CENTRE
LOT 1
PLAN 072 1202
LOT 2
PLAN 072 4700
PLAN 132 2811
S.E. 1/4 SEC.26 – 51 – 25 – 4
S.W. 1/4 SEC.26 – 51 – 25 – 4
GOVERNMENT ROAD ALLOWANCE
CITY PROJECT # CP-5333
NAVLAND GEOMATICS INC.


AMBLESIDE INTEGRATED SITE
TOPOGRAPHIC SURVEY
LOT 1, BLOCK 1, PLAN 072 1202
S.E. 1/4 SEC.26 – TWP.51 – RGE.25 – W.4thM.
EDMONTON – ALBERTA
SCALE 1:1000
2015
DAVID B. HOGBEN ALS CLS
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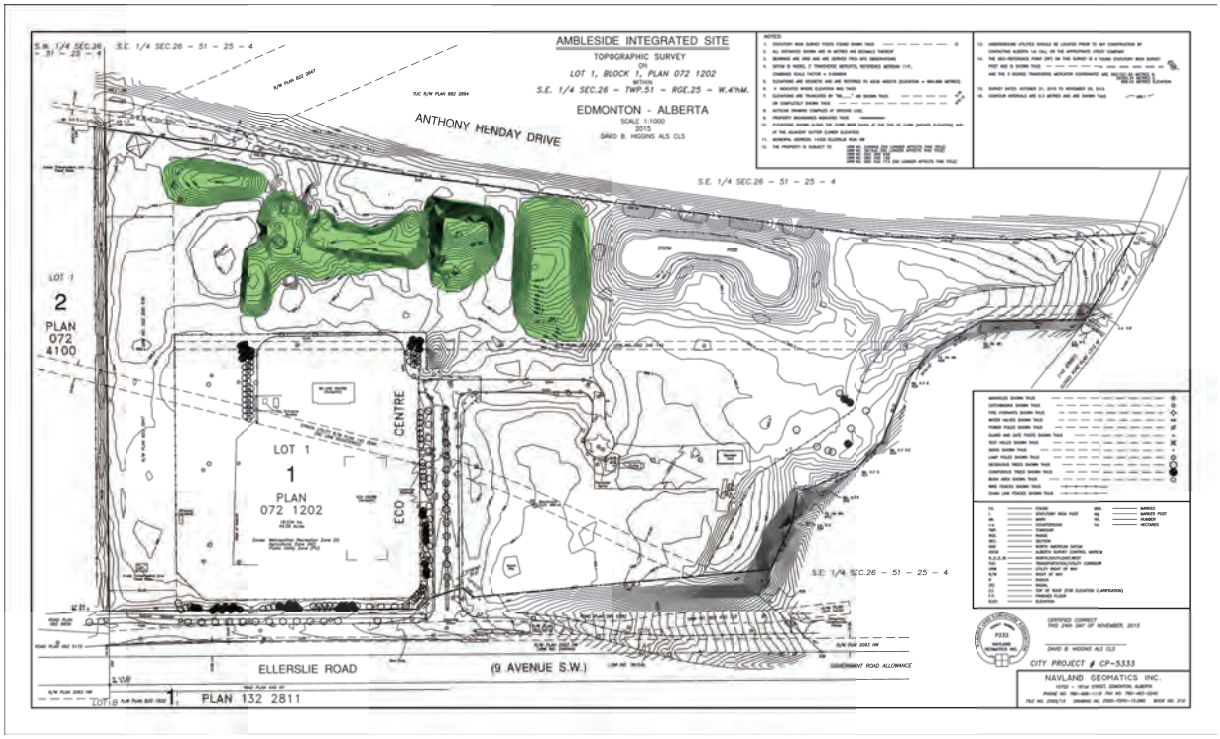
AMBLESIDE INTEGRATED SITE
TOPOGRAPHIC SURVEY
ON
LOT 1, BLOCK 1, PLAN 072 1202
WITHIN
S.E. 1/4 SEC.26 - TWP.51 - RGE.25 - W.4THM.
EDMONTON - ALBERTA
SCALE 1:1000
2015
DAVID B. HIGGINS ALS CLS
ANTHONY HENDAY DRIVE
S.E. 1/4 SEC.26 - 51 - 25 - 4
LOT 1
2
PLAN
072
4100
LOT 1
1
PLAN
072 1202
CENTRE
ECO
ELLERSLIE ROAD
(9 AVENUE S.W.)
PLAN 132 2811
CITY PROJECT # CP-5333
NAVLAND GEOMATICS INC.


Anthony Henday Dr
216
Ambleside Eco Station
Ellerslie Rd SW
Ellerslie Rd SW

AMP2 - INTEGRATED OPERATIONS PROGRAM

NO	NAME	DESCRIPTION	INTEGRATED PROGRAM QTY.	AREA/EA. SQ. M	TOTAL AREA SQ. M	COMMENTS
SITE SERVICES						
7.1	FUEL STATION					
	FUEL ISLANDS	3 pumps per island; 7m aisle width 3m x 44m island	3.0	139.0	417.0	
	STORAGE TANK - GASOLINE	Underground gasoline tank preferred; 100,000 litre capacity; Basis for programming: 3m dia x 15.080m length tank; clearance assumed at 50% tank dia.; excavation dimension: 6m x 18.08m	1.0	108.5	108.5	
	STORAGE TANK - DIESEL	Underground diesel tank perferred; 100,000 litre capacity; Basis for programming: 3m dia x 15.080m length tank; clearance assumed at 50% tank dia.; excavation dimension: 6m x 18.08m	1.0	108.5	108.5	
	GENERATOR + WINDSHIELD FLUID TANK	Building for generator and fuel monitoring system; washer fulid BL1360 litre capacity; 1 barrier free WC; Note: Kennedale Fuel Facility Central Fuel Building utilized as basis for programming	1.0	38.0	38.0	
	DEF DISENSING SYSTEM	1900 litre capacity; tank dim: 1.250 x 2.0 m; locate on concrete pad: 2.5 m x 3.25	1.0	8.1	8.1	
	AISLE	44m L x 7m width	4.0	308.0	1,232.0	
		7.1 SUB-TOTAL			1912.1	
7.2	TOUCHLESS CARWASH					
	WASHBAY - TOUCHLESS	For City-Wide Fleet use as well as exteral clients For light vehicles (trucks, cars)	1.0	176.0	176.0	
	SERVICES	Equipment rooms, mechanical / electrical	1.0	48.0	48.0	
	ACCESS DRIVE AISLE	14 m L x 8 m W	2.0	112.0	224.0	
		7.2 SUB-TOTAL			448.0	
		SITE SERVICES, NSM			2360.1	
		Landscape / Buffer Gross-Up (25%)			590.0	
		Roadways / Hardscape Gross-Up (85%)			2,006.1	Per precedent analysis, significant gross-up for the fuel station is required considering large turning radius and movement of heavy vehicles
		SITE SERVICES TOTAL, GSM			4956.2	
		TOTAL PROGRAM			112890.9	

BTY Group

BTY is one of Canada's most successful and experienced Quantity Surveying and Cost Management consultancies.

Since 1977, BTY has earned a reputation for providing clients with professional and practical advice of the highest calibre. The diversity of our client base attests to our ability to apply critical analysis and thinking to the task at hand. We have provided support to clients for capital investment in the health, education, research, leisure, retail, residential and commercial sectors

We have provided consulting services for over $50 billion of construction projects in the last forty years.

For all the services we offer, BTY listens to your current and upcoming needs. We provide innovative alternatives and consistently deliver the required solutions with cost-conscious creativity. Since we serve clients whose needs span the entire life of an asset, from needs assessment through asset delivery and beyond, we believe that BTY integrated approach represents a better way to deliver KNOWLEDGE TO BUILD WITH.

Resources

The current complement of the BTY offices is 100 technical staff and includes Quantity Surveyors, Construction Estimators and Professional Engineers, all of whom have detailed knowledge and understanding of the many factors affecting construction costs. As a full service Quantity Surveying practice, we have the background required to provide a full range of services including capital cost planning, estimating, life cycle costing, risk and sustainable design analysis.

We make extensive use of a variety of automated systems during the performance of our duties. These systems include cost estimating software, word processing, spreadsheet and project scheduling programs that are used for the preparation of cost reports and other documentation. Our quantity take-offs are prepared with the assistance of computer driven digitizers that run in conjunction with our proprietary estimating program.

In addition to the resources based in our Calgary office, we can also draw on the project experience and knowledge of our Canadian offices that are located in Vancouver, Edmonton, Calgary, Saskatoon, St. Catharines, Toronto, Ottawa, Montreal, our American offices located on Scottsdale, Orlando, Seattle, Los Angeles, Atlanta, Denver, Cleveland and our EMEA offices in Ankara, Turkey and Cairo, Egypt.

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APPENDIX F: TRAFFIC IMPACT ASSESSMENT

F

F.1 TRAFFIC IMPACT ASSESSMENT

Bunt & Associates provided a Traffic Impact Assessment report for the AIS, dated December 8, 2017. The report highlights no significant issues for traffic for Test Fit 5B; however, the report does recommend the installation of the traffic signal at Ellerslie Road SW and the all-directional site access intersection. The report was presented as follows:

Ambleside Integrated Site
Traffic Impact Assessment

Final Report

Prepared for
The marc boutin architectural collaborative inc.

Date
February 5, 2018

Prepared by
Bunt & Associates

Project No.
3519.01

CORPORATE AUTHORIZATION

Prepared By: Alyssa Peters, EIT
Transportation Analyst

Bunt & Associates Engineering Ltd.
504-10339 124 Street NW
Edmonton, AB T5N 3W1
Canada

Reviewed By: Sean Willis, P.Eng.
Senior Transportation Engineer

Telephone: +1 780 732 5373
Facsimile: +1 780 732 7806

Date: 2018-02-05
Project No. 3519.01
Status: Final

Approved By: Sean Willis, P.Eng.
Senior Transportation Engineer

PERMIT TO PRACTICE
Bunt & Associates Engineering Ltd.
Signature
Date FEB 5, 2018
PERMIT NUMBER: P13898
The Association of Professional Engineers
Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER ALBERTA
S. C. WILLIS
Feb. 5, 2018

This document represents an electronic version of the original hard copy document, sealed, signed and dated by Sean Willis and retained on file. The content of the electronically distributed document can be confirmed by referring to the original hard copy.

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EXHIBITS

TABLES

1. INTRODUCTION

1.1 Background

The marc boutin architectural collaborative inc. (MBAC) is currently working with the City of Edmonton to develop a Master Plan for a new integrated operations yard located in southwest Edmonton. The City is looking to develop a flexible space that could accommodate a combination of City Operations departments including, but not limited to, Parks and Roads Services, Facility Maintenance Services, and Fleet Services.

As part of this initiative, Bunt & Associates was retained to provide assistance with on-site planning and design, as well as complete a Traffic Impact Assessment (TIA) for the proposed Ambleside Integrated Operations Yard.

1.2 Study Objectives

MBAC developed a number of Test Fits for the proposed operations yard, which Bunt & Associates reviewed and provided commentary on, including the completion of swept path analysis of key vehicle movements throughout the site. Through this iterative process, MBAC has reached a preferred site development plan.

With the identification of a preferred site development plan, focus shifted to the completion of the TIA. The objectives of the Ambleside Integrated Operations Yard TIA include:

- Analyzing traffic operations at key study area intersections with the development of the proposed operations yard; and
- Identifying roadway geometry and traffic control requirements at the key study intersections required to support the proposed operations yard.

1.3 Study Methodology

The methodology used in the preparation of the Ambleside Integrated Operations Yard TIA includes the following key components:

- Determining existing traffic volumes at key study intersections in the vicinity of the proposed development site;
- Identifying study horizons and estimating background traffic growth;
- Estimating site generated traffic based on trip generation, trip distribution and trip assignment assumptions;
- Evaluating future traffic operations based on the total traffic (background plus site generated) traffic conditions, and identifying intersection improvements required to support the development.

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2. SITE CONTEXT – AREA CONDITIONS

2.1 Site Location

The proposed development is planned to be constructed on an 18 ha parcel of land owned by the City of Edmonton in southwest Edmonton. The parcel is bounded by Whitemud Creek to the east, a City of Edmonton snow storage site to the west, Ellerslie Road to the south, and Anthony Henday Drive to the north. Currently, the parcel is zoned as A – Metropolitan Recreation Zone and PU – Public Utility Zone. The Ambleside Eco Station is currently constructed and operating in the west portion of the site while the remainder of the site is vacant.

The proposed development site location is illustrated in **Exhibit 2-1**.

2.2 Existing Conditions

2.2.1 Ambleside Eco Station

The City of Edmonton Ambleside Eco Station, located southwest of the proposed operations yard site, is currently accessed by one all-directional T-intersection extending north from Ellerslie Road along the east boundary of the Eco Station site. The Ambleside Eco Station is a comprehensive waste drop-off facility that operates 9:00AM - 4:30PM, Tuesday – Saturday, from November through March, and 9:00AM – 6:30PM, Monday – Saturday, from April through October.

2.2.2 Current Site Development

The proposed development site is gated, and while no permanent structures exist on-site, there currently exists a trailer, a portable fabric covered building, several storage sheds, and an area for what appears to be landscaping materials and some equipment storage.

2.2.3 Roadway Network

Ellerslie Road is currently a two-lane undivided arterial roadway running east-west through south Edmonton. Left and right turn bays are constructed along Ellerslie Road at most intersections along the corridor and the speed limit is posted at 60 km/h in the vicinity of the proposed development.

Site Access Road is a north-south private roadway that currently operates as a two-lane divided roadway (one travel lane in each direction) with a raised median, and monolithic sidewalk on the west side of the street. Each travel lane is approximately 8 metres wide, making the roadway wide enough to actually accommodate two travel lanes in each direction.

N.T.S.

Ambleside Integrated Site TIA
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Exhibit 2-1

Site Location

The ***Ellerslie Road/All-Directional Site Access*** intersection is currently constructed as an unsignalized three-legged intersection with stop control on the north approach, as well as left and right turn bays on the west and east approaches respectively. In addition, a crosswalk is painted along the east approach to provide a pedestrian connection between the Ambleside Eco Station and a transit stop on the south side of Ellerslie Road; however, Edmonton Transit does not currently run service to the transit stop.

2.2.4 Traffic Volumes

Bunt & Associates completed intersection turning movement counts at the Ellerslie Road/All-Directional Site Access intersection on Tuesday June 27, 2017 and Wednesday, June 28, 2017. Detailed traffic volume data can be found in **Appendix A**.

Exhibit 2-2 illustrates the existing traffic volumes at the Ellerslie Road/All-Directional Site Access intersection during the AM and PM peak hour. As the Ambleside Eco Station is the main trip generating land use currently constructed on the site, the volumes entering and exiting the north approach of the Ellerslie Road/All-Directional Site Access intersection have been conservatively assumed to represent the traffic currently generated by the Ambleside Eco Station in the AM and PM peak hours. As shown in Exhibit 2-2, the Ambleside Eco Station currently generates in the order of 23 two-way trips between 7:30 AM and 8:30 AM and 59 two-way trips between 4:30 PM and 5:30 PM.

In addition to peak hour turning movement counts, Bunt & Associates completed link volume counts on the north approach of the Ellerslie Road/All-Directional Site Access intersection on Tuesday, June 27, 2017 and Wednesday, June 28, 2017, to estimate the daily traffic volumes entering the Eco Station. Between 9:00AM and 6:30PM, the operating hours in June, the Eco Station experienced in the order of 379 inbound vehicles and 406 outbound vehicles.

2.3 Horizon Year and Future Growth

2.3.1 Horizon Year

Based on discussions with MBAC, it is assumed that the Ambleside Integrated Operation Yard will be operational within 5 years. Therefore, for the purposes of this assessment, a 2022 horizon was selected to understand the short term impacts of the development on the adjacent roadway network.

For the purposes of this assessment, it is assumed that Ellerslie Road will remain a two-lane undivided roadway with the existing left and right turn bays at the Ellerslie Road/All-Directional Site Access intersection within the assessment horizon.

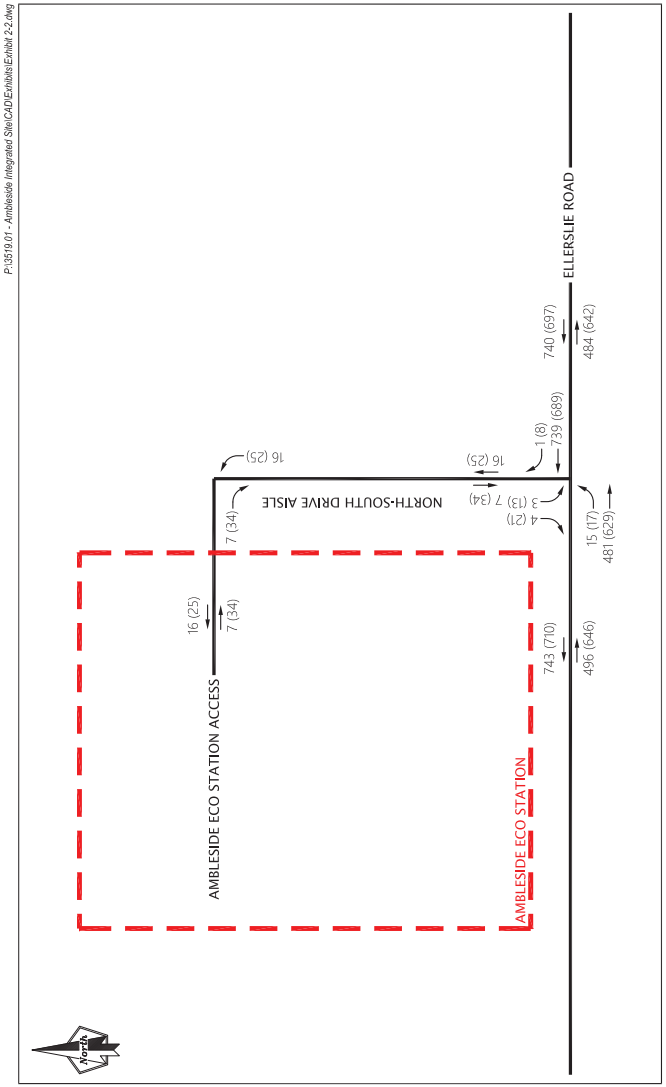

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Exhibit 2-2

June 2017 Existing Traffic Volumes AM (PM) Peak Hour

2.3.2 Background Traffic Volumes

Ellerslie Road

Background traffic is the component of traffic on the adjacent roadway network that would be present regardless of the proposed development proceeding. Background traffic volumes were estimated to correspond to the 2022 horizon.

To account for regional growth in the area, a linear growth rate of 7% per year was applied to the existing through volumes at the Ellerslie Road/All-Directional Site Access intersection. This growth rate isanticipated to be representative of historical growth rates between 5% and 10% measured within southwest Edmonton and is expected to be adequate to capture the magnitude of volume increase anticipated to occur with continued development in southwest Edmonton.

Ambleside Eco Station

With respect to traffic generated by the Ambleside Eco Station, it is understood that this Eco Station is located in a major growth node of the City, and that the facility may not be operating at its peak capacity. As the residential lands in southwest Edmonton continue to grow, visitor numbers to the Eco Station may increase. In addition, the Eco Station is expected to experience seasonal fluctuations in visitor numbers, with higher numbers in the spring/summer and lower numbers in the fall/winter.

Based on information provided by the City of Edmonton, in 2016 this facility experienced an average of 236 visitors per day, 1,283 visitors per week, and 5,584 visitors per month. The busiest day of the year occurred on Saturday, May 14, 2016 with 560 visitors, while the quietest day of the year occurred on Thursday, February 11, 2016 with 65 visitors. April through September experienced higher numbers of visitors compared to the rest of the year, with June representing the peak month of operations with 7,599 visitors. In June 2016, the average number of daily weekday visitors to the Ambleside Eco Station was 263.

Because the traffic counts completed by Bunt occurred in the month of June, which is estimated to represent the busiest month/season for the Eco Station, no factoring up to account for seasonal variations is required.

In consideration of future development growth in the area, which in turn could increase visitor numbers at the Eco Station, Bunt reviewed visitor number information from the City of Edmonton for the Strathcona Eco Station. The Strathcona Eco Station is one of the City's busiest Eco Stations, located in a fully developed, mature area of the City with a mixture of residential and industrial/business developments. In 2016, this facility experienced an average of 338 visitors per day, 1,842 visitors per week, and 8,006 visitors per month. Comparatively, in June 2016 the Strathcona Eco Station saw 9,568 visitors at an average of 364 daily weekday visitors.

The traffic counts completed by Bunt at the Ellerslie Road/All-Directional Site Access intersection on Tuesday, June 27, 2017 estimated 379 daily visitors to the Ambleside Eco Station. It is anticipated that the existing traffic volumes associated with the temporary City yard east of the Eco Station, which have not

been separated out, are artificially inflating the visitor numbers. This conservative approach yields daily visitor numbers to the Ambleside Eco Station that are higher than the average number of visitors experienced at the Strathcona Eco Station (379 v. 364), and appears to provide a reasonable estimate of the amount of visitors the Ambleside Eco Station could experience in the future.

It is possible that the demand at the Ambleside Eco Station could exceed that experienced at the Strathcona Eco Station, which can only be confirmed through continued monitoring. However, for the purposes of this assignment no additional growth or factoring associated with the Ambleside Eco Station was assumed during the AM and PM peak hours in the year 2026.

Exhibit 2-3 illustrates the 2022 AM and PM peak hour background traffic volumes estimates used in the assessment.

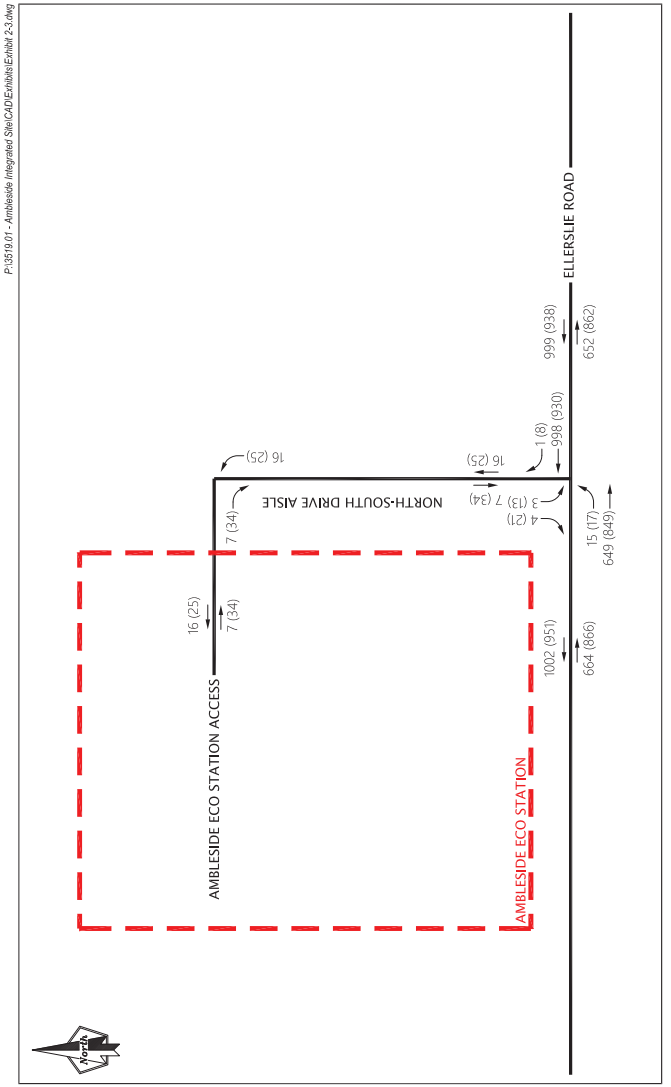

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Exhibit 2-3

2022 Background Traffic Volume Estimates AM (PM) Peak Hour

Ambleside Integrated Site TIA
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3. PROPOSED DEVELOPMENT AND TRAFFIC CHARACTERISTICS

3.1 Development Concept

The proposed development is currently being planned to accommodate a combination of City Operations departments including, but not limited to, Parks and Roads Services, Facility Maintenance Services, and Fleet Services. For the purposes of this assessment, it is assumed that all City Operations departments listed above would be accommodated on-site representing the worst case scenario.

Exhibit 3-1 illustrates the most current and preferred development site plan (Test Fit 5B – December 4, 2017) provided by MBAC. The site plan illustrates the general potential layout of the facility occupying the northern and eastern half of the site while the existing Ambleside Eco Station is anticipated to remain in its current location. Two buildings offering a combination of maintenance bays and offices are proposed in the north and east portions of the site, while the remainder of the site is mainly allocated to equipment parking and storage. Staff parking in the order of 422 stalls and 46 visitor stalls are proposed west of both buildings. The remainder of stalls on-site are expected to be used as fleet vehicle parking in the order of 285 stalls. In addition, a fueling station for City of Edmonton vehicles and machinery, not limited to those associated with the proposed development, has been identified in the northwest corner of the overall site.

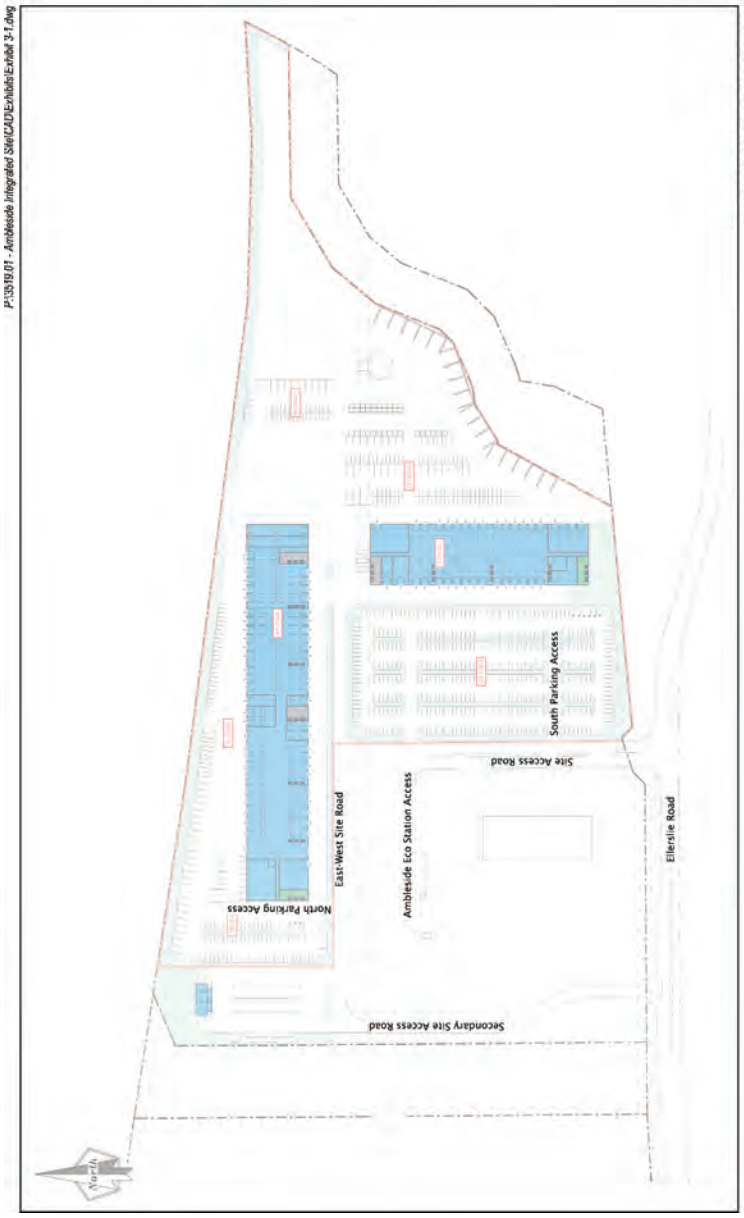
3.2 Site Access

As shown in Exhibit 3-1, the site is anticipated to be accessed by the existing Ellerslie Road/All-Directional Site Access intersection and a proposed Ellerslie Road Right-in/Right-out Site Access intersection located approximately 165 metres to the west of the all-directional access.

3.3 On-Site Circulation

The existing Site Access Road extending north from the Ellerslie Road/All-Directional Site Access intersection will remain in place and continue to provide access to the Ambleside Eco Station, as well as the Ambleside Integrated Operations Yard. The main staff/visitor parking lot will be accessed via two locations along the Site Access Road: one approximately 70 metres north of Ellerslie Road and another opposite of the Ambleside Eco Station access.

The existing Site Access Road is proposed to continue north of its current limit and terminate at a T- intersection with the East-West Site Road. The east approach of the T- intersection is anticipated to provide access to the maintenance and equipment storage areas, while the west approach continues west and provides access to the proposed north parking area and the fueling station in the northwest area of the plan. The East-West Site Road is planned to bend south to form a secondary north-south site access road connecting to Ellerslie Road as a right-in/right-out site access.



3.4 Traffic Characteristics

Traffic volume estimates anticipated to be generated by the proposed development were based on discussions with MBAC, preliminary staffing models representing the worst case scenario, and an application of first principles. The following section outlines the assumptions made regarding trip generation rates, trip distribution, and trip assignment.

3.4.1 Estimated Trip Generation

The site generating characteristics of the proposed development are anticipated to include the following elements:

- City Operations departments accommodated on-site include: Parks and Roads Services, Facility Maintenance Services, and Fleet Services;
- The overall facility will accommodate around 140 administrative staff from the various departments, 80 staff from Facility Maintenance Services; and 200 field crew staff from the various departments for a maximum of 420 employees;
- Administrative staff arrive and depart the site during the AM and PM peak hours respectively;
- Some level of visitors to the site will arrive and depart the site during the AM and PM peak hours respectively;
- Facility Maintenance Services staff arrive and depart the site during the AM and PM peak hours respectively;
- Field staff generally arrive and leave work during off-peak hours; however, some amount of field staff will arrive and depart the site with fleet vehicles during both the AM and PM peak hours; and
- Vehicles arriving/departing the fueling station will be spread throughout the day, and the volumes generated by external fleet vehicles arriving via Ellerslie Road will be negligible in the AM and PM peak hours.

Preliminary staffing models and anticipated shift schedules for each City Operations department was used to estimate the magnitude of staff arriving and departing the site during both the AM and PM peak hours. A detailed table estimating the number of staff on-site throughout the course of a typical day is included in **Appendix B**.

Based on a review of the preferred site plan (Test Fit 5B), in the order 46 visitor parking stalls have been identified to be included on site. It was estimated that approximately 50% of the visitor stalls would fill during the AM peak hour and 50% of the visitor stalls would empty during the PM peak hour.

Table 3-1 summarizes the site generated trips assumed to be associated with the proposed development during the AM and PM peak hours. The proposed development is anticipated to generate In the order of 432 two-way trips in the AM peak hour and 313 two-way trips in the PM peak hour.

Table 3-1: Site Generated Trip Estimates

	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
Staff	279	130	71	219
Visitors	23	0	0	23
Total	**302**	**130**	**71**	**242**
	432		**313**	

3.4.2 Trip Distribution and Assignment

Based on a review of the existing turning movements in and out of the Ambleside Eco Station in the PM peak hour at the Ellerslie Road /All-Directional Site Access intersection, approximately 70% of inbound trips arrived from the west on Ellerslie Road while approximately 30% of inbound trips arrived from the east on Ellerslie Road. In addition, approximately 60% of outbound trips were destined to the west on Ellerslie Road while approximately 40% were destined to the east on Ellerslie Road. The existing Ambleside Eco Station PM peak hour distribution to Ellerslie Road was assumed to be representative of the potential distribution characteristics of the proposed development; therefore, the existing distribution to Ellerslie Road was maintained and applied to the site generated trips in the AM and PM peak hour.

As the proposed development includes the construction of the Ellerslie Road Right-in/Right-out Site Access intersection, the site generated trips were assigned to both the existing all-directional access as well as the right-in/right-out access based on the location of parking areas planned on-site.

Table 3-2 summarizes the assumed distribution and assignment applied to the site generated trips in both the AM and PM peak hours. **Exhibit 3-2** illustrates the AM and PM peak hour site generated traffic volume estimates on the roadway network.

Table 3-2: Assumed AM/PM Peak Hour Distribution and Assignment

Ellerslie Road Access	In		Out	
	Ellerslie Road West	Ellerslie Road East	Ellerslie Road West	Ellerslie Road East
All-Directional	70%	20%	45%	40%
Right-in/Right-out	-	10%	15%	-
Total	**70%**	**30%**	**60%**	**40%**
	100%		**100%**	

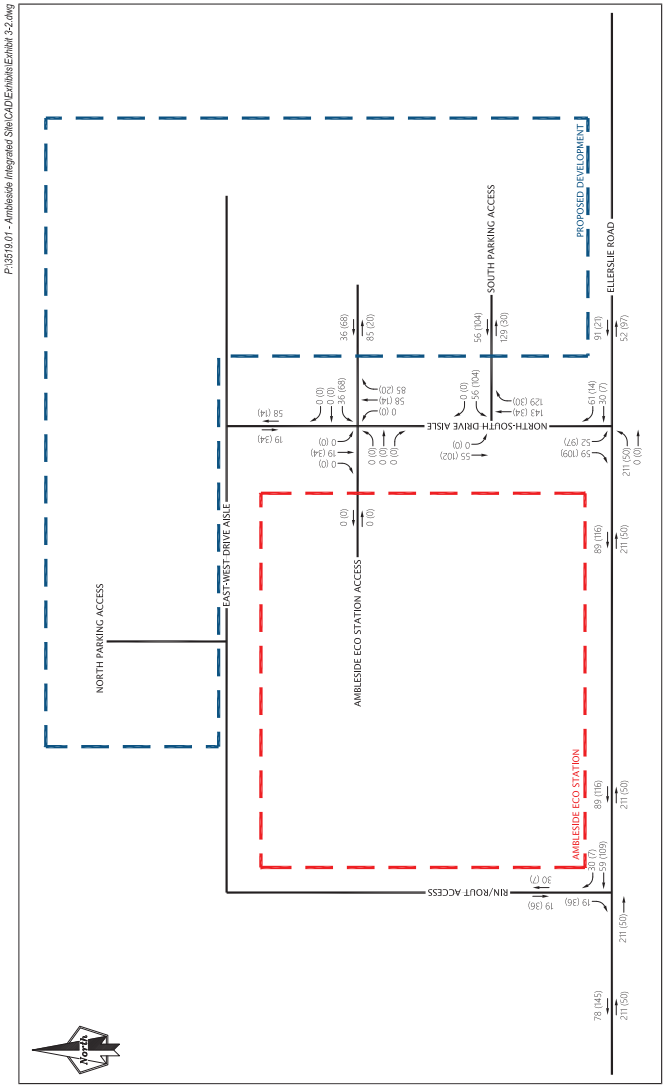


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Exhibit 3-2

Site Generated Traffic Volume Estimates AM (PM) Peak Hour

3.4.3 Total Traffic Volumes Estimates

The site generated traffic volumes were added to the 2022 background traffic volume estimates to determine the total traffic volumes for use in the assessment. **Exhibit 3-3** illustrates the 2022 AM and PM peak hour total traffic volume estimates on the roadway network. It is noted that the 2022 background traffic associated with the Ambleside Eco Station was not reassigned to the proposed Ellerslie Road Right-in/Right-out intersection.

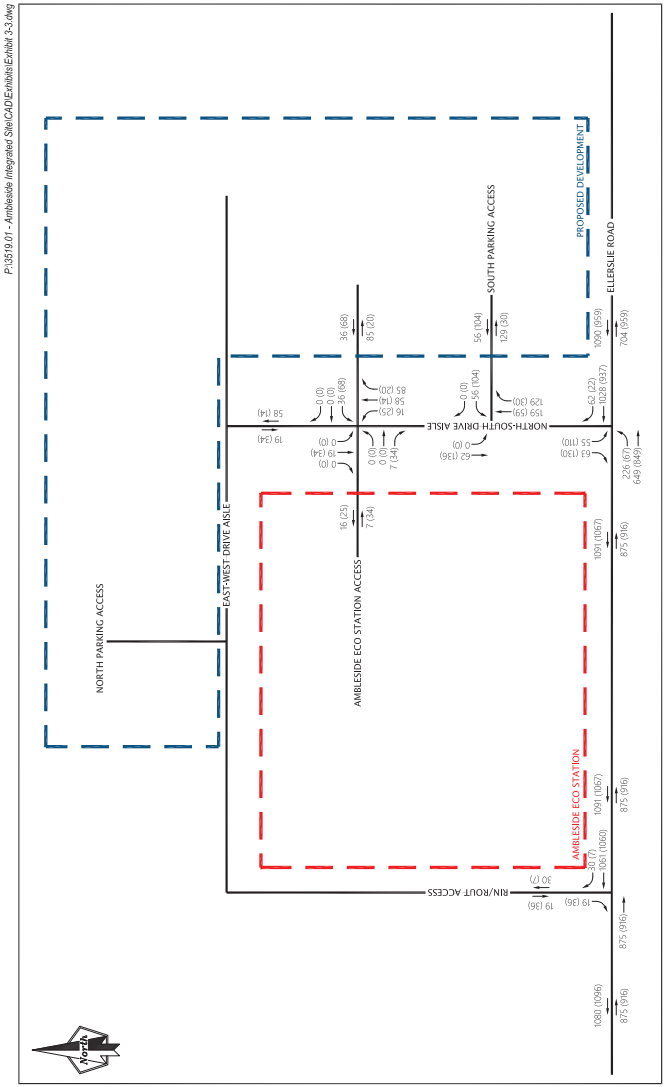

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Exhibit 3-3

2022 Total Traffic Volume Estimates AM (PM) Peak Hour

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4. TRAFFIC ANALYSIS

4.1 Intersection Capacity Analysis

Intersection assessments were completed for the following study area intersections:

- Ellerslie Road & All-Directional Site Access;
- Ellerslie Road Right-in/Right-out Site Access;
- South Parking Lot Access & Site Access Road; and
- Ambleside Eco Station Access & Site Access Road.

The Ellerslie Road/All-Directional Site Access intersection was analyzed under existing, background, and total traffic conditions under the 2022 horizon while the remaining study area intersections were analyzed under total traffic conditions only.

4.2 Intersection Capacity Analysis Assumptions

The capacity analyses are based on the methods outlines in the Highway Capacity Manual 2010, using Synchro 9.1 analyses software. Intersection operations are typically rated by two measures. The volume-to-capacity (v/c) ratio describes the extent to which the traffic volumes can be accommodated by the physical capacity of the road configuration and traffic control. A value (measured during the peak hour) less than 0.90 indicates that generally there is sufficient capacity and the projected traffic volumes can be accommodated at the intersection. A value between 0.90 and 1.0 suggests unstable operations may occur and volumes are nearing capacity conditions. The second measure of performance, Level of Service (LOS), is based on the estimated average delay per vehicle among all traffic passing through the intersection. A low average delay merits a LOS A rating. Average delays greater than 80 seconds per vehicle at a signalized intersection generally produce a LOS F rating, while at unsignalized intersections a LOS F is reached when vehicles experience an average delay greater than 50 seconds.

The anticipated 95th percentile queue length has also been included in the following assessment summaries. The queue provided may include a footnote that relates to the ability of the program to estimate the queue accurately. The 'm' footnote indicates that the volumes entering the intersection is being metered by an upstream intersection. The Synchro help file also provides the following regarding the '#' footnote:

> "The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles of 95th percentile traffic to account for the effects of spill over between cycles. If the reported v/c <1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile

queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bays."[1]

The methodology includes a number of assumptions that relate to operating conditions present at the intersection. The following assumptions were used in the analysis:

- Saturation Flow Rate - 1,900 vphg
- Total Lost Time Adjustment Factor – 0.5
- Peak Hour Factor – as measured; 0.92 where unknown
- The % heavy vehicles per movement measured during the turning movement counts were used in the existing conditions assessment; however, future % heavy vehicles turning in and out of the site as well as intersections on-site were set at 10% to account for the potential for heavy equipment arriving and departing the site during the AM and PM peak hours.

The geometry assumed for each intersection is included in the assessment tables. Left turn movements through movements, and right turn movements are represented by "L", "T", and "R" respectively in the assessment tables, and lanes are separated by a "/". For example, an approach whose geometry is described as LT/R features two lanes: one accommodating shared left/through movements and a second land accommodating right turning movements.

Traffic control information is also included in the assessment tables. Key signal phasing is identified in the tables with protected/permitted left turn phasing identified by "Pm+Pt" and protected only left turn phasing identified by "Prot". Permitted and overlapped right turn phasing is identified by "Pm'Ov" and free flow right turns are denoted by "free".

Unsignalized intersection assessments were completed using the HCM 2010 methodology within Synchro 9.1. As per the HCM 2010 methodology, assessment results are reported for critical movements only. As well, the HCM 2010 95th percentile queue is reported as vehicles; therefore, a distance in metres was calculated assuming an average of 7.5 metres per vehicle.

The following sections summarize the results of the intersection assessments completed for the key study area intersections. Detailed analysis summaries are included in **Appendix B** for reference.

4.3 Ellerslie Road and All-Directional Site Access

The Ellerslie Road and All-Directional Site Access intersection is currently a three-legged unsignalized intersection with the following geometry:

- ***West Approach*** – one left turn bay, one through lane;
- ***East Approach*** – one through lane, one right turn bay; and
- ***North Approach*** – one left turn lane, one right turn lane.

[1] Trafficware LLC., Synchro Studio 9 User Guide, Chapter 10 – Timing/Signing Settings, Queue Lengths, pg. 10-19.

Tables 5-1 and **5-2** present the results of the existing and 2022 horizon assessments completed for the Ellerslie Road/All-Directional Site Access intersection during the AM and PM peak hours based on existing geometry and traffic control.

Table 5-1: Ellerslie Road and All-Directional Site Access – AM Peak Hour

	Eastbound		Westbound		Southbound	
Movement	**L**	**T**	**T**	**R**	**L**	**R**
2017 Existing – Unsignalized (SB Stop)						
Geometry	L/T		T/R		LR	
Volume (vph)	15	481	739	1	3	4
v/c	0.02				0.03	0.01
Delay (s)	9.4				29.0	14.7
LOS	A				D	B
95th Queue (m)	1				1	0
Intersection Delay			**0.3**	**Intersection LOS**		**A**
2022 Background – Unsignalized (SB Stop)						
Geometry	L/T		T/R		LR	
Volume (vph)	15	649	998	1	3	4
v/c	0.02				0.05	0.02
Delay (s)	10.6				51.7	19.1
LOS	B				F	C
95th Queue (m)	1				2	0
Intersection Delay			**0.2**	**Intersection LOS**		**A**
2022 Total – Unsignalized (SB Stop)						
Geometry	L/T		T/R		LR	
Volume (vph)	226	649	1028	62	55	63
v/c	0.38				2.53	0.24
Delay (s)	14.1				982.6	22.6
LOS	B				F	C
95th Queue (m)	14				65	7
Intersection Delay			**35.5**	**Intersection LOS**		**D**

Table 5-2: Ellerslie Road and All-Directional Site Access – PM Peak Hour

	Eastbound		Westbound		Southbound	
Movement	**L**	**T**	**T**	**R**	**L**	**R**
2017 Existing – Unsignalized (SB Stop)						
Geometry	L/T		T/R		LR	
Volume (vph)	17	629	689	8	13	21
v/c	0.03				0.09	0.07
Delay (s)	9.1				31.7	13.9
LOS	A				D	B
95th Queue (m)	1				2	2
Intersection Delay			**0.8**	**Intersection LOS**		**A**
2022 Background – Unsignalized (SB Stop)						
Geometry	L/T		T/R		LR	
Volume (vph)	17	849	930	8	13	21
v/c	0.04				0.17	0.09
Delay (s)	10.1				62.8	17.6
LOS	B				F	C
95th Queue (m)	1				5	2
Intersection Delay			**0.8**	**Intersection LOS**		**A**
2022 Total – Unsignalized (SB Stop)						
Geometry	L/T		T/R		LR	
Volume (vph)	67	849	937	22	110	130
v/c	0.16				2.25	0.56
Delay (s)	11.1				749.3	30.4
LOS	B				F	D
95th Queue (m)	5				85	24
Intersection Delay			**39.5**	**Intersection LOS**		**D**

As shown in Tables 5-1 and 5-2, in the 2022 horizon under background traffic conditions, the southbound left-turn is anticipated to have low volumes but operate at LOS F. This is due to limited gaps in traffic on Ellerslie Road in both the AM and PM peak hour. With the addition of the integrated operations yard, this issue will be exacerbated due to the significant increase in southbound left-turns. Traffic signals at this

intersection are anticipated to be required to support the integrated operations yard. **Table 5-3** presents the results of the 2022 total traffic scenario as a signalized intersection in the AM and PM peak hours.

Table 5-3: Ellerslie Road and All-Directional Site Access – Signalization

	Eastbound		Westbound		Southbound	
Movement	**L**	**T**	**T**	**R**	**L**	**R**
AM Peak Hour – Signalized (100s cycle, Pm+Pt EBL)						
Geometry	L/T		T/R		LR	
Volume (vph)	226	649	1028	62	55	63
v/c	0.83	0.46	0.84	0.07	0.55	0.36
Delay (s)	36.9	3.8	20.2	3.1	60.9	17.6
LOS	D	A	C	A	E	B
95th Queue (m)	#25	40	207	6	23	12
Intersection Delay			**17.8**	**Intersection LOS**		**B**
PM Peak Hour – Signalized (100s cycle)						
Geometry	L/T		T/R		LR	
Volume (vph)	67	849	937	22	110	130
v/c	0.40	0.65	0.77	0.02	0.38	0.43
Delay (s)	10.1	9.6	13.5	2.0	40.9	9.3
LOS	B	A	B	A	D	A
95th Queue (m)	9	109	147	2	35	9
Intersection Delay			**12.6**	**Intersection LOS**		**B**

As shown in Table 5-3, the introduction of traffic signals is anticipated to significantly improve intersection capacity, vehicle delays and LOS in both the AM and PM peak hour. Overall, with traffic signals this intersection is anticipated to operate at acceptable levels. The southbound queue anticipated to occur during both the AM and PM peak hours is estimated to be in the order of 23 metres and 35 metres respectively. As previously mentioned, the Ellerslie Road/All-Directional Site Access and the South Parking Lot Access/Site Access Road intersections are spaced at approximately 70 metres; therefore, it is anticipated that the intersection spacing is adequate to accommodate the southbound queues at the Ellerslie Road/All-Directional Site Access intersection.

It is noted that the southbound left movement is anticipated to operate at LOS E with a v/c ratio of 0.55 in the AM peak hour under the 2022 total traffic scenario. During the AM peak hour, the majority of green time was allocated to the eastbound and westbound through movements to maintain acceptable levels of service along Ellerslie Road. As traffic volumes increase along Ellerslie Road beyond the 2022 horizon, the

southbound left-turn delay could increase as more southbound green time would need to shift to east-west green time. Once Ellerslie Road is widened to accommodate higher through volume capacity it is expected that overall intersection operations will improve.

4.4 Ellerslie Road Right-in/Right-out Site Access

The Ellerslie Road Right-in/Right-out Site Access intersection is anticipated to be constructed as a three-legged unsignalized intersection with stop control on the north approach with the following geometry:

- ***West Approach*** – one through lane;
- ***East Approach*** – one through lane, one right turn bay; and
- ***North Approach*** – one channelized right turn lane.

For the purposes of this assessment, the north approach was assumed to include one channelized right turn lane with stop control. **Table 5-4** summarizes the results of the 2022 total traffic scenario assessments completed for the Ellerslie Road Right-in/Right-out Site Access intersection during the AM and PM peak hours.

Table 5-4: Ellerslie Road Right-in/Right-out Site Access – 2022 Total

	Eastbound	Westbound		Southbound
Movement	**T**	**T**	**R**	**R**
AM Peak Hour – Unsignalized (SB Stop)				
Geometry	T	T/R		R
Volume (vph)	875	1061	30	19
v/c				0.09
Delay (s)				22.1
LOS				C
95th Queue (m)				2
Intersection Delay		**0.2**	**Intersection LOS**	**A**
PM Peak Hour – Unsignalized (SB Stop)				
Geometry	T	T/R		R
Volume (vph)	916	1060	7	36
v/c				0.17
Delay (s)				23.6
LOS				C
95th Queue (m)				5
Intersection Delay		**0.4**	**Intersection LOS**	**A**

The Ellerslie Road Right-in/Right-out intersection is anticipated to operate well in the AM and PM peak hours under the 2022 total traffic scenario.

4.5 On-Site Intersections

4.5.1 South Parking Lot Access and Site Access Road

The South Parking Lot Access/Site Access Road intersection was identified as a key study area intersection to understand the potential impacts between the first on-site access and the Ellerslie Road/All-Directional Site Access intersection. The South Parking Lot Access/Site Access Road intersection is anticipated to be developed as a three-legged intersection with stop control on the east approach. For the purposes of this assessment, it was assumed that all approaches would accommodate one shared lane; however, the Site Access Road is wide enough to accommodate two northbound and two southbound lanes.

Based on the assessment, it is anticipated that the South Parking Lot Access/Site Access Road intersection will operate at LOS B or better in the AM and PM peak hours as an unsignalized intersection under the 2022 total traffic scenario. In addition, the northbound queue is not anticipated to be significant; therefore, is not expected to impact the operations at the Ellerslie Road/All-Directional Site Access intersection in both the AM and PM peak hours.

4.5.2 Ambleside Eco Station and Site Access Road

The Ambleside Eco Station/Site Access Road intersection was identified as a key study area intersection to understand the impacts of the additional site generated traffic on the existing Ambleside Eco Station access intersection. Currently, the Site Access Road terminates at the Ambleside Eco Station Access and forms a three-legged intersection with the west approach providing access to the Eco Station. With the development of the proposed integrated operations yard and the extension of the Site Access Road to the north, it is anticipated that the Ambleside Eco Station/Site Access Road will be constructed as a four-legged intersection with the east approach providing a secondary access to the south parking lot area. For the purposes of this assessment, it was assumed that the intersection will operate with one shared lane on each approach and include stop control on the east and west approaches.

Based on the assessment completed, the Ambleside Eco Station/Site Access Road intersection is anticipated to operate at LOS B or better in the AM and PM peak hours as an unsignalized intersection under the 2022 total traffic scenario.

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5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This report documents the potential traffic impacts associated with the proposed City of Edmonton Ambleside Integrated Operations Yard accommodating a combination of City Operations departments including, but not limited to: Parks and Roads Services, Facility Maintenance Services, and Fleet Services. The development is anticipated to generate in the order of 432 two-way trips in the AM peak hour and 313 two-way trips in the PM peak hour.

Based on the assessments completed, the Ellerslie Road/All-Directional Site Access intersection is anticipated to require signalization in the 2022 horizon to accommodate growth along Ellerslie Road and the anticipated site generated traffic.

The remaining study area intersections (Ellerslie Road Right-in/Right-out Site Access, South Parking Lot Access/Site Access Road, and Ambleside Eco Station/Site Access Road) are anticipated to operate well in both the AM and PM peak hours under the 2022 total traffic scenario.

5.2 Recommendations

Based on the review of the development concept and the roadway network, the following recommendations are advanced:

- Monitor the demands at the Ambleside Eco Station; and
- Signalize the Ellerslie Road/All-Directional Site Access intersection.

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APPENDIX A

Traffic Counts

Project No. 3519.01
Location Ambleside Eco Station Entrance
Date Tuesday, June 27, 2017
Weather Clear
Surveyor MO

Street	Ellerslie Road												Eco Station												Total		Pedestrians			
Direction	Eastbound						Westbound						Northbound						Southbound											
Movement	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		Hourly	East	West	North	South
start time	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Totals	Approac N/S	Approac N/S	Approac E/W	Approac E/W
6:00 AM	6	0	21	1					53	1	0	0							0	0			0	0	82	0	0	0	0
6:15 AM	0	0	42	4					88	0	0	0							0	0			5	1	140	0	0	0	
6:30 AM	0	1	55	1					122	1	0	0							3	0			1	0	184	0	0	1	
6:45 AM	1	0	76	8					125	1	1	0							1	0			0	0	213	619	0	0	0
7:00 AM	0	0	74	10					139	3	0	0							2	0			0	3	231	788	0	0	0
7:15 AM	1	0	75	13					185	6	0	0							0	0			1	1	282	910	0	0	0
7:30 AM	3	0	111	9					173	7	0	0							0	0			0	0	303	1029	0	0	0
7:45 AM	1	1	118	13					168	9	0	0							0	0			0	0	310	1135	0	0	0
8:00 AM	4	0	105	19					183	6	0	0							1	0			1	0	319	1214	0	0	0
8:15 AM	6	0	102	4					175	18	1	0							1	1			2	1	311	1243	0	0	0
8:30 AM	2	0	76	11					127	6	1	0							0	0			1	0	224	1164	0	0	0
8:45 AM	5	0	94	16					102	11	5	0							0	0			1	1	235	1089	0	0	0
9:30 AM	10	0	54	9					109	9	6	1							2	0			7	1	208		0	0	0
9:45 AM	8	0	71	16					99	11	7	0							10	2			12	0	236		0	0	0
10:00 AM	9	2	60	9					96	12	3	0							3	0			10	0	204		0	0	0
10:15 AM	11	1	79	6					113	12	3	0							4	2			10	0	241	889	0	0	0
Total	67	5	1219	149	0	0	0	0	2057	113	27	1	0	0	0	0	0	0	27	5	0	0	51	8	9723	1243	0	0	1	0
Total	72		1362		0		0		2170		28		0		0		0		32		0		59							
Peak hour	7:30 AM to 8:30 AM																													
Peak Hour Total	15		481		0		0		739		1		0		0		0		3		0		4		1243		0	0	0	0
% HV	7%		9%		#DIV/0!		#DIV/0!		0%		0%		#DIV/0!		#DIV/0!		#DIV/0!		33%		#DIV/0!		25%		7%					
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2 Hr Factor																														

Street	Ellerslie Road												Eco Station												Total		Pedestrians			
Direction	Eastbound						Westbound						Northbound						Southbound											
Movement	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		Hourly	East	West	North	South
start time	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Totals	Approac N/S	Approac N/S	Approac E/W	Approac E/W
3:00 PM	7	2	111	7					108	10	7	0							6	0			4	0	380		0	0	0	
3:15 PM	8	0	114	12					158	12	3	0							3	0			4	1	315		0	0	0	
3:30 PM	11	1	125	8					123	10	4	0							7	1			10	1	301		0	0	0	
3:45 PM	7	0	156	13					108	14	5	0							9	0			29	0	341	1217	0	0	0	
4:00 PM	3	0	136	9					152	9	3	0							3	0			15	0	330	1287	0	0	0	
4:15 PM	6	1	143	11					147	10	5	0							5	0			2	0	330	1302	0	0	0	
4:30 PM	7	0	161	5					161	10	0	0							1	0			5	2	352	1353	0	0	0	
4:45 PM	7	0	135	5					184	3	5	0							5	0			3	0	347	1339	0	0	0	
5:00 PM	2	0	154	6					160	5	2	0							3	0			6	0	338	1367	0	0	0	
5:15 PM	1	0	161	2					157	9	1	0							4	0			5	0	340	1377	0	0	0	
5:30 PM	9	0	138	7					172	7	2	0							1	0			1	0	337	1362	0	0	0	
5:45 PM	4	0	157	4					180	4	3	0							4	0			3	0	359	1374	0	0	0	
Total	39	1	1186	49	0	0	0	0	1313	57	21	0	0	0	0	0	0	0	26	0	0	0	40	2	2733	1377	0	0	0	0
Total	40		1234		0		0		1370		21		0		0		0		26		0		42							
Peak hour	4:30 PM to 5:30 PM																													
Peak Hour Total	17		629		0		0		689		8		0		0		0		13		0		21		1377		0	0	0	0
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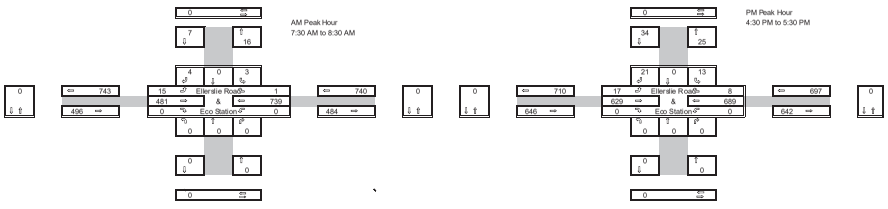
2 Hr Factor																														



Project No. 3519.01
Location Ambleside Eco Station Entrance
Date Wednesday, June 28, 2017
Weather Clear
Surveyor MIO

Street	Ellerslie Road												Eco Station												Total		Pedestrians			
Direction	Eastbound						Westbound						Northbound						Southbound							Hourly	East	West	North	South
Movement	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		Left		Thru		Right			Totals	Approac	Approac	Approac	Approac
start time	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV			N/S	N/S	E/W	E/W
6:00 AM	6	0	14	1					64	0	0	0							4	0			6	0	95		0	0	0	
6:15 AM	0	0	36	2					83	0	1	0							0	0			1	0	123		0	0	0	
6:30 AM	0	0	45	4					122	0	0	0							3	0			9	0	183		0	0	0	
6:45 AM	0	0	68	2					130	1	0	0							0	0			0	0	201	602	0	0	0	
7:00 AM	0	0	61	4					132	4	0	0							0	0			0	0	201	708	0	0	0	
7:15 AM	1	0	66	7					167	6	0	0							3	0			1	0	251	836	0	0	0	
7:30 AM	1	0	78	8					173	5	0	0							0	0			0	0	265	918	0	0	0	
7:45 AM	0	0	109	11					170	9	0	0							0	0			0	1	300	1017	0	0	0	
8:00 AM	4	1	84	8					171	6	0	0							0	0			1	0	275	1091	0	0	0	
8:15 AM	11	0	98	4					177	3	1	0							1	0			1	1	297	1137	0	0	0	
8:30 AM	2	0	93	8					114	4	1	0							1	0			0	0	223	1095	0	0	0	
8:45 AM	3	1	69	7					104	10	4	0							0	1			3	1	203	998	0	0	0	
Total	28	2	821	66	0	0	0	0	1607	48	7	0	0	0	0	0	0	0	12	1	0	0	22	3	2617	1137	0	0	0	0
Total	30		887		0		0		1655		7		0		0		0		13		0		25							
Peak hour	7:30 AM to 8:30 AM																													
Peak Hour Total	17		400		0		0		714		1		0		0		0		1		0		4		1137		0	0	0	0
% HV	6%		8%		#DIV/0!		#DIV/0!		3%		0%		#DIV/0!		#DIV/0!		#DIV/0!		0%		#DIV/0!		50%		5%					
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Street	Ellerslie Road												Eco Station												Total		Pedestrians			
Direction	Eastbound						Westbound						Northbound						Southbound							Hourly	East	West	North	South
Movement	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		Left		Thru		Right			Totals	Approac	Approac	Approac	Approac
start time	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV	Car	HV			N/S	N/S	E/W	E/W
4:00 PM	2	0	146	4					149	3	2	0							2	0			9	0	317		0	0	0	
4:15 PM	2	0	138	7					171	7	3	0							2	0			6	0	336		0	0	0	
4:30 PM	2	1	135	4					167	8	1	0							1	0			1	0	320		0	0	0	
4:45 PM	2	0	128	6					159	6	2	0							1	0			1	1	306	1279	0	0	0	
5:00 PM	1	0	147	5					157	6	1	1							1	0			4	0	323	1285	0	0	0	
5:15 PM	3	0	124	4					170	4	2	1							3	2			2	0	315	1284	0	0	0	
5:30 PM	2	0	144	5					150	1	0	1							2	0			0	0	305	1249	0	0	0	
5:45 PM	3	0	177	0					146	5	2	0							1	0			4	1	339	1282	0	0	0	
Total	17	1	1139	35	0	0	0	0	1269	40	13	3	0	0	0	0	0	0	13	2	0	0	27	2	2561	1285	0	0	0	0
Total	18		1174		0		0		1309		16		0		0		0		15		0		29							
Peak hour	4:15 PM to 5:15 PM																													
Peak Hour Total	8		570		0		0		681		5		0		0		0		5		0		13		1285		0	0	0	0
% HV	13%		4%		#DIV/0!		#DIV/0!		4%		13%		#DIV/0!		#DIV/0!		#DIV/0!		0%		#DIV/0!		8%		4%					
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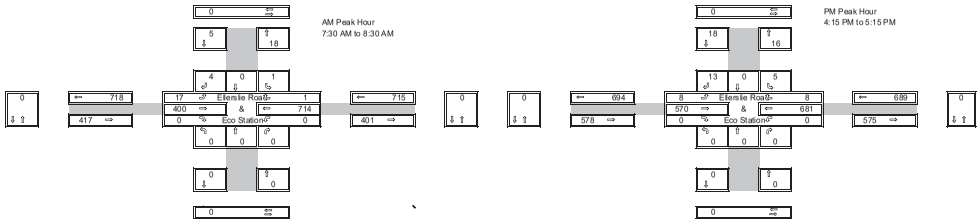


APPENDIX B

Ambleside Operations Yard Staffing Model Assumptions

bunt & associates

3519.01 - Ambleside Integrated Site
Employment Forecasts
May

			Time Starting																						
Department	Shift	# of Staff	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
Parks	8AM to 6PM (Estimate)	60									60	60	60	60	60	60	60	60	60	60						
	7:00 AM -3:00 PM	20								20	20	20	20	20	20	20	20									
Roads	7:00 AM -3:00 PM	50								50	50	50	50	50	50	50	50									
	3:00 PM - 11:00 PM	12																12	12	12	12	12	12	12	12	
	11:00 PM - 7:00 AM	30	30	30	30	30	30	30	30																	30
	7:00 AM to 30:00 PM *	10								10	10	10	10	10	10	10	10	10	10	10						
Traffic	7:00 AM -3:30 PM	10								10	10	10	10	10	10	10	10	10								
	5:00 AM to 1:30 PM	3						3	3	3	3	3	3	3	3	3										
	3:30 PM to 12:00 AM	3																3	3	3	3	3	3	3	3	3
	11:00 PM to 1:00 AM	10	10																							10
Fleet	6:00 AM to 4:00 PM	10							10	10	10	10	10	10	10	10	10	10								
	6:00 AM to 4:00 PM	10							10	10	10	10	10	10	10	10	10	10								
	2:00 PM to 12:00 AM	10															10	10	10	10	10	10	10	10	10	10
	9:00 PM to 7:00 AM	10	10	10	10	10	10	10	10															10	10	10
RMS	8:00 AM to 4:30 PM	79									79	79	79	79	79	79	79	79	79							
Other Admin	8:00 AM to 4:30 PM	140									140	140	140	140	140	140	140	140	140							
Total Working by Hour		467	50	40	40	40	40	43	63	113	393	392	392	392	392	399	344	314	95	25	25	25	35	35	63
Arriving between 7:00 AM and 9:00 AM											279	113													
Departing between 4:00 PM and 6:00 PM																			30	219	70					
Estimate of workings departing from base between 7:00 AM and 9:00 AM at start of shift		75%								85	130															
Estimate of workers returning to base between 4:00 PM and 6:00 PM at end of shift		75%																	71	71						
Total Volumes			0	0	0	0	0	0	0	85	409	113	0	0	0	0	0	0	101	290	70	0	0	0	0	0

AM Peak Hour
Inbound 279
Outbound 130
Total 409

PM Peak Hour
Inbound 71
Outbound 219
Total 290

Assumptions

Employees arrive and depart site within 30 minute of shift start or end time
Employees do not make multiple trips to/from site in a City vehicle within the peak hour
Parks 10-hour shifts are assumed to be from 8AM to 6PM - shifting this to 7AM-5PM would decrease AM peak hour volumes and increase PM peak hour volumes by 60vph
Estimates do not include any mode split to transit or alternate modes, or account for carpooling to site
Estimates all City vehicles are housed on-site when not in use (e.g. staff do not take City vehicles home and start their day from home)
The Roads Rotating shift is assumed to be a minimum of 10 hours in the worst case scenario

APPENDIX C

Synchro 9.1 Printouts

3: Ellerslie Road & A/D Site Access Road
2017 Existing

AM Peak

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	481	739	1	3	4
Future Vol, veh/h	15	481	739	1	3	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	600	-	-	300	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	97	98	92	75	100
Heavy Vehicles, %	7	9	5	2	33	25
Mvmt Flow	16	496	754	1	4	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	754	0	-	0	1282	754
Stage 1	-	-	-	-	754	-
Stage 2	-	-	-	-	528	-
Critical Hdwy	4.17	-	-	-	6.73	6.45
Critical Hdwy Stg 1	-	-	-	-	5.73	-
Critical Hdwy Stg 2	-	-	-	-	5.73	-
Follow-up Hdwy	2.263	-	-	-	3.797	3.525
Pot Cap-1 Maneuver	834	-	-	-	157	374
Stage 1	-	-	-	-	414	-
Stage 2	-	-	-	-	534	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	834	-	-	-	154	374
Mov Cap-2 Maneuver	-	-	-	-	154	-
Stage 1	-	-	-	-	414	-
Stage 2	-	-	-	-	524	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	21.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	834	-	-	-	154	374
HCM Lane V/C Ratio	0.019	-	-	-	0.026	0.011
HCM Control Delay (s)	9.4	-	-	-	29	14.7
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	0

3: Ellerslie Road & A/D Site Access Road
2017 Existing

PM Peak

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	629	689	8	13	21
Future Vol, veh/h	17	629	689	8	13	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	600	-	-	300	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	61	95	100	92	100	75
Heavy Vehicles, %	2	3	4	2	2	10
Mvmt Flow	28	662	689	9	13	28

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	689	0	-	0	1407	689
Stage 1	-	-	-	-	689	-
Stage 2	-	-	-	-	718	-
Critical Hdwy	4.12	-	-	-	6.42	6.3
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.39
Pot Cap-1 Maneuver	905	-	-	-	153	432
Stage 1	-	-	-	-	498	-
Stage 2	-	-	-	-	483	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	905	-	-	-	148	432
Mov Cap-2 Maneuver	-	-	-	-	148	-
Stage 1	-	-	-	-	498	-
Stage 2	-	-	-	-	468	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	19.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	905	-	-	-	148	432
HCM Lane V/C Ratio	0.031	-	-	-	0.088	0.065
HCM Control Delay (s)	9.1	-	-	-	31.7	13.9
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3	0.2

3: Ellerslie Road & A/D Site Access Road
2022 Background
AM Peak

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	649	998	1	3	4
Future Vol, veh/h	15	649	998	1	3	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	600	-	-	300	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	97	98	92	75	100
Heavy Vehicles, %	7	9	5	2	33	25
Mvmt Flow	16	669	1018	1	4	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1018	0	-	0	1719	1018
Stage 1	-	-	-	-	1018	-
Stage 2	-	-	-	-	701	-
Critical Hdwy	4.17	-	-	-	6.73	6.45
Critical Hdwy Stg 1	-	-	-	-	5.73	-
Critical Hdwy Stg 2	-	-	-	-	5.73	-
Follow-up Hdwy	2.263	-	-	-	3.797	3.525
Pot Cap-1 Maneuver	662	-	-	-	83	260
Stage 1	-	-	-	-	306	-
Stage 2	-	-	-	-	440	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	662	-	-	-	81	260
Mov Cap-2 Maneuver	-	-	-	-	81	-
Stage 1	-	-	-	-	306	-
Stage 2	-	-	-	-	429	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	35.4
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	662	-	-	-	81	260
HCM Lane V/C Ratio	0.024	-	-	-	0.049	0.015
HCM Control Delay (s)	10.6	-	-	-	51.7	19.1
HCM Lane LOS	B	-	-	-	F	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2	0

3: Ellerslie Road & A/D Site Access Road
2022 Background
PM Peak

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	849	930	8	13	21
Future Vol, veh/h	17	849	930	8	13	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	600	-	-	300	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	61	95	100	92	100	75
Heavy Vehicles, %	2	3	4	2	2	10
Mvmt Flow	28	894	930	9	13	28

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	930	0	-	0	1879	930
Stage 1	-	-	-	-	930	-
Stage 2	-	-	-	-	949	-
Critical Hdwy	4.12	-	-	-	6.42	6.3
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.39
Pot Cap-1 Maneuver	736	-	-	-	78	313
Stage 1	-	-	-	-	384	-
Stage 2	-	-	-	-	376	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	736	-	-	-	75	313
Mov Cap-2 Maneuver	-	-	-	-	75	-
Stage 1	-	-	-	-	384	-
Stage 2	-	-	-	-	362	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	31.9
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	736	-	-	-	75	313
HCM Lane V/C Ratio	0.038	-	-	-	0.173	0.089
HCM Control Delay (s)	10.1	-	-	-	62.8	17.6
HCM Lane LOS	B	-	-	-	F	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6	0.3

3: Ellerslie Road & A/D Site Access Road
2022 Total
AM Peak

Intersection	
Int Delay, s/veh	35.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	226	649	1028	62	55	63
Future Vol, veh/h	226	649	1028	62	55	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	600	-	-	300	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	97	98	92	75	100
Heavy Vehicles, %	10	9	5	10	10	10
Mvmt Flow	240	669	1049	67	73	63

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1049	0	-	0	2199	1049
Stage 1	-	-	-	-	1049	-
Stage 2	-	-	-	-	1150	-
Critical Hdwy	4.2	-	-	-	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.29	-	-	-	3.59	3.39
Pot Cap-1 Maneuver	634	-	-	-	~ 47	267
Stage 1	-	-	-	-	326	-
Stage 2	-	-	-	-	291	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	634	-	-	-	~ 29	267
Mov Cap-2 Maneuver	-	-	-	-	~ 29	-
Stage 1	-	-	-	-	326	-
Stage 2	-	-	-	-	181	-

Approach	EB	WB	SB
HCM Control Delay, s	3.7	0	$ 539
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	634	-	-	-	29	267
HCM Lane V/C Ratio	0.379	-	-	-	2.529	0.236
HCM Control Delay (s)	14.1	-	-	-	-$ 982.6	22.6
HCM Lane LOS	B	-	-	-	F	C
HCM 95th %tile Q(veh)	1.8	-	-	-	8.7	0.9

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

3: Ellerslie Road & A/D Site Access Road
2022 Total
PM Peak

Intersection	
Int Delay, s/veh	39.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	67	849	937	22	110	130
Future Vol, veh/h	67	849	937	22	110	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	600	-	-	300	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	61	95	100	92	100	75
Heavy Vehicles, %	10	3	4	10	10	10
Mvmt Flow	110	894	937	24	110	173

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	937	0	-	0	2050	937
Stage 1	-	-	-	-	937	-
Stage 2	-	-	-	-	1113	-
Critical Hdwy	4.2	-	-	-	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.29	-	-	-	3.59	3.39
Pot Cap-1 Maneuver	699	-	-	-	~ 58	310
Stage 1	-	-	-	-	369	-
Stage 2	-	-	-	-	303	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	699	-	-	-	~ 49	310
Mov Cap-2 Maneuver	-	-	-	-	~ 49	-
Stage 1	-	-	-	-	369	-
Stage 2	-	-	-	-	255	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	$ 309.5
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	699	-	-	-	49	310
HCM Lane V/C Ratio	0.157	-	-	-	2.245	0.559
HCM Control Delay (s)	11.1	-	-	-	-$ 749.3	30.4
HCM Lane LOS	B	-	-	-	F	D
HCM 95th %tile Q(veh)	0.6	-	-	-	11.3	3.2

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

3: Ellerslie Road & A/D Site Access Road
2022 Total - with Improvements

AM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	226	649	1028	62	55	63
Future Volume (vph)	226	649	1028	62	55	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0			30.0	0.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	7.6				7.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1659	1762	1830	1484	1659	1484
Flt Permitted	0.111				0.950	
Satd. Flow (perm)	194	1762	1830	1484	1659	1484
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				36		63
Link Speed (k/h)		50	50		50	
Link Distance (m)		175.1	396.2		70.1	
Travel Time (s)		12.6	28.5		5.0	
Peak Hour Factor	0.94	0.97	0.98	0.92	0.75	1.00
Heavy Vehicles (%)	10%	9%	5%	10%	10%	10%
Adj. Flow (vph)	240	669	1049	67	73	63
Shared Lane Traffic (%)						
Lane Group Flow (vph)	240	669	1049	67	73	63
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Total Split (s)	14.0	87.0	73.0	73.0	13.0	13.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	82.0	82.0	68.0	68.0	8.0	8.0
Actuated g/C Ratio	0.82	0.82	0.68	0.68	0.08	0.08
v/c Ratio	0.83	0.46	0.84	0.07	0.55	0.36
Control Delay	36.9	3.8	20.2	3.1	60.9	17.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.9	3.8	20.2	3.1	60.9	17.6
LOS	D	A	C	A	E	B
Approach Delay		12.5	19.2		40.8	
Approach LOS		B	B		D	
Queue Length 50th (m)	15.4	27.5	135.0	1.7	13.9	0.0
Queue Length 95th (m)	#25.2	40.2	207.4	5.7	23.1	12.1
Internal Link Dist (m)		151.1	372.2		46.1	
Turn Bay Length (m)	60.0			30.0		
Base Capacity (vph)	290	1444	1244	1020	132	176
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.46	0.84	0.07	0.55	0.36

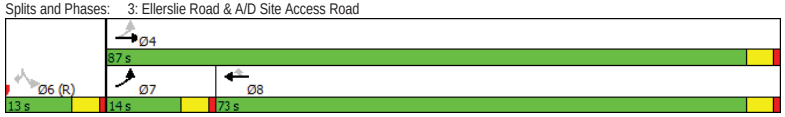
Intersection Summary	
Area Type:	Other

3: Ellerslie Road & A/D Site Access Road
2022 Total - with Improvements

AM Peak

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green
Control Type: Pretimed
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 17.8 — Intersection LOS: B
Intersection Capacity Utilization 83.3% — ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Ellerslie Road & A/D Site Access Road



3: Ellerslie Road & A/D Site Access Road
2022 Total

PM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	67	849	937	22	110	130
Future Volume (vph)	67	849	937	22	110	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0			30.0	0.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	7.6				7.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1659	1865	1662	1484	1659	1484
Flt Permitted	0.214				0.950	
Satd. Flow (perm)	374	1865	1662	1484	1659	1484
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				17		173
Link Speed (k/h)		50	50		50	
Link Distance (m)		175.1	396.2		70.1	
Travel Time (s)		12.6	28.5		5.0	
Peak Hour Factor	0.61	0.95	1.00	0.92	1.00	0.75
Heavy Vehicles (%)	10%	3%	4%	10%	10%	10%
Parking (#/hr)			0			
Adj. Flow (vph)	110	894	937	24	110	173
Shared Lane Traffic (%)						
Lane Group Flow (vph)	110	894	937	24	110	173
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Total Split (s)	78.0	78.0	78.0	78.0	22.0	22.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	73.5	73.5	73.5	73.5	17.5	17.5
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.18	0.18
v/c Ratio	0.40	0.65	0.77	0.02	0.38	0.43
Control Delay	10.1	9.6	13.5	2.0	40.9	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	9.6	13.5	2.0	40.9	9.3
LOS	B	A	B	A	D	A
Approach Delay		9.6	13.2		21.6	
Approach LOS		A	B		C	
Queue Length 50th (m)	6.8	74.3	93.3	0.3	19.0	0.0
Queue Length 95th (m)	8.7	108.8	146.8	2.2	35.3	9.1
Internal Link Dist (m)		151.1	372.2		46.1	
Turn Bay Length (m)	60.0			30.0		
Base Capacity (vph)	274	1370	1221	1095	290	402
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.65	0.77	0.02	0.38	0.43

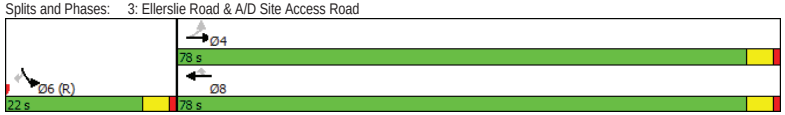
Intersection Summary

3: Ellerslie Road & A/D Site Access Road
2022 Total

PM Peak

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green
Control Type: Pretimed
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 12.6 Intersection LOS: B
Intersection Capacity Utilization 69.3% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: Ellerslie Road & A/D Site Access Road



1: Ellerslie Road & Rin/Rout Site Access
2022 Total - with Improvements

AM Peak

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑	↱		↱
Traffic Vol, veh/h	0	875	1061	30	0	19
Future Vol, veh/h	0	875	1061	30	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	-	900	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	9	5	10	2	10
Mvmt Flow	0	951	1153	33	0	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1153
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.39
Pot Cap-1 Maneuver	0	-	-	-	0	231
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	231
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	22.1
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	231
HCM Lane V/C Ratio	-	-	-	0.089
HCM Control Delay (s)	-	-	-	22.1
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.3

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1: Ellerslie Road & Rin/Rout Site Access
2022 Total

PM Peak

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑	↱		↱
Traffic Vol, veh/h	0	916	1060	7	0	36
Future Vol, veh/h	0	916	1060	7	0	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	-	900	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	3	4	10	10	10
Mvmt Flow	0	996	1152	8	0	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1152
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.39
Pot Cap-1 Maneuver	0	-	-	-	0	232
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	232
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	23.6
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	232
HCM Lane V/C Ratio	-	-	-	0.169
HCM Control Delay (s)	-	-	-	23.6
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.6

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4: A/D Site Access Road & South Staff Parking Access
2022 Total - with Improvements

AM Peak

Intersection	
Int Delay, s/veh	1.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	56	5	159	129	5	62
Future Vol, veh/h	56	5	159	129	5	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	61	5	173	140	5	67

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	321	243	0	0	313	0
Stage 1	243	-	-	-	-	-
Stage 2	78	-	-	-	-	-
Critical Hdwy	6.5	6.3	-	-	4.2	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.39	-	-	2.29	-
Pot Cap-1 Maneuver	656	777	-	-	1203	-
Stage 1	779	-	-	-	-	-
Stage 2	925	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	653	777	-	-	1203	-
Mov Cap-2 Maneuver	653	-	-	-	-	-
Stage 1	779	-	-	-	-	-
Stage 2	921	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	0.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	662	1203	-
HCM Lane V/C Ratio	-	-	0.1	0.005	-
HCM Control Delay (s)	-	-	11	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

4: A/D Site Access Road & South Staff Parking Access
2022 Total

PM Peak

Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	104	5	59	30	5	136
Future Vol, veh/h	104	5	59	30	5	136
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	113	5	64	33	5	148

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	239	80	0	0	97	0
Stage 1	80	-	-	-	-	-
Stage 2	159	-	-	-	-	-
Critical Hdwy	6.5	6.3	-	-	4.2	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.39	-	-	2.29	-
Pot Cap-1 Maneuver	732	958	-	-	1448	-
Stage 1	923	-	-	-	-	-
Stage 2	851	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	729	958	-	-	1448	-
Mov Cap-2 Maneuver	729	-	-	-	-	-
Stage 1	923	-	-	-	-	-
Stage 2	848	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	737	1448	-
HCM Lane V/C Ratio	-	-	0.161	0.004	-
HCM Control Delay (s)	-	-	10.8	7.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0	-

6: A/D Site Access Road & ECO Station Access/North Staff Parking Access
2022 Total - with Improvements

AM Peak

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	5	7	36	5	5	16	58	85	5	19	5
Future Vol, veh/h	5	5	7	36	5	5	16	58	85	5	19	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	5	5	8	39	5	5	17	63	92	5	21	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	183	224	23	185	181	109	26	0	0	155	0	0
Stage 1	34	34	-	144	144	-	-	-	-	-	-	-
Stage 2	149	190	-	41	37	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	761	661	1031	759	699	923	1538	-	-	1378	-	-
Stage 1	962	851	-	840	763	-	-	-	-	-	-	-
Stage 2	835	728	-	954	849	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	743	650	1031	739	688	923	1538	-	-	1378	-	-
Mov Cap-2 Maneuver	743	650	-	739	688	-	-	-	-	-	-	-
Stage 1	950	848	-	830	754	-	-	-	-	-	-	-
Stage 2	814	719	-	937	846	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.6	10.2	0.7	1.3
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1538	-	-	801	749	1378	-	-
HCM Lane V/C Ratio	0.011	-	-	0.023	0.067	0.004	-	-
HCM Control Delay (s)	7.4	0	-	9.6	10.2	7.6	0	-
HCM Lane LOS	A	A	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.2	0	-	-

6: A/D Site Access Road & ECO Station Access/North Staff Parking Access
2022 Total

PM Peak

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	5	34	68	5	5	25	14	20	5	34	5
Future Vol, veh/h	5	5	34	68	5	5	25	14	20	5	34	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	5	5	37	74	5	5	27	15	22	5	37	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	137	142	40	152	133	26	42	0	0	37	0	0
Stage 1	51	51	-	80	80	-	-	-	-	-	-	-
Stage 2	86	91	-	72	53	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	816	735	1009	797	743	1027	1517	-	-	1523	-	-
Stage 1	942	837	-	909	813	-	-	-	-	-	-	-
Stage 2	902	804	-	918	835	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	794	720	1009	751	727	1027	1517	-	-	1523	-	-
Mov Cap-2 Maneuver	794	720	-	751	727	-	-	-	-	-	-	-
Stage 1	925	834	-	893	798	-	-	-	-	-	-	-
Stage 2	875	790	-	876	832	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9	10.3	3.1	0.8
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1517	-	-	937	763	1523	-	-
HCM Lane V/C Ratio	0.018	-	-	0.051	0.111	0.004	-	-
HCM Control Delay (s)	7.4	0	-	9	10.3	7.4	0	-
HCM Lane LOS	A	A	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.4	0	-	-

G

G.1 FUEL STATION SWEEP ANALYSIS

Bunt & Associates Engineering Ltd. provided a swept path analysis on the fuel station on July 25, 2017. The diagram on the right indicates that the proposed layout for the fuel station, as of July 25, 2017, should accommodate the typical expected vehicles, including a b-train fuel truck.

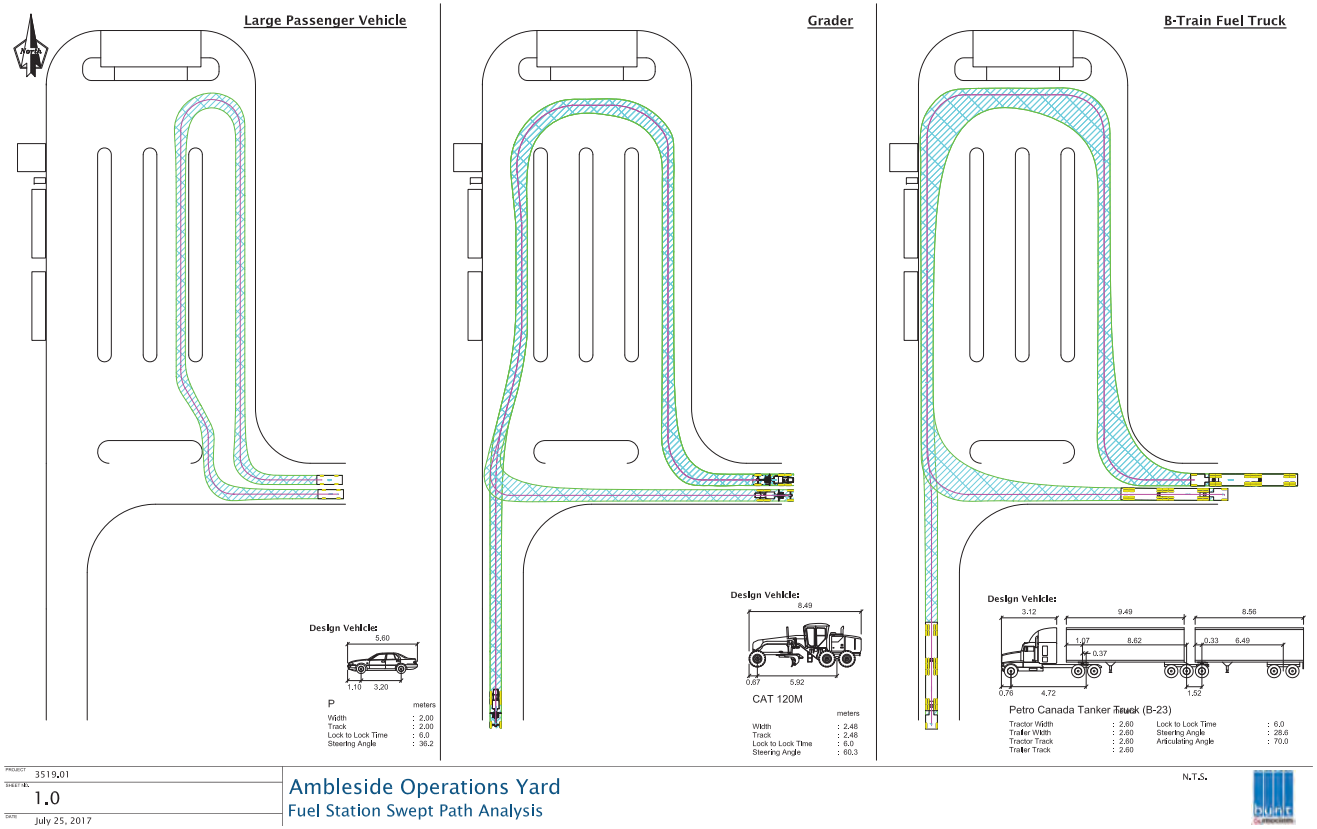

Figure #: Sweep Analysis Fuel Station

G.2 STRUCTURAL SUMMARY & RECOMMENDATIONS

The following structural summary and recommendations were provided by Read Jones Christoffersen Ltd. on July 20 to 21, 2017.

Geotechnical Report Summary – Main Floor Slab

The recommendations of the AMEC Foster Wheeler Geotechnical Investigation Report (November 18, 2016) with respect to a main floor slab on grade are significantly different from the historical geotechnical report (Hoggan, 2007).

The Hoggan report indicated that if partitions walls were grade supported, a gap of 75mm would need to be provided at the top to allow for anticipated slab heave. With this magnitude of anticipated movement, we had previously determined that a grade supported slab on grade was not viable.

In contrast, the AMEC Foster Wheeler report is recommending just a 25mm gap at the top of partitions in anticipation of about 15mm of slab on grade heave. The report recommends to "reduce the impact of swelling potential of sub-grade clay, removal and replacement of a portion of the upper high plastic clay could be undertaken. With this approach, it is recommended that the sub-excavation and replacement be at least 0.6m below the slab on grade."

This magnitude of slab on grade movement is likely an acceptable amount for the use and function of the building. As a result, a grade supported slab may now be considered feasible for this site. A pile supported slab on grade would not be required. This level of anticipated slab movement should be reviewed with the City of Edmonton to confirm that it is acceptable.

If a grade supported slab is deemed to be acceptable, the discussion about the cost effectiveness of below grade parking changes significantly. At that point, it would be most cost effective to construct a grade supported slab on grade for the vehicle storage.

General Structural Considerations + Recommendations

Poor soils considerations in general for the site and structural implications for on grade and stacking variations

- Based on the AMEC Foster Wheeler geotechnical report, a conventional grade supported slab on grade is feasible provided some level of slab heave is acceptable. To improve slab on grade performance, the geotechnical report recommends a sub-excavation of 0.6m to remove and replace a portion of the near surface high plastic clay soils.

Underground parking beneath heavy vehicle maintenance garage / vehicle storage bays

- The suspended slab to support heavy vehicles over parking below would need to be a heavily reinforced slab and slab band system. Column supports would need to coordinate with the parking layout and would typically be placed between every 2nd or 3rd parking stall. Given that it appears likely that a conventional grade supported slab on grade is feasible (see previous item), underground parking under heavy vehicles is not the most economical solution.

Building over the deep S.E.S.S. utility right-of-way

- The AMEC Foster Wheeler geotechnical report permits installing concrete belled piles above the S.E.S.S. tunnel. Belled piles would be founded at above elevation 670m in bedrock, "to avoid any load transfer from the AIS Building to the Tunnel". This elevation is adequate to maintain the 2 x tunnel diameter clearance required by the City of Edmonton. Although piles installed above elevation 670m are acceptable, the geotechnical report recommends "that the pile layout be such that no pile tips are directly above the tunnel". This requirement should be reviewed with geotechnical further; however, taken at face value, this means that no piles could be located directly above the 3m diameter of the tunnel below as it crosses the building site. The building layout and pile locations would need to be carefully located to comply with this. Alternately, any building columns located directly above the tunnel would need to be supported by a pile-cap that spreads the column load to piles located either side of the tunnel location.
- With the exception of coordinating column locations to avoid direct alignment over the tunnel (see Item #2 above), there should be no cost implications in regards to building or not building over the S.E.S.S. tunnel.

The following structural summary and recommendations for Test Fits 2B and 5 were provided by Read Jones Christoffersen Ltd. on November 6, 2017.

Placement of the Administration and Staff Support program above the Operations program:

For either Test Fit 2B or Test Fit 5, the inner exterior wall of the Third Floor office/ support space will require column support down through the main floor below. This will need to be coordinated with the function and layout of the main floor. Depending on how the third floor exterior wall aligns with the main floor below, adjustments to the locations of the third floor exterior wall may be required. For structural efficiency, there must be alignment between the exterior wall of the third floor and the column support below.

Bridging Administration and Staff Support between two Operations main floor bases:

Test Fit 5 indicates a "bridge" between the two buildings supporting an occupied floor area measuring approximately 22.7m x 43.5m. As an occupied floor space, this "bridge" would require structural supports at approximately the mid-span, thereby impacting the functionality of the roadway below. As a simple pedestrian bridge, it is anticipated the structure would be approximately 3-4m wide and would be constructed structurally independent from either building at each end. Structural support piers would be located to support the pedestrian bridge nominally outside of the exterior face of each building. This permits the pedestrian bridge to be built as a tempered space, and avoids any thermal bridging issues between the buildings at either end.

G.3 STORMWATER MANAGEMENT OPTIONS

Matrix Solutions Inc. provided a Civil Design Recommendations Report regarding the existing stormwater pond on October 3, 2017. The report outlined the existing conditions of the stormwater pond as well as the predicted runoff volumes for Test Fits 2 and 4. As the predicted runoff volumes were higher than the current capacity of the stormwater pond, six modifications to the pond were then provided to capture the increased runoff volume for the site. The report was presented as follows:

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

October 3, 2017 Matrix 24684-530

Ms. Michelle Smith Cowman
MARC BOUTIN ARCHITECTURAL COLLABORATIVE INC.
100, 205 - 9 Ave. SE
Calgary, AB T2G 0R3

Subject: Ambleside Integrated Site Master Plan – Updated Test Fit Civil Design Recommendations, SE ¼ 26-051-25 W4M – Final Copy

Dear Ms. Smith Cowman:

1 INTRODUCTION

Matrix Solutions Inc. is pleased to provide the Marc Boutin Architectural Collaborative Inc. (MBAC) with the civil design recommendations for the Master Plan test fit layouts for the Ambleside Integrated Site, located at SE ¼ 26-051-25 W4M, in the City of Edmonton. This letter documents the civil design recommendations for the site based on the test fit scenarios Matrix received on July 20, 2017 from MBAC.

Matrix reviewed the following project documents:

- Topographic survey by Navland Geomatics dated November 24, 2015
- Geotechnical Evaluation (EBA 2007)
- Phase 1 Environmental Site Assessment Supplementary Letter (Hoggan Engineering and Testing 2007)
- Existing Storm Pond As-Built Drawings (IBI 2007)
- City of Edmonton Design Standards dated March 2015 (City of Edmonton 2015)

2 EXISTING CONDITIONS

2.1 Subsurface Conditions

The existing soils are not conducive to infiltration measures (i.e., as low impact development measures) due to tight native clay material.

2.2 Existing Storm Pond Design Parameters

The pond was sized for the Eco station development based on:

- a drainage area of 15.85 ha

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- surface area of the pond of 0.94 ha
- outflow of 5 L/s/ha
- active storage capacity of 12,860 m^3 (dictated by runoff volume during the critical event)
- Normal Water Level (NWL) at 681.70 m
- a critical event of 155 mm of rainfall
- an additional 0.5 m of freeboard which provides total volume of 14,500 m^3
- dead storage capacity of 1,430 m^3 (90 m^3/ha)

Note: The City of Edmonton design standards were updated in 2015. The pond was designed in 2007 and built in 2011. For example, the current design standard for the 1:100-year, 24-hour rainfall is 168 mm, which is more than the critical event used in 2007.

3 PROPOSED CONDITIONS

The following are preliminary stormwater management and site servicing design parameters based on the available information and test fit layouts.

3.1 Runoff Volumes

Matrix completed the following to determine the runoff volume for the proposed site layouts:

- determined composite runoff coefficients for the four test fit layouts
- ran preliminary rainfall/runoff model (EPA-SWMM) with 5 L/s/ha outflow (see Table 1)
- based on 2015 design standards, the 1:100-year, 24-hour storm event dictates runoff storage requirements
- the test fit layouts with the maximum required storage are Test Fit #2 and #4 with 15,500 m^3 required storage in the 1:100-year storm
- therefore, 2,640 m^3 of additional active storage is required under proposed conditions to maintain the existing pond high water level and freeboard
- alternatively, based on the existing pond capacity of 14,500 m^3, 1,000 m^3 additional storage is required for active storage under proposed conditions plus additional freeboard:
    - if there is an emergency overland flow route, there must be minimum of 0.3 m of freeboard above the high water level
    - if there is no emergency overland flow route, there must be minimum of 0.5 m of freeboard above the high water level

TABLE 1 Summary of Runoff Storage Requirements

Layout	Design Storm	Rainfall Depth (mm)	Contributing Area (ha)	Imperviousness	Modelled Runoff Volume Depth (mm)	Runoff Ratio	Storage Volume (m^3) (with 5 L/s/ha release rate)*
Test Fit 1	1:100-year, 24-hour storm	168	14.8	59%	134	0.80	15,250
Test Fit 2				62%	138	0.82	15,500
Test Fit 3				59%	134	0.80	15,250
Test Fit 4				62%	138	0.82	15,500

*Note: Storage volume does not include freeboard or dead storage

3.2 Recommended Stormwater Management Options

The following are recommended stormwater management options. A setback distance of 33 m from the ravine top of bank is maintained. The final stormwater management design can be a combination of the options.

3.2.1 Modifications to Storm Pond (ordered by lowest cost to highest cost)

1. increase storm pond storage capacity by berming around the top of the pond to increase storage depth
    - if there is no emergency overland flow route:
        - raise high water level (HWL) by 0.60 m for active storage + 0.50 m freeboard (HWL 684.8 m, freeboard (FB) = 685.3 m)
        - deep pool areas will need to be expanded to meet additional dead storage requirements
        - existing control manhole will need to be assessed
        - hydraulic grade line analysis will need to be completed
    - if there is an emergency overland flow route:
        - raise HWL by 0.60 m for active storage + 0.3 m freeboard (HWL 684.8 m, FB = 685.1 m)
        - overflow to either Anthony Henday ditch or the ravine (approvals would be required)
        - deep pool areas will need to be expanded to meet additional dead storage requirements
        - existing control manhole will need to be assessed
        - hydraulic grade line analysis will need to be completed
    - existing grades along property line support this grade increase
2. maintain existing pond location and increase storm pond storage capacity by increasing the surface area (footprint of the pond)
    - 2,640 m^3 additional storage required (maintains existing 0.5 m of freeboard)
    - deep pool areas will need to be expanded to meet additional dead storage requirements
    - will encroach in test fit Master Plan layouts
    - rough estimate of 15% to 20% additional area would be required
3. relocate and resize storm pond to accommodate full build-out of site (see Figures 1 and 2 attached)
    - relocate the pond to the northeast corner of the site as far as possible, and maintain access to the far corner where grading restricts the pond footprint (Figure 1)
    - provide active storage volume of 15,500 m^3 plus freeboard to accommodate full build-out of the site
    - provide dead storage volume of 1,720 m^3 to accommodate full build out of site, based on 65% impervious (116 m^3/ha prorated based on design standards)
    - maintain the NWL at 681.70 m
    - maintain wetland design with inlet and outlet sediment forebays

- provides more flexibility for site Master Plan along west side
- inlet and outlet control structure designs will need to be assessed
- maintain connection to existing storm line

3.2.2 Alternative Storage Options with Existing Pond As-is

4. lot-level detention in parking lots

   - lot-level storage can be provided in the asphalt parking lots

     - aboveground storage (e.g., surface ponding, cisterns)
     - underground storage (e.g., plastic chambers such as Stormtech, Cultec or Triton; or concrete structures)

   - used in conjunction with existing storm pond and possible combination with roof runoff reuse (Option 5)
   - overflow would be provided to either surface or storm sewer and to the storm pond
   - high cost for underground storage; cost depends on balance of storage volume between pond and alternatives

5. underground storage for roof runoff reuse

   - roof areas (2.5 ha) can be directed to underground storage facilities and pumped for irrigation of landscaped areas
   - used in combination with existing storm pond and lot-level detention (Option 4) for balance of storage volume requirements
   - high cost for underground storage; cost depends on balance of storage volume between pond and alternatives

3.2.3 Removal of Existing Pond

6. remove existing storm pond and provide alternative storage

   - provide combination of rooftop, lot-level and underground storage for total runoff volume (15,500 m^3)
   - limitations/considerations for Master Plan layouts in order to accommodate storage, for example:

     - roof design and mechanical considerations for rooftop storage
     - grading and servicing limitations in parking lots for surface ponding
     - layout limitations for underground storage chambers (no structures on top)
     - grading/servicing considerations, and possible load limitations for underground storage chambers

   - existing groundwater elevation needs to be confirmed
   - adequate depth to maintain gravity connection to existing storm line
   - available depth is more suitable for concrete underground structures, as opposed to chambers, which have a maximum cover limit and therefore would take up a larger surface area
   - very cost prohibitive (over $5 million)

3.3 Site Services

- remove and abandon existing utilities on existing road cul-de-sac
- reconnect existing storm sewer to storm pond (will be disconnected due to removal of cul-de-sac)
- connect proposed development to local storm sewer system for up to 1:5-year storm event (which outlets to the existing storm pond)
- major system (up to the 1:100-year storm event) is conveyed overland to the existing pond (as needed based on stormwater management option(s) selected)
- connect to existing sanitary sewer and service line from Ellerslie Road (Note: existing capacity information has not been provided or verified at this time)
- connect to existing watermain service line from Ellerslie Road (Note: existing capacity information has not been provided or verified at this time)
- servicing of underground parking to be coordinated between civil and mechanical disciplines for connection to either sanitary system or sump pump discharge to surface

4 CLOSURE

We trust that this letter report suits your present requirements. If you have any questions or comments, please call either of the undersigned at 403.237.0606.

Yours truly,

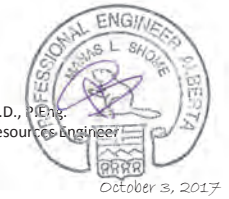
MATRIX SOLUTIONS INC.

Shaina Blue, P.Eng.
Water Resources Engineer

SB/mm
Attachments

October 3, 2017

Reviewed by



Manas Shome, Ph.D., P.Eng.
Principal Water Resources Engineer

October 3, 2017

APEGA Permit to Practice
Permit No. P5540

DISCLAIMER

REFERENCES

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EBA Engineering Consultants Ltd. (EBA). 2007. *Geotechnical Evaluation, Proposed Ellerslie Eco Station, 14320 Ellerslie Road, Edmonton, Alberta*. E12201145. Report prepared for the City of Edmonton. October 2007.

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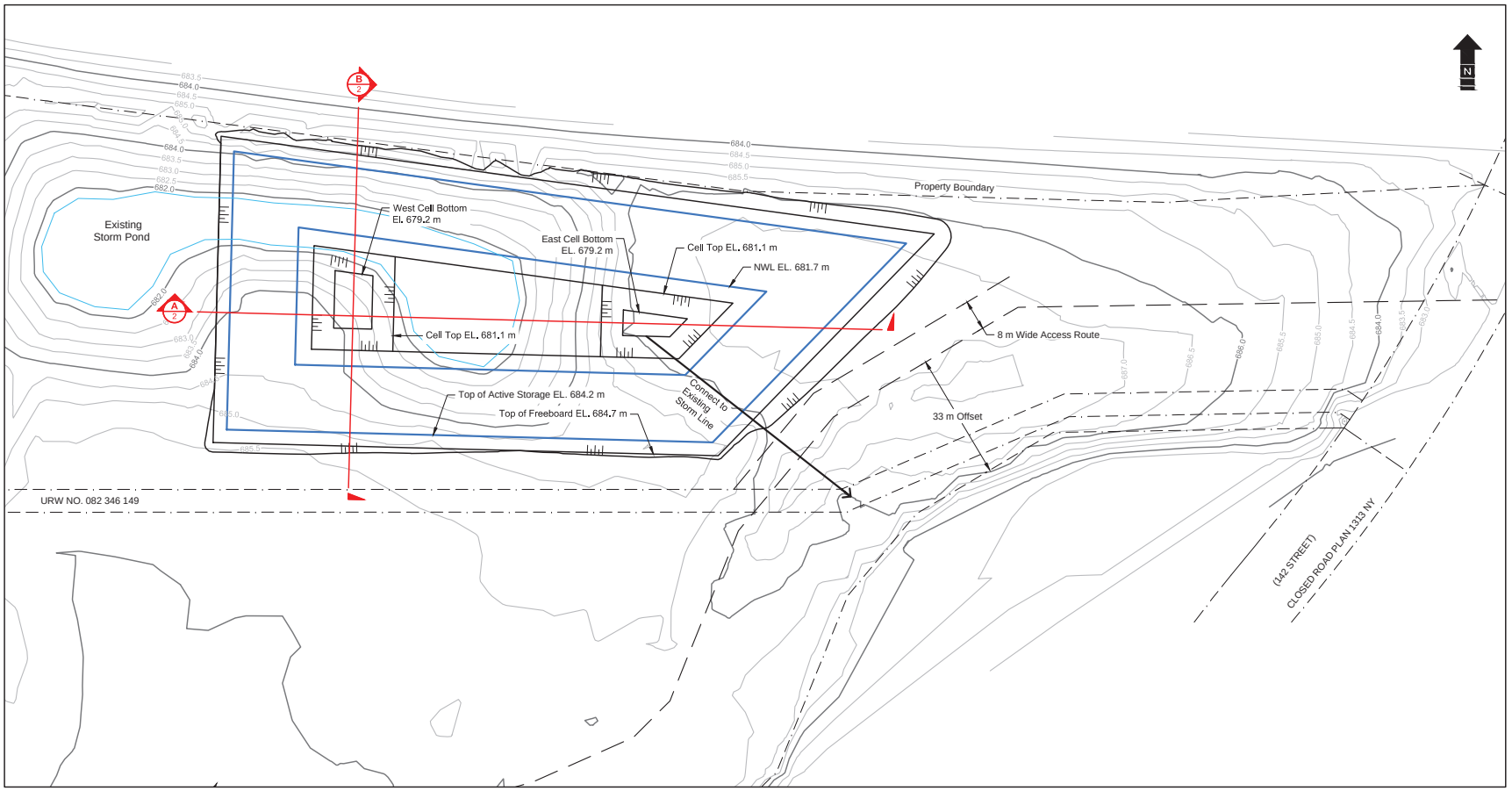


Required Active Storage Volume = 15,500 m^3
Required Dead Storage Volume = 1,750 m^3

Illustrated Footprint:
Provided Active Storage Volume = 16,000 m^3
Provided Dead Storage Volume = 2,800 m^3

Footprint Shown can be Refined According to Master Plan Layout.

NOT FOR CONSTRUCTION

Reference: Surface and Base Data Acquired from Navland Geomatics Inc., Drawings 2565-SITE-15 and 2565-TOPO-15, Dated November 24, 2015.

1:1000 Meters
10 0 10 20
Datum

REVISION					
0	2017-10-03	Issued Final	SB	MS	ZS
No.	DATE	DESCRIPTION	BY	CHK.	DRN.

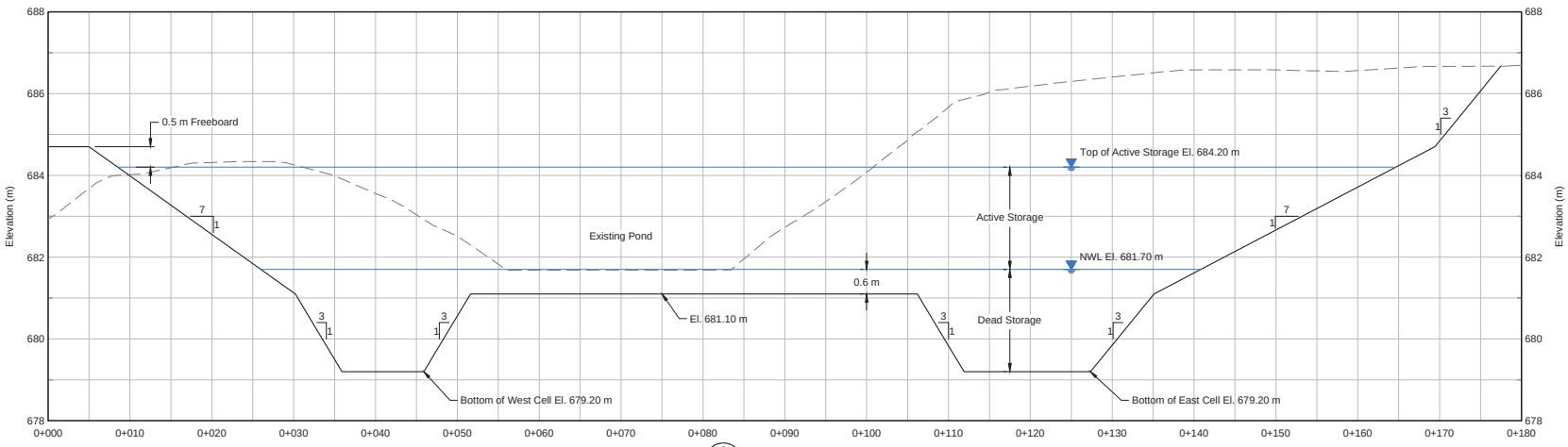
Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of Edmonton
Soutwest Integrated Services Site

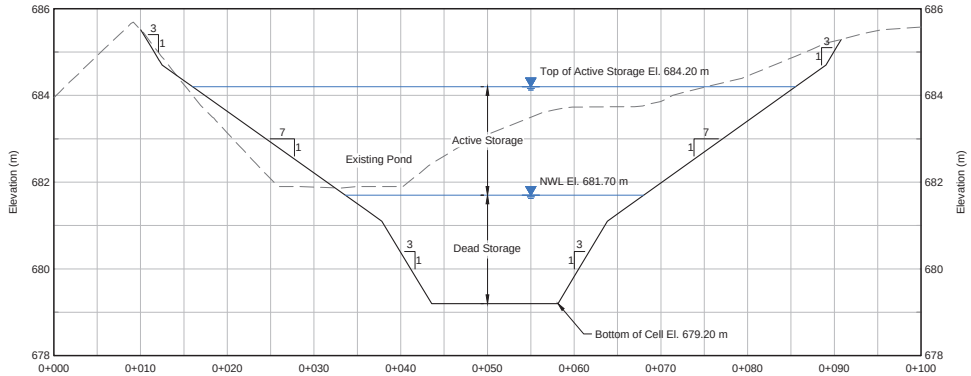
Site Plan - Proposed Pond

Date:	Project:	Technical:	Reviewer:	Drawn:
Sept 2017	24684-SP-17	S. Blue	M. Shome	M. Jordan

Figure 1



A/1 **Pond Profile**
Horizontal Scale 1:500
Vertical Scale 1:100



B/1 **Pond Cross-section**
Horizontal Scale 1:500
Vertical Scale 1:100

NOT FOR CONSTRUCTION

REVISION					
No.	DATE	DESCRIPTION	BY	CHK.	DRN.
0	2017-10-03	Issued Final	SB	MS	ZS

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of Edmonton
Soutwest Integrated Services Site

Sections

Date:	Project:	Technical:	Reviewer:	Drawn:
Sept 2017	24684-SP-17	S. Blue	M. Shome	M. Jordan

Figure 2

Matrix Solutions Inc. provided an Updated Test Fit Civil Design Recommendations Report after discussions with CoE representatives when it was determined that in order to achieve a suitable scheme for the AIS the increased storage capacity for stormwater management had to strategized. Two scenarios were explored the first being shifting the stormwater pond as far east on the site as possible while maintaining access to the northeast corner and increasing its size to meeting updated City standards. The second scenario involved maintaining the stormwater pond in its current location and meeting the increased required capacity through underground storage. The report was presented as follows:

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

November 14, 2017 Matrix 24684-530

Ms. Michelle Smith Cowman
MARC BOUTIN ARCHITECTURAL COLLABORATIVE INC.
100, 205 - 9 Ave. SE
Calgary, AB T2G 0R3

Subject: Ambleside Integrated Site Master Plan – Updated Test Fit Civil Design Recommendations, SE ¼ 26-051-25 W4M

Dear Ms. Smith Cowman:

1 INTRODUCTION

Matrix Solutions Inc. is pleased to provide the Marc Boutin Architectural Collaborative Inc. (MBAC) with the additional stormwater management options assessment and analysis for the revised Master Plan test fit layouts #2 and #5 for the Ambleside Integrated Site, located at SE ¼ 26-051-25 W4M, in the City of Edmonton. This letter is further to our preliminary stormwater management recommendations, as outlined in our letter report dated October 2, 2017 and titled "*Ambleside Integrated Site Master Plan – Updated Test Fit Civil Design Recommendations, SE ¼ 26-051-25 W4M – Final Copy*".

2 METHODS

As part of this analysis, the hydrologic modelling that was completed for the preliminary analysis was further refined using the EPA-SWMM (version 5.1) software. The latest test fit schematic layouts were incorporated using a composite percent impervious value. The incorporation of low impact development (LID) includes two green roof scenarios, which were modelled by modifying the composite percent impervious value. The model simulates maximum allowable release rate of 5 L/s/ha outflow (74 L/s for the site) from the storm pond. Based on the 2015 City of Edmonton design standards, the 1:100 year, 24-hour storm event with a total rainfall amount of 169 mm dictates runoff storage requirements. The following scenarios were simulated:

Test Fit 5

- Scenario 1a Relocation/Expansion of Existing Storm Pond with no LID
- Scenario 1b Relocation/Expansion of Existing Storm Pond with Partial Green Roof
- Scenario 1c Relocation/Expansion of Existing Storm Pond with Full Green Roof

Test Fit 2B

- Scenario 2a Existing Storm Pond with no LID + Underground Storage
- Scenario 2b Existing Storm Pond with Partial Green Roof + Underground Storage

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- Scenario 2c Existing Storm Pond with Full Green Roof + Underground Storage

Partial green roof scenarios include only the second floor level as a green roof (both North and South buildings for Test Fit 2B) and the third floor as a standard roof. The cost of green roof includes root-repelling membrane, green roof system, plants, installation/labour, irrigation system, and maintenance for 2 years, based on the Design Guidelines for Green Roof by the Ontario Association of Architects (OAA) and Canadian Mortgage and Housing Corporation (CMHC). The low estimate is based on an inaccessible extensive green roof and the high estimate is based on an accessible intensive green roof. Extensive green roofs have a thin growing medium (2-6" of soil), low plant diversity, lower maintenance and irrigation requirements, but have less stormwater retention and energy efficiency benefits. Intensive green roofs have a thicker growing medium (>6" depth soil), higher plant diversity, are more visually appealing and have greater benefits for stormwater retention and energy efficiency. The extensive green roofs are more expensive and more complex in terms of design and maintenance, as well as have greater loading on the roof.

3 RESULTS

3.1 Test Fit 5

The results of the stormwater management analysis for Test Fit 5 are summarized in Table 1. The addition of a full green roof will reduce the total required storage volume by about 1,000 m^3. The change in footprint to the revised pond is shown on Figure 1. The solid line represents the footprint for scenario 1a, with no LID. The dashed line represents the pond outline with the full green roof (scenario 1c). The partial green roof (scenario 1b) would be in between the footprint for scenario 1a and 1c.

The estimated relative costs are included in Table 2. Costs are not fully comprehensive construction cost estimates but are meant to provide a comparison between options only. Pond relocation costs include high level estimates for dewatering the existing pond, earthworks, landscaping, and inlet and outlet control structures. They assume no disposal fee for earthworks and that a cut/fill balance will be achieved onsite.

3.2 Test Fit 2B

The results of the stormwater management analysis for Test Fit 2B are summarized in Table 3. With no green roof, an additional 2440 m^3 of active storage is required. The addition of a full green roof will reduce this by about 1,000 m^3 to 1,440 m^3 of required storage volume. Two underground storage options are provided: (1) pre-fabricated 2.4m x 3.0m box culvert sections; or (2) CULTEC pre-fabricated plastic chambers. The footprint for each underground storage option is shown on Figure 2. The box culvert has a much smaller footprint than the CULTEC chambers. Both systems are flexible in terms of location on the site but need a storm line connection to the pond. The box culvert acts as overflow storage for the existing pond. Thus, the pond still provides treatment during most storm events and only in the large and infrequent storm events (e.g., 1:100 year) would the underground storage be required. The CULTEC chambers can be configured similarly, or can be used upstream of the pond; in this case pre-treatment would be necessary (oil/grit separator).

The estimated relative costs are included in Table 4 for the box culvert option and Table 5 for the CULTEC chambers option. The costs do not include an oil/grit separator (~$10,000). The box culvert option is more expensive than the CULTEC chambers, but has a much smaller footprint. Note costs are not fully comprehensive but are meant to provide a comparison between options only.

It is important to note that the permanent pool (dead storage) component of the existing pond will not meet the current COE design standards, which is a function of impervious area (Table 5). The full green roof will bring this option very close; however, it is still short of the required storage by about 110 m^3. If this option is selected, the COE/EPCOR should be consulted to confirm their acceptance. The COE/EPCOR may find this option acceptable by including LIDs such as the green roof and possibly other LIDs.

TABLE 1 Summary of Stormwater Management Analysis for Test Fit 5

Scenario	% Impervious [1]	Modelled Runoff Depth [2] (mm)	Runoff Ratio	Required Storage Volume (m^3) [3]	Storage Facility
1a - No LID	64%	135	0.80	15,240	Relocated Pond
1b - Partial Green Roof [4]	59%	131	0.78	14,700	Relocated Pond
1c - Full Green Roof	55%	127	0.75	14,300	Relocated Pond

Notes:
1 - Imperviousness based on areas provided by MBAC on November 1-3, 2017. Total contributing area is 14.8 ha.
2 - Modelled runoff based on rainfall depth of 169mm for the 1:100 year, 24-hour storm
3 - Required storage volume based on 5 L/s/ha release rate from pond (74 L/s) and does not include freeboard or dead storage.
4 - Partial Green Roof scenario includes second floor green roof only.

TABLE 2 Summary of Costs for Test Fit 5

Scenario	Storage Facility	Estimated Pond Relocation Cost (Million $)	Green Roof Cost - Low Estimate (Million $)	Green Roof Cost - High Estimate (Million $)	Total Cost - Low Estimate (Million $)	Total Cost - High Estimate (Million $)
1a - No LID	Relocated Pond	$0.7	-	-	**$0.7**	**$0.7**
1b - Partial Green Roof [2]	Relocated Pond	$0.7	$2.4	$20	**$3.1**	**$20.7**
1c - Full Green Roof	Relocated Pond	$0.6	$4.2	$34	**$4.8**	**$34.6**

Notes:
1 - Costs are not comprehensive construction cost estimates but are meant to provide a comparison between options only
2 - Partial Green Roof scenario includes second floor green roof only.

TABLE 3 Summary of Stormwater Management Analysis for Test Fit 2B

Scenario	% Imperv -ious [1]	Modelled Runoff Volume Depth [2] (mm)	Runoff Ratio	Required Storage Volume (m^3) [3]	Storage Facility	Provided Pond Storage Volume (m^3)	Underground Storage Required Volume (m^3)	Underground Storage Required Footprint (m^2)	
								Box Culvert	CULTEC Chambers
No LID	64%	135	0.80	15,300	Existing Pond + Underground Storage	12,860	2,440	900	3,500
Partial Green Roof [4]	58%	130	0.77	14,600	Existing Pond + Underground Storage	12,860	1,740	600	2,500
Full Green Roof	55%	127	0.75	14,300	Existing Pond + Underground Storage	12,860	1,440	500	2,100

Notes:
1 - Imperviousness based on areas provided by MBAC on November 1-3, 2017. Total contributing area is 14.8 ha.
2 - Modelled runoff based on rainfall depth of 169mm for the 1:100 year, 24-hour storm
3 – Required storage volume based on 5 L/s/ha release rate from pond (74 L/s) and does not include freeboard or dead storage.
4 - Partial Green Roof scenario includes second floor green roof only.

TABLE 4 Summary of Costs for Test Fit 2B – Box Culvert Option

Scenario	Storage Facility	Green Roof Cost - Low Estimate (Million $)	Green Roof Cost - High Estimate (Million $)	Estimated Cost of Box Culvert (Million $)	Total Cost - Low Estimate (Million $)	Total Cost - High Estimate (Million $)
No LID	Existing Pond + Underground Storage	-	-	$2.8	**$2.8**	**$2.8**
Partial Green Roof [2]	Existing Pond + Underground Storage	$2.7	$22	$2.0	**$4.7**	**$24.0**
Full Green Roof	Existing Pond + Underground Storage	$4.1	$33	$1.7	**$5.8**	**$34.7**

Notes:
1 - Costs are not comprehensive construction cost estimates but are meant to provide a comparison between options only
2 - Partial Green Roof scenario includes second floor green roof only.

TABLE 5 Summary of Costs for Test Fit 2B – CULTEC Chambers Option

Scenario	Storage Facility	Green Roof Cost - Low Estimate	Green Roof Cost - High Estimate	Estimated Cost of CULTEC Chambers ($)	Total Cost - Low Estimate	Total Cost - High Estimate
No LID	Existing Pond + Underground Storage	-	-	$1.1	**$1.1**	**$1.1**
Partial Green Roof [2]	Existing Pond + Underground Storage	$2.7	$22	$0.8	**$3.5**	**$22.8**
Full Green Roof	Existing Pond + Underground Storage	$4.1	$33	$0.7	**$4.8**	**$33.7**

Notes:
1 - Costs are not comprehensive construction cost estimates but are meant to provide a comparison between options only
2 - Partial Green Roof scenario includes second floor green roof only.

TABLE 6 Summary of Dead Storage Requirements

Scenario	Storage Facility	% Impervious	Required Storage per COE Standards (m^3/ha)	Area (ha)	Required Dead Storage (m^3)	Provided Dead Storage (m^3)	Difference (m^3)
Existing	Existing Pond	43%	90	15.85	1,427	1,430	4
1a	Revised Pond	64%	115	14.8	1,710	2,340	630
1b		59%	109	14.8	1,620	2,250 (est.)	630 (est.)
1c		55%	104	14.8	1,540	2,170	630
2a	Existing Pond	64%	115	14.8	1,702	1,430	-272
2b		58%	108	14.8	1,598	1,430	-168
2c		55%	104	14.8	1,539	1,430	-109

3.3 Site Services

- remove and abandon existing utilities on existing road cul-de-sac
- reconnect existing storm sewer to storm pond (will be disconnected due to removal of cul-de-sac)
- connect proposed development to local storm sewer system for up to 1:5-year storm event (which outlets to the existing storm pond)
- major system (up to the 1:100-year storm event) is conveyed overland to the existing pond (as needed based on stormwater management option(s) selected)
- connect to existing sanitary sewer and service line from Ellerslie Road (Note: existing capacity information has not been provided or verified at this time)
- connect to existing watermain service line from Ellerslie Road (Note: existing capacity information has not been provided or verified at this time)
- servicing of underground parking to be coordinated between civil and mechanical disciplines for connection to either sanitary system or sump pump discharge to surface

4 CONCLUSIONS AND RECOMMENDATIONS

The relocation and expansion of the storm pond (Test Fit 5 – Scenario 1a) is the most economical option for the City of Edmonton in terms of stormwater management. This option allows the City to meet all water quality and quantity requirements with the lowest retrofitting costs. It also allows for more flexibility with the Master Plan layouts by shifting the pond further east and maximizing the usable area to the west.

Supplementing the existing pond with underground storage is the most expensive stormwater management option; however, it does provide the most area for site programming. There is additional uncertainty/risk in terms of the water quality component and will need to be approved by EPCOR/COE.

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5 CLOSURE

We trust that this letter report suits your present requirements. If you have any questions or comments, please call either of the undersigned at 403.237.0606.

Yours truly,

MATRIX SOLUTIONS INC. **Reviewed by**

Shaina Blue, P.Eng.
Water Resources Engineer

Manas Shome, Ph.D., P.Eng.
Principal Water Resources Engineer

SB
Attachments

REFERENCES

City of Edmonton. 2015. *Design and Construction Standards*. *Volume 3 Drainage*. March 2015. https://www.edmonton.ca/city_government/documents/Volume_3_Drainage_.pdf

EBA Engineering Consultants Ltd. (EBA). 2007. *Geotechnical Evaluation, Proposed Ellerslie Eco Station, 14320 Ellerslie Road, Edmonton, Alberta*. E12201145. Report prepared for the City of Edmonton. October 2007.

Hoggan Engineering & Testing (1980) Ltd. 2007. *Supplementary Letter, Environmental Site Assessment, Phase 1, Part of SE ¼-26-51-25-W4M, 14320 Ellerslie Road S.W., Edmonton, Alberta*. Letter prepared from I.B.I. Group Ltd. Edmonton, Alberta. May 31, 2007.

IBI Group Group Ltd. (IBI). 2007. *The City of Edmonton, Southwest Integrated Services Site*. As-Built Drawings. Tender No. 912544. August 2007.

Ontario Association of Architects (OAA) and Canadian Mortgage and Housing Corporation. *Design Guidelines for Green Roof*. No date.

Matrix Solutions Inc. provided a Pond Removal Civil Design Recommendations Report after the November 15, 2017 Design Presentation when it was decided that Test Fit 5B would be the final scheme for the Master Plan. The report includes high level cost estimates and capacity calculations for the removal of the stormwater pond and installation of an underground storage system. The report was presented as follows.

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

December 5, 2017 Matrix 24684-530

Ms. Michelle Smith Cowman
MARC BOUTIN ARCHITECTURAL COLLABORATIVE INC.
100, 205 - 9 Ave. SE
Calgary, AB T2G 0R3

Subject: Ambleside Integrated Site Master Plan – Pond Removal Civil Design Recommendations, SE ¼ 26-051-25 W4M

Dear Ms. Smith Cowman:

1 INTRODUCTION

Matrix Solutions Inc. is pleased to provide the Marc Boutin Architectural Collaborative Inc. (MBAC) with the updated stormwater management assessment for the existing pond removal option based on revised Master Plan test fit layout #5 for the Ambleside Integrated Site, located at SE ¼ 26-051-25 W4M, in the City of Edmonton.

This letter is further to our preliminary stormwater management recommendations, as outlined in our letter report dated October 2, 2017 and titled "*Ambleside Integrated Site Master Plan – Updated Test Fit Civil Design Recommendations, SE ¼ 26-051-25 W4M – Final Copy*" and additional analysis as outlined in our letter report dated November 14, 2017 titled "*Ambleside Integrated Site Master Plan – Updated Test Fit Civil Design Recommendations, SE ¼ 26-051-25 W4M*".

2 METHODS AND MODELLING SCENARIO

As part of this analysis, the hydrologic modelling that was completed for the preliminary analysis was further refined using the EPA-SWMM (version 5.1) software. Updates included:

- composite percent impervious value based on the latest test fit #5 schematic layout (dated Nov 22, 2017) and land use provided by MBAC (i.e., no gravel surface, all hardscape)
- no green roof scenarios
- existing stormwater pond will be removed (IBI 2007)
- required storage will be provided via underground storage facilities with gravity outlets

The model simulates maximum allowable release rate of 5 L/s/ha outflow (74 L/s for the site) from the underground storage system. Based on the 2015 City of Edmonton design standards, the 1:100 year, 24-hour storm event with a total rainfall amount of 169 mm dictates runoff storage requirements.

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3 RESULTS

3.1 Stormwater Management

The results of the stormwater management analysis for Test Fit 5 are summarized in Table 1. It is anticipated that the CULTEC underground chambers will be split up into 2 areas, as shown on Figure 1. Pre-treatment with oil-grit separators (OGS) will be required upstream of the chambers to remove sediment and meet the COE water quality standards (TSS removal is 85% of particle size 75 µm or greater). It is assumed that two OGS will be needed, one for each area, to provide adequate pre-treatment. This may need to be revised during future design phases depending on the proposed storm servicing.

TABLE 1 Summary of Stormwater Management Analysis for Test Fit 5

Scenario	% Impervious (1)	Modelled Runoff Depth (2) (mm)	Runoff Ratio	Required Storage Volume 3 (m^3)	Storage Facility
Remove Existing Pond	77%	146	0.87	17,000	Underground Storage - CULTEC Chambers

Notes:
1 - Imperviousness based on areas provided by MBAC on November 23, 2017. Total contributing area is 14.8 ha.
2 - Modelled runoff based on rainfall depth of 169mm for the 1:100 year, 24-hour storm
3 - Required storage volume based on 5 L/s/ha release rate from chambers (74 L/s).

The estimated relative costs are included in Table 2. Costs are not fully comprehensive construction cost estimates but are meant to provide a comparison between previously identified options. Pond removal with underground storage includes high level cost estimates for filling in the existing storm pond, and the supply and installation of the underground storage system. Proposed grades are not set as part of the current design phase and may affect the infill volume requirements. Existing soil mound material that is onsite will need to be tested to determine if it can be used as fill material.

It is anticipated that the developed area will be divided into two subareas: north and south of the existing storm easement. There will be two CULTEC underground chamber systems to receive surface runoff from the developed area and two OGS units, one for each area (Figure 1). No storm servicing is included in the cost estimate, and this will need to be determined at future design phases.

TABLE 2 Summary of Costs for Test Fit 5 Pond Removal with Underground Storage

Item	Unit Cost ($/Unit)	Units	# Units	Total Cost Estimate (1) (Million $)
Infill Existing Pond	$30	per m^3	16,000 m^3	**$0.5**
Oil-Grit Separator	$84,000	per unit	2 units	**$0.2**
CULTEC Chambers for Underground Storage	$325	per m^3 required storage	17,000 m^3	**$5.6**
Impermeable Liner for CULTEC Chambers System	$250,000	each	1	**$0.3**
TOTAL				**$6.6**

Notes:
1 - Costs are not comprehensive construction cost estimates but are meant to provide a comparison between options only

3.2 Site Services

- remove and abandon existing utilities on existing road cul-de-sac
- connect proposed development north of existing storm easement to oil-grit separator and north underground storage system
- connect proposed development south of existing storm easement to oil-grit separator and south underground storage system
- major system (up to the 1:100-year storm event) is captured and conveyed to underground storage
- connect outlet of each underground storage to local storm sewer system
- connect to existing sanitary sewer and service line from Ellerslie Road (Note: existing capacity information has not been provided or verified at this time)
- connect to existing watermain service line from Ellerslie Road (Note: existing capacity information has not been provided or verified at this time)
- servicing of underground parking to be coordinated between civil and mechanical disciplines for connection to either sanitary system or sump pump discharge to surface.

4 CLOSURE

We trust that this letter report suits your present requirements. If you have any questions or comments, please call either of the undersigned at 403.237.0606.

Yours truly,

MATRIX SOLUTIONS INC.

Shaina Blue, P.Eng.
Water Resources Engineer

SB/
Attachments

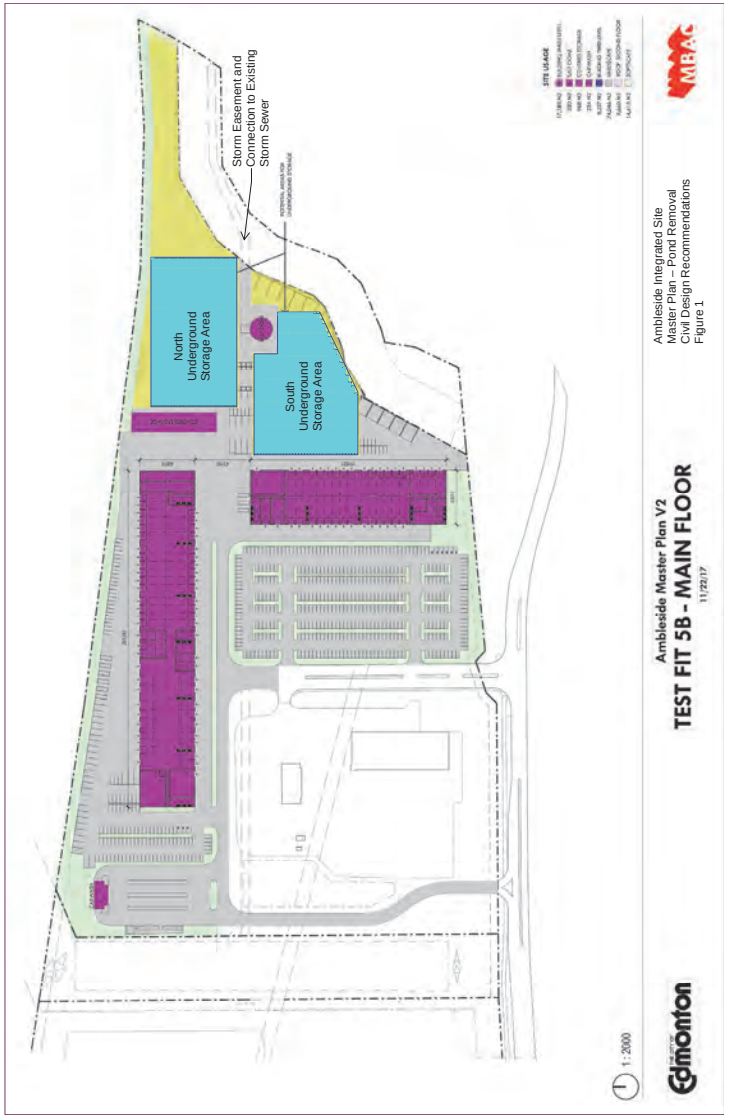
Reviewed by

Manas Shome, Ph.D., P.Eng.
Principal Water Resources Engineer

REFERENCES

City of Edmonton. 2015. *Design and Construction Standards*. *Volume 3 Drainage*. March 2015. https://www.edmonton.ca/city_government/documents/Volume_3_Drainage_.pdf

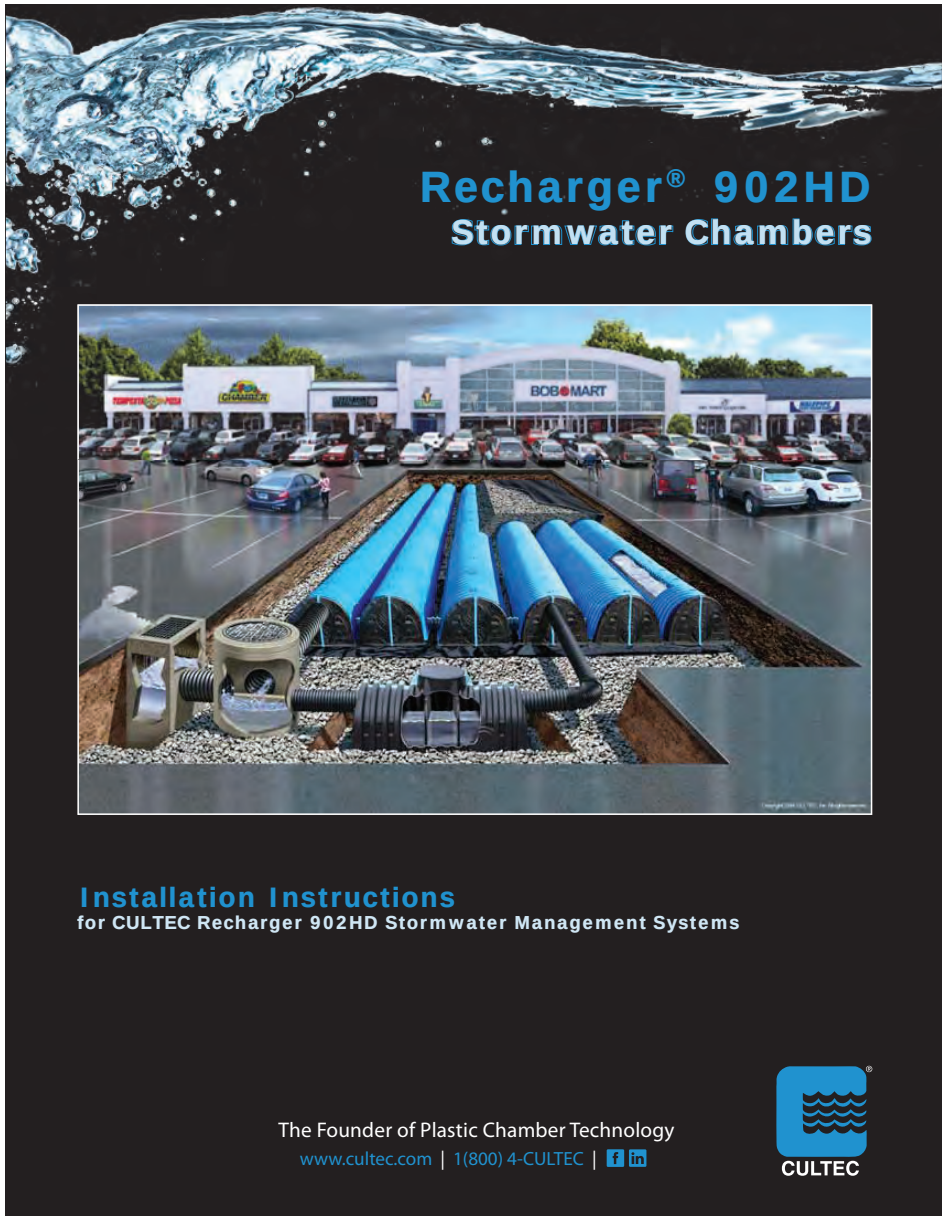
IBI Group Ltd. (IBI). 2007. *The City of Edmonton, Southwest Integrated Services Site*. As-Built Drawings. Tender No. 912544. August 2007.



H

H.1 CULTEC RECHARGER 902HD PRODUCT INFORMATION

Matrix Solutions Inc. provided a Pond Removal Civil Design Recommendations Report with reference to the Cultec Recharger 902HD stormwater chamber product as the recommendation for the stormwater underground storage on the AIS. The following document provides product information and installation instructions for the stormwater chambers:



Installation Instructions for CULTEC Recharger® 902HD

Published by
CULTEC, Inc.
P.O. Box 280
878 Federal Road
Brookfield, Connecticut 06804 USA
www.cultec.com

Disclaimers:
The drawings, photographs and illustrations shown in this document are for illustrative purposes only and are not necessarily to scale.
Actual designs may vary.

CULTEC reserves the right to make design and/or specification changes at any time without notice at CULTEC's sole discretion.

CULTEC is not responsible for typographical errors.

Contact Information:
For general information on our other products and services, please contact our offices within the United States at (800)428-5832, (203)775-4416 ext. 202, or e-mail us at custservice@cultec.com.

For technical support, please call (203)775-4416 ext. 203 or e-mail tech@cultec.com.

Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

Doc ID: CULG086 05-16
May 2016
You are using version CULG086 05-16 of our CULTEC Installation Instructions for Recharger® 902HD Stormwater Systems.

These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC.
All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings.
Actual designs may vary.

Required Materials and Equipment

- Proper geotechnical soil evaluation by a qualified engineer or soil scientist to determine suitability of structural installation
- OSHA compliance
- CULTEC warning tape, or equivalent
- Assurances from local utilities that no underground gas, electrical or other potentially dangerous pipelines or conduits are already buried at the site
- Acceptable 1– 2 inch (25 - 51 mm) washed, crushed stone as shown in Table 4, page 19. Cleanliness of stone to be verified by engineer.
- Acceptable fill material as shown in Table 5, page 20
- CULTEC No. 410™ non-woven geotextile or equivalent (See Table 3, page 19).
- All CULTEC chambers and accessories as specified in the engineer's plans including CULTEC No. 410™ non-woven geotextile, CULTEC StormFilter® and CULTEC No. 66™ woven geotextile, where applicable. Check CULTEC chambers for damage prior to installation. Do not use damaged CULTEC chambers. Contact your supplier immediately to report damage or packing list discrepancies.
- Reciprocating saw or router
- Stone bucket
- Stone conveyor and/or tracked excavator
- Transit or laser level measuring device
- Compaction equipment with maximum gross vehicle weight of 12,000 lbs (5,440 kgs).
- Vibratory rollers may only be used on the stone base prior to the installation of chambers.

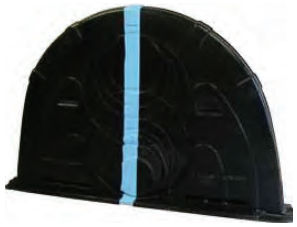
Requirements for CULTEC Chamber System Installations

- Installing contractors are expected to comprehend and use the most current installation instructions prior to beginning a system installation. If there is any question as to whether these are the most current instructions, contact CULTEC at (203) 775-4416 or visit www.cultec.com.
- Contact CULTEC at least thirty days prior to system installation to arrange for a pre-construction meeting.
- All CULTEC system designs must be certified by a registered professional engineer.
- Use these installation instructions as a guideline only. Actual design may vary. Refer to approved construction drawings for job-specific details. Be sure to follow the engineer's drawings as your primary guide.
- System cover/backfill requirements will vary based on installation type. (See Table 6 on page 20 and engineer's drawings).
- Any discrepancies with the system sub-grade soil's bearing capacity must be reported to the design engineer.
- Non-woven geotextile must be used as specified in the engineer's drawings.
- CULTEC requires the contractor to refer to CULTEC's Installation Instructions Tables 1 - 6 shown on pages 18-20, concerning vehicular traffic. Responsibility for preventing vehicles that exceed CULTEC's requirements from traveling across or parking over the chamber system lies solely with the contractor throughout the entire site construction process. The placement of warning tape, temporary fencing, and/or appropriately located signs is highly recommended. Imprinted warning tape is available from CULTEC. For Acceptable Vehicle Load information, refer to Tables 1 and 2 on page 18.
- Erosion and sediment-control measures must meet local codes and the design engineer's specifications throughout the entire site construction process.
- CULTEC systems must be designed and installed in accordance with CULTEC's minimum requirements. Failure to do so will void the limited warranty. To request a copy of the CULTEC limited warranty, call CULTEC at 203-775-4416 or visit www.cultec.com.

CULTEC Recharger® 902HD Specification Information

Recharger 902HD Chamber	
Size (L x W x H)	4.10' x 78" x 48"
	1.25 m x 1981 mm x 1219 mm
Installed Length	3.67'
	1.12 m
Length Adjustment per Row - with two end caps installed	1.03'
	0.31 m
Length Adjustment per Row - when not using end caps	0.44'
	0.133 m
Chamber Storage	17.66 ft^3/ft
	1.64 m^3/m
	64.75 ft^3/unit
	1.84 m^3/unit
Min. Installed Storage	27.27 ft^3/ft
	2.53 m^3/m
	100 ft^3/unit
	2.83 m^3/unit
Min. Area Required	26.58 ft^2
	2.47 m^2
Min. Center-to-Center Spacing	7.25'
	2.21 m
Max. Allowable Cover	8.3'
	2.53 m
Max. Allowable O.D. in Side Portal	11.5"
	292 mm
Compatible Feed Connector	HVLV FC-48 Feed Connector

Recharger 902HD End Cap	
Size (L x W x H)	9.7" x 78" x 48.5"
	246 mm x 1982 mm x 1231 mm
Installed Length	6.2"
	157 mm
End Cap Storage	5.34 ft^3/ft
	0.50 m^3/m
	2.76 ft^3/unit
	0.08 m^3/unit
Min. Installed Storage	19.88 ft^3/ft
	1.85 m^3/m
	10.28 ft^3/unit
	0.29 m^3/unit
Max. Inlet Opening in End Cap	24"
	600 mm



All dimensions are nominal. Actual dimensions may vary on-site due to shipping and temperature.

CULTEC HVLV FC-48 Feed Connector Specification Information

	HVLV® FC-48 Feed Connector
Length	49"
	1245 mm
Installed Length when used with Recharger 902HD (exposed)	9" min.
	229 mm min.
Width	16"
	406 mm
Height	12"
	305 mm
Chamber Storage Capacity	0.91 ft^3/ft
	0.08 m^3/m
Compatible With	Recharger 902HD
Pipe Comparison	Greater flow capacity than 12" (300 mm) pipe

Site Preparation and Excavation

- Excavate and level the area per engineer's drawings. Refer to plan view and cross-section details and excavate bed to accommodate chambers and manifold system. Be sure to allow for a minimum 12 inch (305 mm) stone border around the perimeter of the system and unforeseen overages in your excavation calculations.
- Remove any standing water and maintain positive drainage of the site throughout the installation. Dewatering procedures must be used if necessary.
- Prepare the sub-grade soil for the chamber bed as specified by the engineer's drawings.
- Place CULTEC No. 410™ non-woven geotextile (or equivalent — see Table 3, page 19) on the excavated bed bottom and perimeter sidewalls as specified by the engineer's drawings. CULTEC No. 410™ non-woven geotextile is required on the sides and over the top of the system. It is also recommended on the system bottom. Overlap the geotextile by at least 24 inches (610 mm) where the fabric edges meet.
- Disperse a level base of 1 to 2 inch (25 - 51 mm) diameter washed, crushed stone over the entire area of the bed bottom (see Table 4, page 19 for stone requirements). Refer to the engineer's drawings for sub-grade soil preparation and required stone foundation thickness.
- Compact the stone base to achieve a flat, level surface. Vibratory rollers may only be used on the stone base prior to the installation of chambers. Use of vibratory rollers is strictly prohibited on all other backfill layers.

End Detail Information for Recharger® 902HD

Directional arrows located on the top of the chamber point towards the Small Rib End.

Directional arrows located on the top of the chamber point towards the Small Rib End.

CULTEC Recharger® 902HD Chamber

The Recharger 902HD chamber comes in only one model type which is fully open on both ends. The Recharger 902HD chamber requires the coordinating Recharger 902HD End Cap (*sold separately*) to cap rows of chambers or to create single stand alone units.

Large Rib End Detail

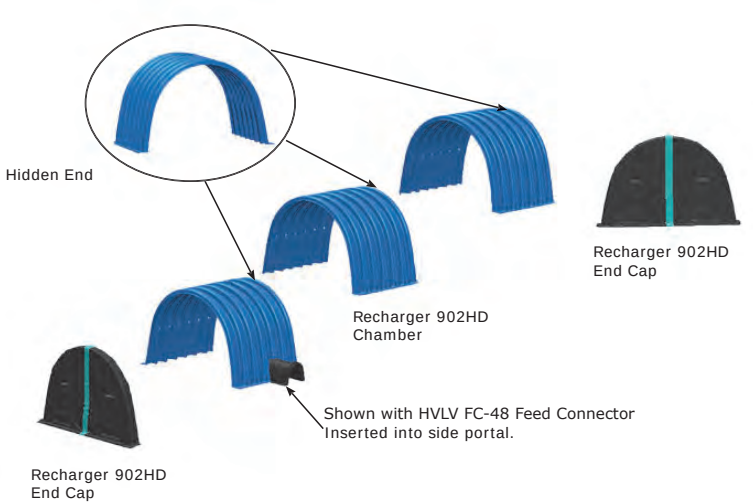
Small Rib End Detail

CULTEC Recharger® 902HD End Cap

The Recharger 902HD End Cap is used in conjunction with the Recharger 902HD chamber to cap rows of chambers or to create single stand alone units.

Typical Installation Method for Recharger® 902HD

Interlock Recharger 902HD chambers using the overlapping rib connection. Cap the ends of the lines using the Recharger 902HD End Cap.



Chamber Preparation and Installation

CULTEC Recharger® 902HD chambers have the distinctive features of being fully open on both ends and utilize an overlapping rib connection. CULTEC chamber ribs are dimensionally sized with a large rib and a smaller rib to allow for an easy interlocking rib connection. The chambers require a separate end cap to cap off lines.

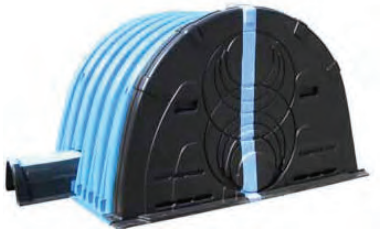
- Identify and group the chambers and end caps to ensure proper quantity and usage as outlined on page 6.
- Trim all side portals, end caps and inspection ports prior to installation for easier handling during trimming.
- Place one Recharger 902HD chamber for each row of units to be installed. Directional arrows point towards the small rib end of the chamber - see page 6.
- If using the side portal internal manifold feature, trim the side portal(s) according to guidelines located on the sidewall of the chamber, as required - see page 13. Insert one end of the HVLV FC-48 Feed Connector into the trimmed portal to create the internal manifold. Refer to Installation of Manifold section on page 9.
- Place the next Recharger 902HD chamber so the directional arrow located in the center of the unit points downstream towards the end of the line. Overlap the large rib over the small rib of the preceding chamber's end wall, interlocking the chambers together - see page 7. When placing chambers take care to maintain center-to-center separation requirements, measuring from the base of the chamber.
- To ease backfilling requirements, only install as many chambers as the stone-laying bucket or conveyor can reach.
- Place stone as outlined on page 15 taking care not to drop stone over the last rib to be overlapped.
- Continue chamber and stone placement to extend the length of the row.
- Use the Recharger 902HD End Caps to cap off chamber rows. To install the end cap, lift the end cap above the chamber and slide down the chamber rib - see page 7.
- Prior to the placement of the next line of chambers, the level and alignment of the chamber units shall be checked and corrected, where needed.

Installation of Manifold

Utilize the side portals located on the chamber as an internal manifold in locations where indicated on the engineer's drawings. HVLV® FC-48 Feed Connectors are inserted into the portals to promote flow. An additional external manifold is not required unless specified by the engineer's design.

- CULTEC No. 66™ woven geotextile is to be placed under all chambers utilizing the internal manifold feature and under all chambers accepting inlet/outlet pipe connections per engineer's drawings. If inserting a pipe 18" (450 mm) diameter or larger into the CULTEC chamber, the use of CULTEC No. 66 woven geotextile is recommended to prevent washout. See page 11.
- Most installations are designed with the internal manifold located at the ends of the chamber bed. However, the side portal internal manifold feature allows for the manifold to be located at any point within the chamber run. Refer to system design for manifold location(s). Install chambers according to directional arrows located in the top center of the unit.
- Using a reciprocating saw or router, trim the sidewall portals of the units that are to receive the HVLV FC-48 Feed Connectors. Feed connectors may be placed on any chamber requiring a manifold, as indicated by the engineer's drawings. See page 13.
- Place the HVLV FC-48 Feed Connector into the side portal of the chambers per engineer's drawings. Maintain a 9" (229 mm) min. separation between chamber rows. See page 13.
- Check for correct center-to-center spacing of chamber runs according to engineer's drawings before proceeding to next row.
- Insert inflow/outflow pipe(s) into end cap or side portal as detailed on engineer's drawings. See pages 10 and 14. Maximum inlet size for end cap is 24" (600 mm). Maximum inlet for side portals is 11.5" (292 mm) O.D. There is no need to feed every row if utilizing the internal manifold feature.

If the manifold installation detail does not include CULTEC's side portal internal manifold, proceed according to the engineer's drawings for pipe manifold installation.



Installation Instructions for CULTEC Recharger® 902HD

How to Trim CULTEC Chamber to Accommodate Pipe on End Cap

When using a conventional pipe manifold or inlet / outlet pipes, the contractor is required to trim the CULTEC Recharger 902HD End Cap on-site.

Here are some quick steps to ensure a successful outcome:

- Lay out chambers according to engineered plans.
- Directional arrows located at the top of the chamber point towards the small rib end.
- Install end caps on the chambers as detailed on the engineer's drawing.
- Locate the proper diameter pipe outline on the end cap to accommodate the designed pipe size and invert elevation.
- Drill a hole on the chamber endwall large enough to accommodate a saw blade.
- Following the etched outline, use a reciprocating saw to trim out the opening to accommodate the pipe. Trimming should be within 1/4" (6 mm) tolerance of pipe O.D.
- Insert the pipe or fitting a minimum of 8" (203 mm) into the chamber. This is not required to be a watertight connection. Maximum inlet pipe I.D. is 24" (600 mm).
- Backfill as noted in the installation instructions and engineering details.
- Trimming may only be performed on end caps or within side portal areas. Pipe may not be inserted into the sidewall of the chamber unless it is within the side portal trim lines.

See pages 13-14 for more information on trimming side portals.

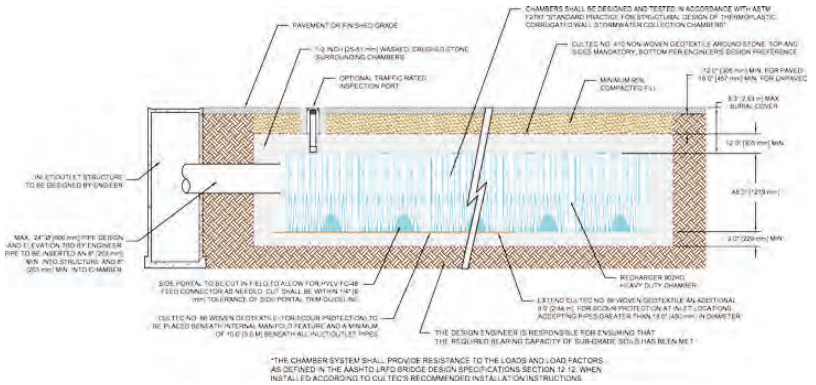
Typical Cross Section for Systems with Pipes with Hi-Flows or Exaggerated Slopes

18" (450 mm) diameter or larger

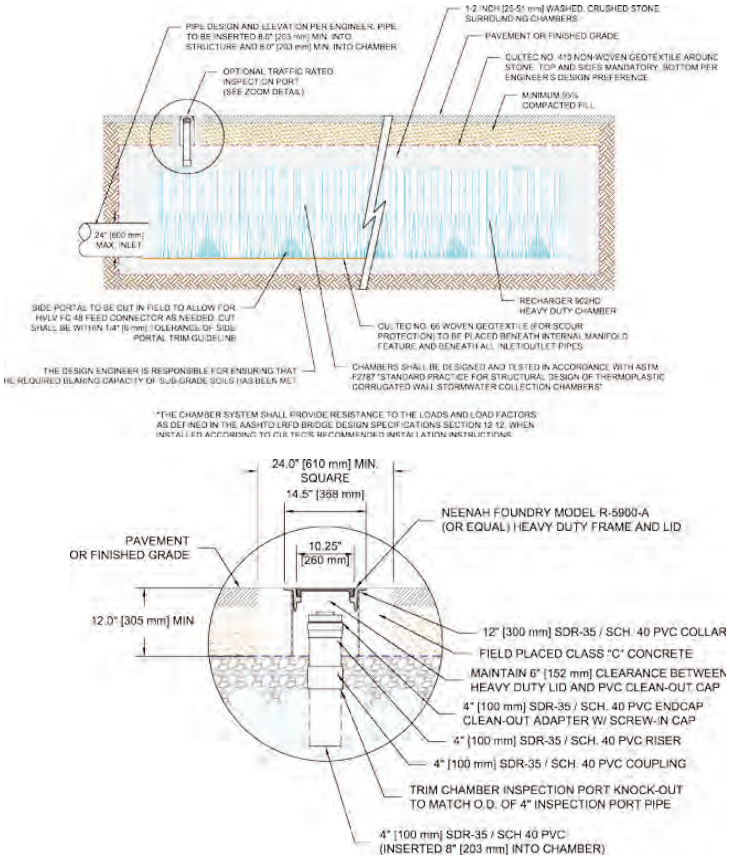
Description	Recharger 902HD
Min. depth of stone base	9" 229 mm
Chamber Height	48" 1219 mm
Min. depth of stone required above units for traffic applications	12" 305 mm
Min. depth of required 95% compacted fill	
For paved applications	12" 305 mm
For unpaved applications	18" 457 mm
Max. depth of cover allowed above crown of chamber	8.3' 2.53 m
Max. inlet/outlet pipe size into the end wall of the chamber	24"[1] 600 mm[1]

[1]When installing systems with hi-flow piping or piping with exaggerated slopes, please contact CULTEC's Technical Department for assistance at 203-775-4416 or tech@cultec.com (See Fig. 1).

Fig. 1 - Typical Cross Section for Systems with Pipes with Hi-Flows or Exaggerated Slopes



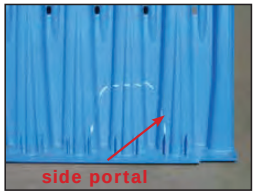
Recharger 902HD Inspection Port Detail for Paved Traffic Applications



Trim inspection port knock-out with reciprocating saw or hole-saw.
Corrugated pipe is not suitable for inspection port.
A belled end pipe may be used as replacement to configuration depicted. Belled end may rest on outside of chamber.

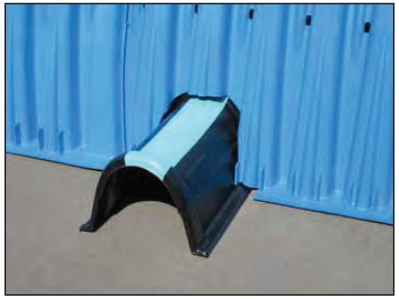
How to Trim Side Portal to Accommodate HVLV FC-48 Feed Connector for Internal Manifold

When using the side portal internal manifold feature, the contractor is required to trim the side portal of the CULTEC Recharger 902HD on site.



- Following the guides on the side portal, use a reciprocating saw to trim out the opening to accommodate the HVLV FC-48 Feed Connector. Trimming should be within 1/4" (6 mm) tolerance of HVLV FC-48 Feed Connector.

Trimming may only be performed on the side portal area. Side entry in any other location is unacceptable.



- Insert the HVLV FC-48 Feed Connector a minimum of 8" (203 mm) into the chamber. This is not required to be a watertight connection.

- Maintain proper separation of 9" (229 mm) minimum between chamber rows.

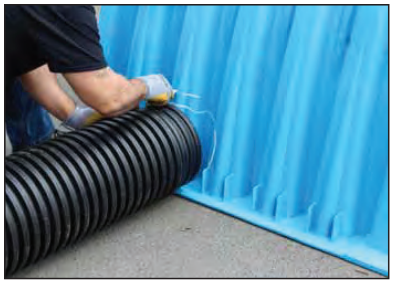
For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.

 Installation Instructions for CULTEC Recharger 902HD CULG086 05-16

How to Trim Side Portal to Accommodate Pipe for Side Entry

When using the side portal feature as an inlet /outlet location, the contractor is required to trim the side portal of the CULTEC Chamber on site.

- Line up the pipe on the chamber side portal to the designated pipe elevation as detailed on the engineer's drawing. Pipe outside diameter (O.D.) may not exceed 11.5" (292 mm).
- Using a grease pen, outline the pipe on the side portal of the CULTEC chamber. See Fig. 1 for acceptable trim area. Do not cut outside the side portal area guides.
- Drill a hole on the chamber side portal large enough to accommodate a saw blade.
- Following the grease pen outline, use a reciprocating saw to trim out the opening to accommodate the pipe. Trimming should be within 1/4" (6 mm) tolerance of pipe O.D.
- Insert the pipe or fitting a minimum of 8" (203 mm) into the chamber. This is not required to be a watertight connection.



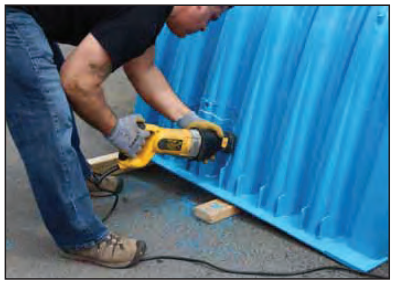


Fig. 1 - Acceptable Trim Area

Trimming may only be performed on the side portal area. Side entry in any other location is unacceptable.

Embedment Stone Backfill

Backfill using washed, crushed stone as specified in Table 4, page 19 and Table 5, page 20. To maintain row separation distance and prevent chamber displacement, slowly distribute stone on top of the center of the chamber crown so that stone trickles down and builds between chamber rows as required. Stone column differential should not exceed 12" (300 mm) between adjacent chamber rows or between chamber rows and perimeter.

Place the stone carefully over the centerline of the chamber crown. Embedment stone must only be placed by an excavator or telescoping conveyor boom. Placement of embedment stone with a bulldozer is not an acceptable method of installation and may cause damage to the chambers. Any chambers damaged using an unacceptable method of backfill are not covered under the CULTEC limited warranty.

Excavator-Placed Stone

Typically the most common method, excavator-placed stone is limited by the reach of the arm. To accommodate this issue with larger beds, it is common to prepare a bed by joining just a few chamber units at a time, then placing the stone and fabric before installing the next few units.

The excavator is usually operated within the excavation area. The excavator may work at grade level over recently placed chambers, provided coverage between the chambers and the excavator tracks meets the minimum requirements as shown in Table 2, page 18 and Table 6, page 20.

Telescoping Conveyor Boom Placement

With booms as much as 120-140 feet (36.6 - 42.7 meters) long, telescoping aggregate conveyors can greatly aid the process of stone placement.

With both stone-placement methods, ladling the stone carefully over the chambers' centers will secure them in place. Evenly distributing the stones will help prevent chamber movement and maintain row separation.

Once secured, stone may be placed to surround the chambers and fill the perimeter areas. Refer to Table 6 on page 20 and engineer's drawings for system cover/backfill requirements.

For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.

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Do not allow equipment to drive over the chambers unless the minimum cover as shown in Table 6, page 20 is in place. Use a warning tape (available from CULTEC) to restrict access.

Repeat steps until all of the last chamber units are in place. Be certain to use the Recharger 902HD End Caps to end the line of chambers as specified by the drawings.

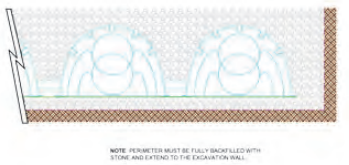
If a manifold system is designed on the back end of the chamber bed, follow manifold installation instructions as described previously.

Stone column height differential should never exceed 12 inches (300 mm) with adjacent chambers or between chamber rows and perimeter. Minimum depth of cover of properly compacted material must be met before allowing vehicles to drive over the bed. Avoid using large rocks and/or organic matter as backfill material. See Table 5, page 20 for acceptable cover materials, or contact the design engineer for approved fill types.

UNEVEN BACKFILL - INCORRECT INSTALLATION

EVEN BACKFILL - CORRECT INSTALLATION

PERIMETER NOT FULLY BACKFILLED
INCORRECT INSTALLATION

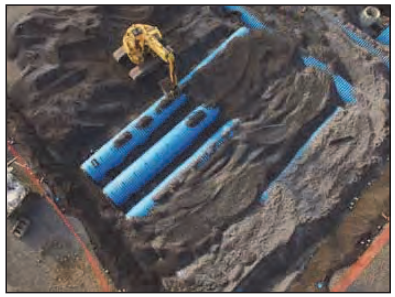


PERIMETER FULLY BACKFILLED
CORRECT INSTALLATION

Placement of Top Fabric Layer & System Backfill Process

- Place the stone over the entire bed area as described in previous section (See 2 in Fig. 1, page 21).
- Cover the entire installation area with CULTEC No. 410 non-woven geotextile starting from the perimeter and laying it atop the stone. The geotextile must overlap at least 24 inches (610 mm) at the edges.
- Fill the first 12 inches (305 mm) with enough material (See 3 in Fig. 1, page 21) to meet the requirements as shown in Table 5, page 20. Backfill over the top of the geotextile (See 3 in Fig. 1, page 21) in lifts that do not exceed 6 inches (152 mm), and disperse the fill with a vehicle that meets the maximum wheel loads or ground pressure limits as specified on specified in Tables 1 & 2 on page 18.
- Compact each lift of backfill as specified in the engineer's drawings. CULTEC specifies compacting to a minimum of 95% of the standard proctor density using compaction equipment with a gross vehicle weight of less than of 12,000 lbs (5,400 kg). The use of vibratory equipment is strictly prohibited and will void any warranties.
- Backfill over the chamber bed (See 4 in Fig. 1, page 21) in 6-inch (152 mm) maximum lifts until the specified grade is achieved. See Table 3, page 19 for minimum and maximum coverage. For pavement sub-base or special fill requirements, see engineer's drawings.

NOTE:
Excavation alongside already installed chamber rows backfilled with stone is not acceptable. No chambers may be added or subtracted from previously installed systems.



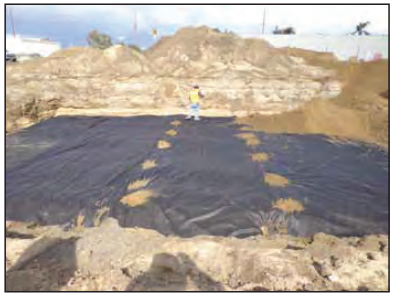


Table 1: Maximum allowable axle loads for wheeled vehicles at various cover depths

	Fill Depth Over Chamber		Max. Axle Load	
	inches	mm	lbs	kN
	6	152	8,000	35.6
	9	305	16,000	71.2
With pavement	24	610	40,000	177.9
Without pavement	30	762	40,000	177.9

Any load which travels over the system that exceeds the maximum load allowed is strictly prohibited and will void the warranty.
All depths listed above are based on compacted fill and include min. 12" (305 mm) of stone above the crown of the unit as listed as 3 of Fig. 1, page 21.

Table 2: Maximum allowable ground pressures for various vehicle track widths and fill depths

Fill Depth Over Chamber		Track Width		Max. Ground Pressure[2]	
inches	mm	inches	mm	PSF	kPa
6	152	12	305	1070	51
		18	457	900	43
		24	610	800	38
		30	762	760	36
		36	914	720	34
12	305	12	305	1540	74
		18	457	1190	57
		24	610	1010	48
		30	762	910	43
		36	914	840	40
18	457	12	305	2010	96
		18	457	1480	71
		24	610	1220	58
		30	762	1060	51
		36	914	950	45

The use of wheeled equipment without proper cover is strictly prohibited.
[2]Ground pressure is vehicle operating weight divided by total truck contact area for both tracks. Turning should be kept to a minimum.

Table 3: CULTEC No. 410™ Non-Woven Geotextile Specification Information

Properties	Test Method	Test Results
Appearance		Black
Grab Tensile	D 4632	90 lbs 400 N
Elongation	D 4632	50%
Trapezoid Tear	D 4533	35 lbs 155 N
Puncture	D 4833	55 lbs 245 N
Mullen Burst	D 3786	175 psi 1205 kPa
AOS	D 4751	70 U.S. sieve .21 mm
Permittivity	D 4491	2.0 sec^{-1}
Permeability	D 4491	.2 cm/sec
Water Flow	D 4491	145 gal/min/sf 5908 l/min/sq.m
UV Stability	D 4355	70%

Substitutions must meet or exceed these minimums. Non-woven geotextile placement is mandatory over top and sides of system. Coverage of system bottom is recommended. However, follow engineer's design preference.

Table 4: Criteria for acceptable 1 - 2 inch (25 - 51 mm) washed, crushed, angular stone

Washed Crushed Stone	Description	Criteria
Acceptable	Angular	Stones have sharp edges and relatively plane sides with unpolished surfaces
	Subangular	Stones are similar to angular description but may have slightly rounded edges
Unacceptable	Subrounded	Stones have nearly plane sides but have well-rounded corners and edges
	Rounded	Stones have smoothly curved sides and no edges

See Item 1 and Item 2 of Table 5 on page 20 for additional stone requirements.

Table 5: Acceptable Fill Materials

	Material Location	Description	AASHTO M43 Classification	Compaction / Density Requirement
1	Foundation Stone below chambers per engineer's drawing 9" (229 mm) min. required.	Washed, crushed stone with the majority of particles between 1" - 2" (25 - 51 mm)	3,4	Plate compact or roll to achieve a 95% Standard Proctor density
2	Embedment Stone surrounding chambers and to a min. 12" (305 mm) elevation above chamber crown.	Washed, crushed stone with the majority of particles between 1" - 2" (25 - 51 mm)	3,4	No compaction required
3	Fill Material for Layer 3 starts from top of embedment stone (Layer 2) to minimum required depth above top of chamber. Refer to Table 6, page 20 for proper minimum fill requirements.	Granular well-graded soil/aggregate mixtures, <35% fines	3,4, 5, 6, 7, 8, 9, 10, 56, 57, 67, 68, 78, 89, 467	Compact in 6" (152 mm) lifts to a minimum 95% Standard Proctor density. Roller gross vehicle weight not to exceed 12,000 lbs. (53 kN) Dynamic force not to exceed 20,000 lbs. (89 kN)
4	Fill Material for Layer 4 starts from the top of Layer 3 to the bottom of pavement or unpaved finished grade above. Refer to Table 6, page 20 for proper minimum fill requirements.	Any soil/rock materials, native soils or per engineer's plans. Check plans for pavement sub-grade requirements.	Per engineer's drawings	Prepare per engineer's drawing. Paved installations may have strict material and preparation requirements

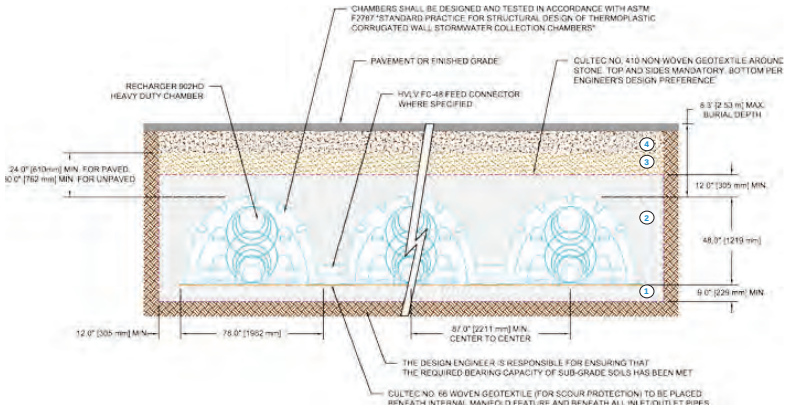
The listed AASHTO classifications are for gradations. The stone must be washed, crushed and angular. See Table 6, page 20.
For example, the stone must be specified as washed, crushed No. 4 stone. Fill materials shall be free of debris, trash, frozen lumps and other deleterious matter.
Contact CULTEC for gradation requirements for specific projects that do not fall within the above specifications.

Table 6: Minimum and Maximum Fill and Separation Requirements for Traffic Installations
(See Fig. 1 on page 21)

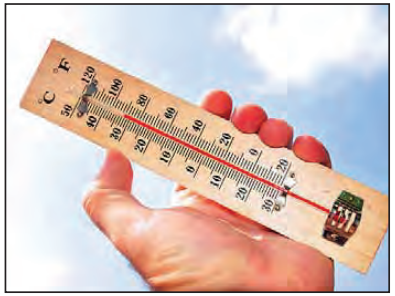
Model	Minimum Fill Requirements				Maximum Fill Requirements		Center-to-Center Separation Requirement	
	For Paved inches	For Paved mm	For Unpaved inches	For Unpaved mm	feet	m	inches	mm
Recharger® 902HD	24	610	30	762	8.3	2.53	87	2210

Refer to Table 5 and Fig. 1 page 20 and Table 4 on page 19 for acceptable fill requirements.
When fill requirements will exceed Maximum Fill Requirements listed above, contact CULTEC at 203-775-4416.
All depths listed above are based on compacted fill and include the required stone above the crown of the unit.

Fig. 1. Fill Material Locations for Recharger 902HD – *refer to Tables 4, 5, and 6.*



Special Handling Instructions for Polypropylene, Chambers in Warmer Temperatures



CULTEC chambers are manufactured of impact-modified polypropylene, which is inherently resistant to corrosion and chemical breakdown and cold weather impact. Additional UV inhibitors and antioxidants increase the chambers' resistance to sunlight degradation. However, CULTEC recommends that, when installed in cold temperatures below 32 degrees F, the installer take special care when removing the chambers from the stacks, not allowing the chambers to fall from height. Avoid using machinery to handle the chambers. When possible, CULTEC recommends that the stone backfill be placed in temperatures above 32 degrees F to minimize depressions or deflections.

Installation Instructions for CULTEC Recharger® 902HD






For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.

 Installation Instructions for CULTEC Recharger 902HD CULG086 05-16



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 Installation Instructions for CULTEC Recharger 902HD CULG086 05-16


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