Intercity Transit
Pattison Facility Expansion

Master Plan & Zero Emission Bus Update

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Topics

1. Master Plan Report Summary
2. Zero Emission Bus Planning
3. Questions & Comments

Without change there is no innovation, creativity, or incentive for improvement. Those who initiate change will have a better opportunity to manage the change that is inevitable.

William Pollard

Master Plan Report Summary Vol 1 & 2

Project Statement

Our community recently asked us to increase services significantly and this new facility will allow I.T. to provide that service and future-proof our site for at least the next 25 years. When the existing facility was built I.T. did not have a vanpool program, nor was it established yet as a mobility option. Vanpool is now our largest fleet, and we are continuing to grow our Fixed-Route and Dial-A-Lift services.

Keys to the Plan

- **This is a facility master plan which will allow us to provide expanded services to our community.**
- **This master plan provides future flexibility to be able to respond to the unknown future, particularly evolving propulsion/fuel technologies.**

Executive Summary

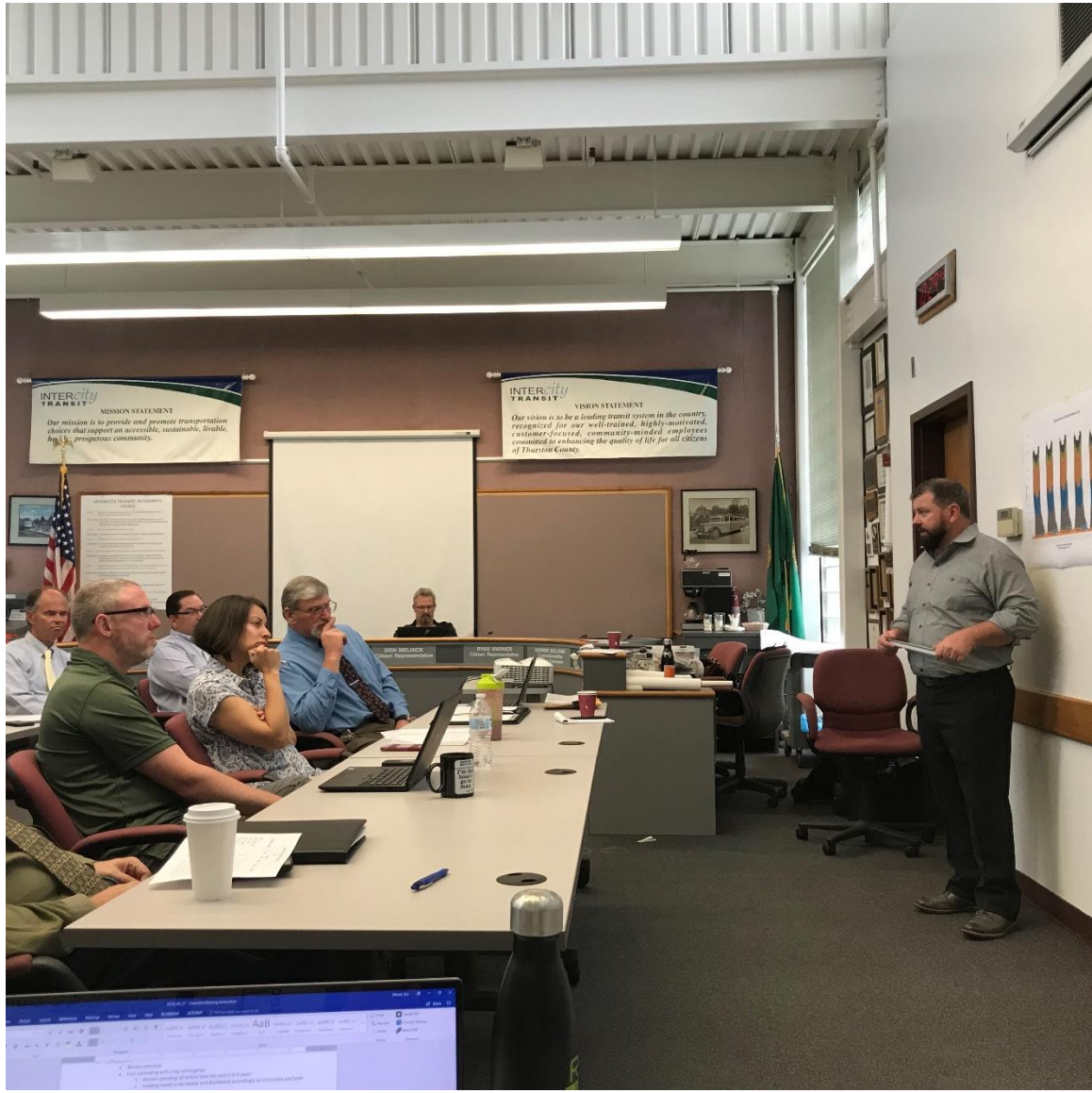
This project will enable I.T. to meet its long term goal in providing increased transit services to the community for the next 25 years through 2045. New and expanded facilities are necessary to allow I.T. the ability to grow and implement the necessary changes required for an expanded operation.

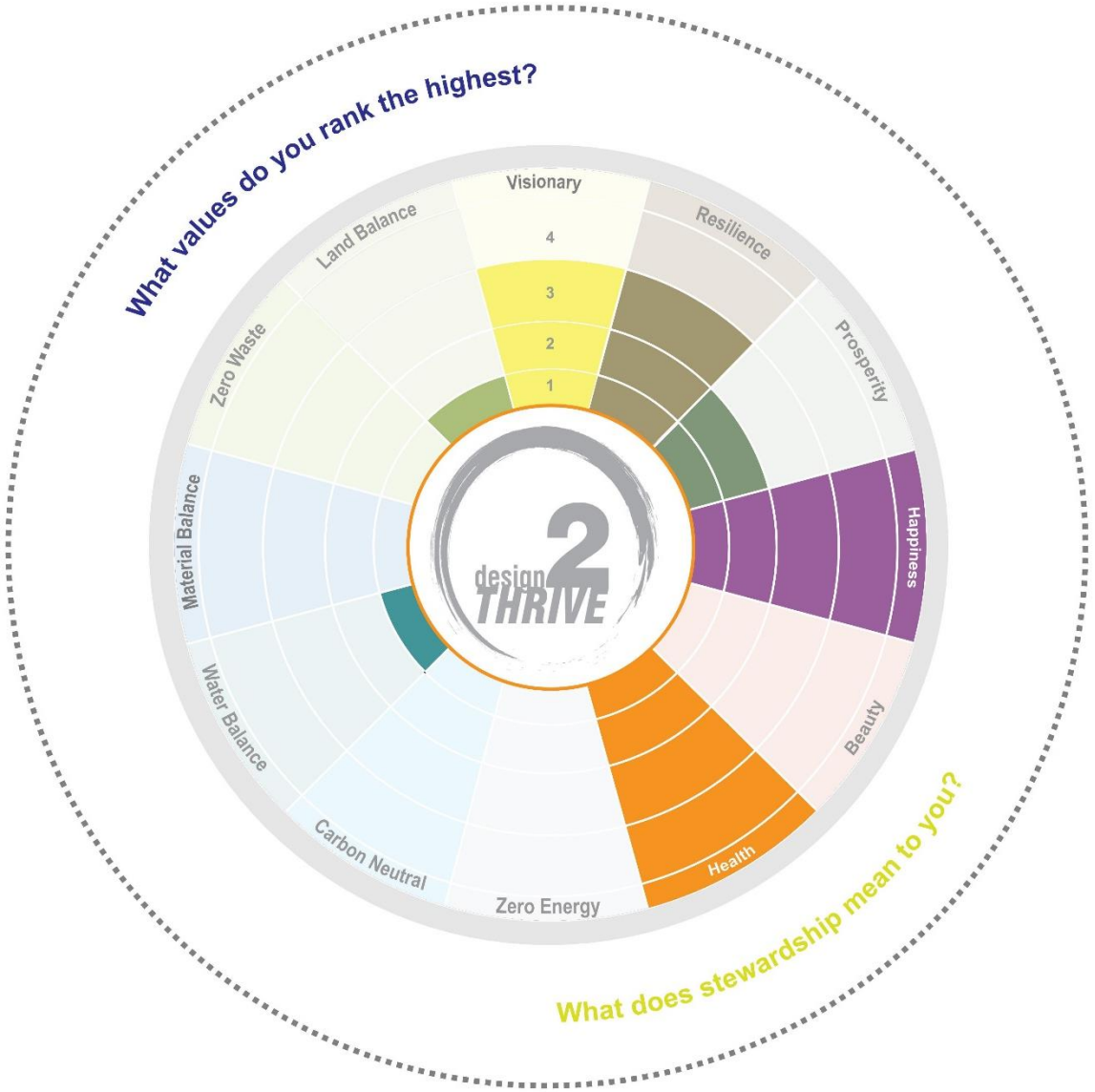
Keys to the Plan

- **Construct new Fuel, Wash, Facilities, and Bike Shop Building**
- **Construction new Admin and Operations building with immediate and long term growth potential**
- **Remodel existing maintenance**
- **Implement off-site improvements to Martin Way and Pattison St**
- **Reserve space for future ZEB infrastructure**

Methodology

- **Establish Goal and Objectives**
- **Program Verification**
- **Master Planning**
- **Findings and Recommendations**
- **Cost Estimating**
- **ZEB Planning**





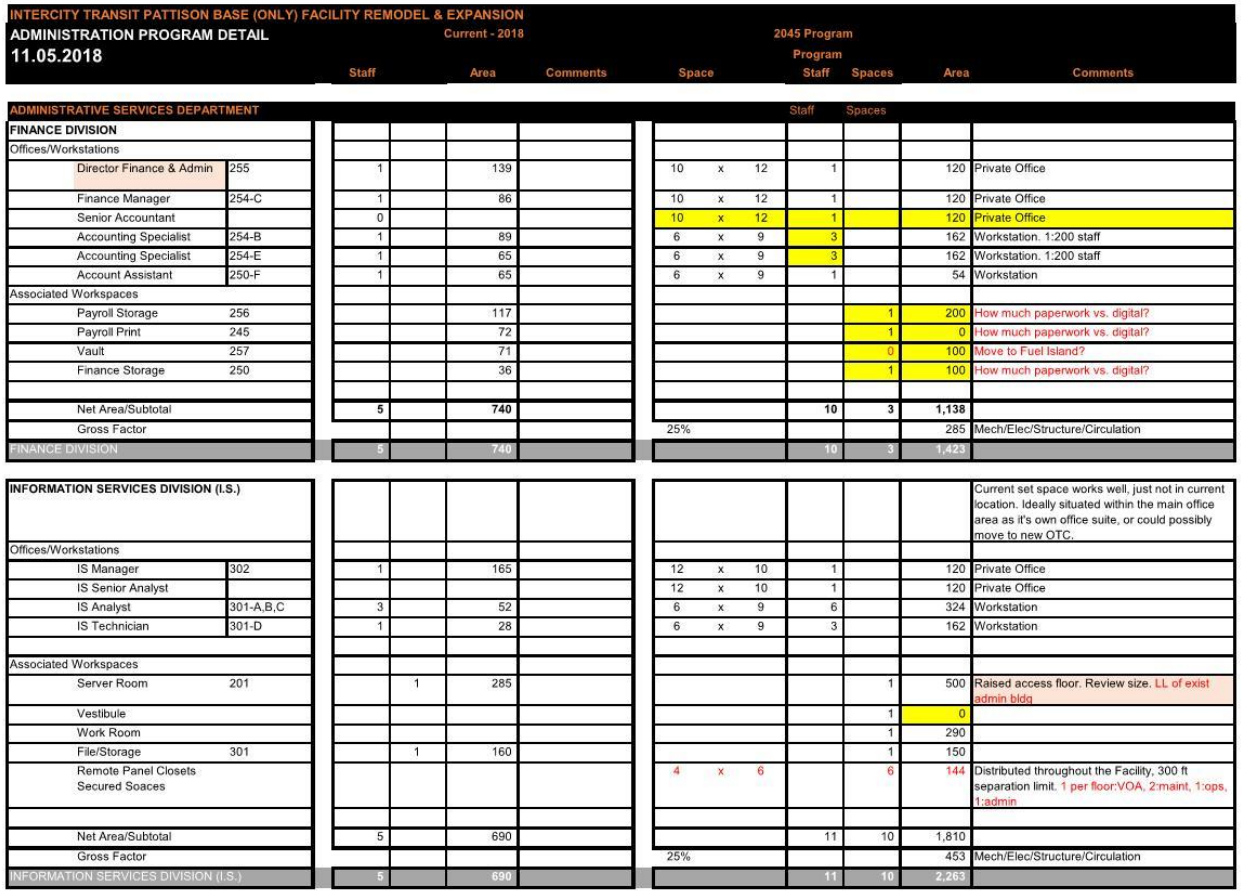
Goals and Objectives

Utilized Stantec's Design 2 Thrive process

With the design team and stakeholders working together, 4 primary goals were developed:

- ✓ Promote employee happiness & inclusivity
- ✓ Make employee health and safety a top priority
- ✓ Embrace resiliency as a characteristic of IT's culture
- ✓ Provide visionary leadership for the future

Program Verification



INTERCITY TRANSIT PATTISON BASE (ONLY) FACILITY REMODEL & EXPANSION
ADMINISTRATION PROGRAM DETAIL
11.05.2018

		Current - 2018 Staff		Area	Comments	Space	2045 Program Staff	Spaces	Area	Comments
ADMINISTRATIVE SERVICES DEPARTMENT							Staff	Spaces		
FINANCE DIVISION										
Offices/Workstations										
Director Finance & Admin	255	1		139		10 x 12	1		120	Private Office
Finance Manager	254-C	1		86		10 x 12	1		120	Private Office
Senior Accountant		0				10 x 12	1		120	Private Office
Accounting Specialist	254-B	1		89		6 x 9	3		162	Workstation. 1:200 staff
Accounting Specialist	254-E	1		65		6 x 9	3		162	Workstation. 1:200 staff
Account Assistant	250-F	1		65		6 x 9	1		54	Workstation
Associated Workspaces										
Payroll Storage	256			117				1	200	How much paperwork vs. digital?
Payroll Print	245			72				1	0	How much paperwork vs. digital?
Vault	257			71				0	100	Move to Fuel Island?
Finance Storage	250			36				1	100	How much paperwork vs. digital?
Net Area/Subtotal		**5**		**740**			**10**	**3**	**1,138**	
Gross Factor						25%			285	Mech/Elec/Structure/Circulation
FINANCE DIVISION		**5**		**740**			**10**	**3**	**1,423**	
INFORMATION SERVICES DIVISION (I.S.)										Current set space works well, just not in current location. Ideally situated within the main office area as it's own office suite, or could possibly move to new OTC.
Offices/Workstations										
IS Manager	302	1		165		12 x 10	1		120	Private Office
IS Senior Analyst						12 x 10	1		120	Private Office
IS Analyst	301-A,B,C	3		52		6 x 9	6		324	Workstation
IS Technician	301-D	1		28		6 x 9	3		162	Workstation
Associated Workspaces										
Server Room	201		1	285				1	500	Raised access floor. Review size. LL of exist admin bldg
Vestibule								1	0	
Work Room								1	290	
File/Storage	301		1	160				1	150	
Remote Panel Closets Secured Soaces						4 x 6		6	144	Distributed throughout the Facility, 300 ft separation limit. 1 per floor:VOA, 2:maint, 1:ops, 1:admin
Net Area/Subtotal		5		690			11	10	1,810	
Gross Factor						25%			453	Mech/Elec/Structure/Circulation
INFORMATION SERVICES DIVISION (I.S.)		**5**		**690**			**11**	**10**	**2,263**	

- ✓ Review previous space needs program with stakeholder.
- ✓ Update the program based on current needs.
- ✓ Review by all stakeholders.
- ✓ Finalize draft as basis of design.
- ✓ Review and approval by stakeholders.
- ✓ Update throughout design when changes are made.

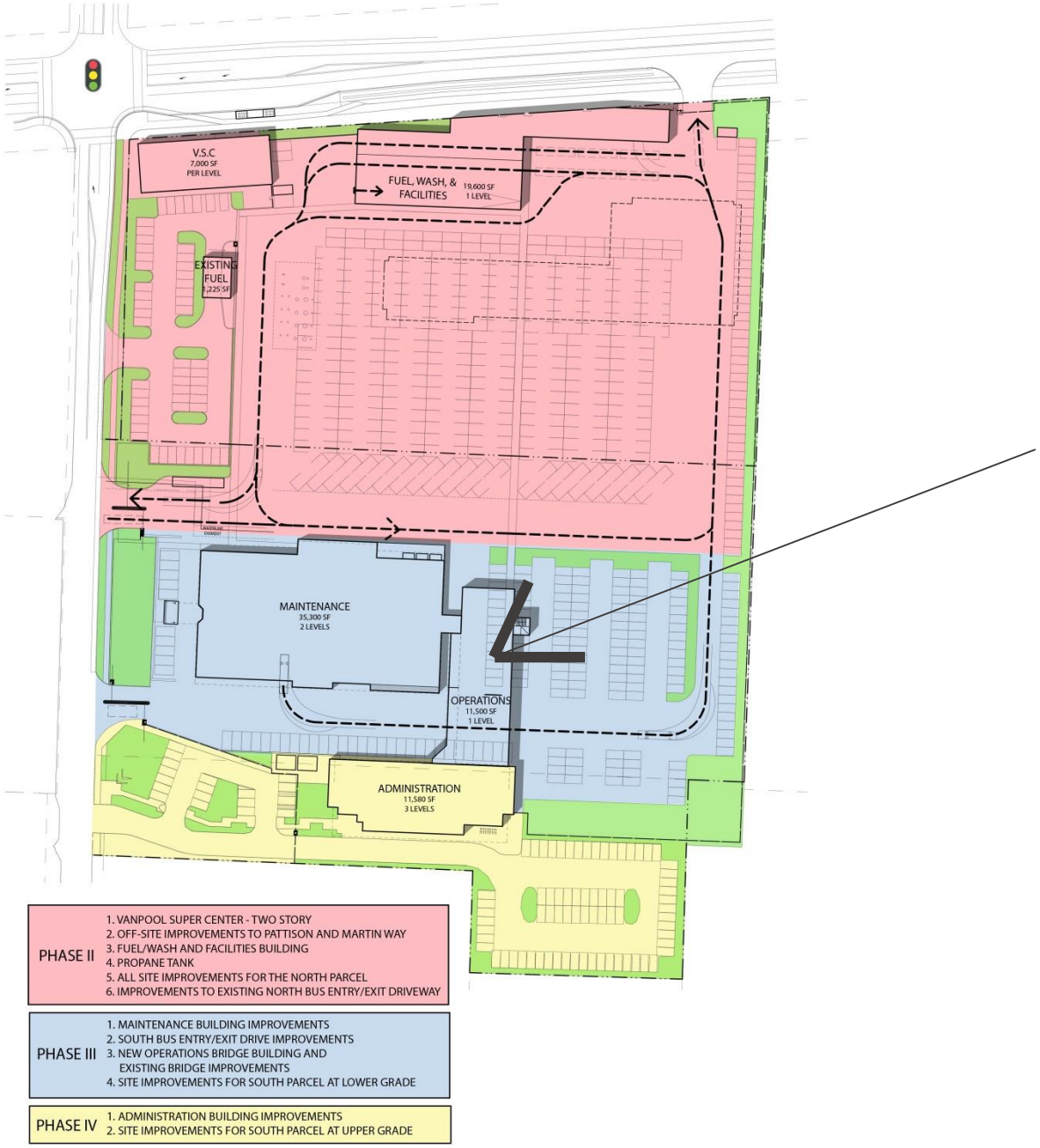
Program Data

VEHICLES	CURRENT	2045 PROGRAM
Fixed-Route	71	86
Dead Line	0	21
F.R. Transition	0	3
Dial-A-Lift	44	80
Vanpool	30	60
VP Transition	0	60
Support	26	40
Village Vans	4	6
Community Vans	4	6
TOTAL	**179**	**362**

Fleet = 202% Increase

STAFF	CURRENT	2045 PROGRAM
Administration	40	70
Operations	229	325
Vanpool	9	14
Maintenance	43	78
Facilities	6	14
TOTAL	**327**	**501**

Staff = 153% Increase



Master Planning Charrette

The initial recommendation following the three day charrette with I.T.'s stakeholders included the elevated operations building.

- Elevated Operations Building
  - ✓ Connect I.T. all under one roof
  - ✓ Connects Admin through Ops to Maintenance
- Cost Impacts
  - ✓ Constructing while remaining operational would be very challenging
  - ✓ Difficult to phase
  - ✓ Triggers larger site improvements immediately.
  - ✓ Delays construction of expanded Ops and Admin space to phase 4.

MASTER PLAN CONCEPT - POST CHARRETTE

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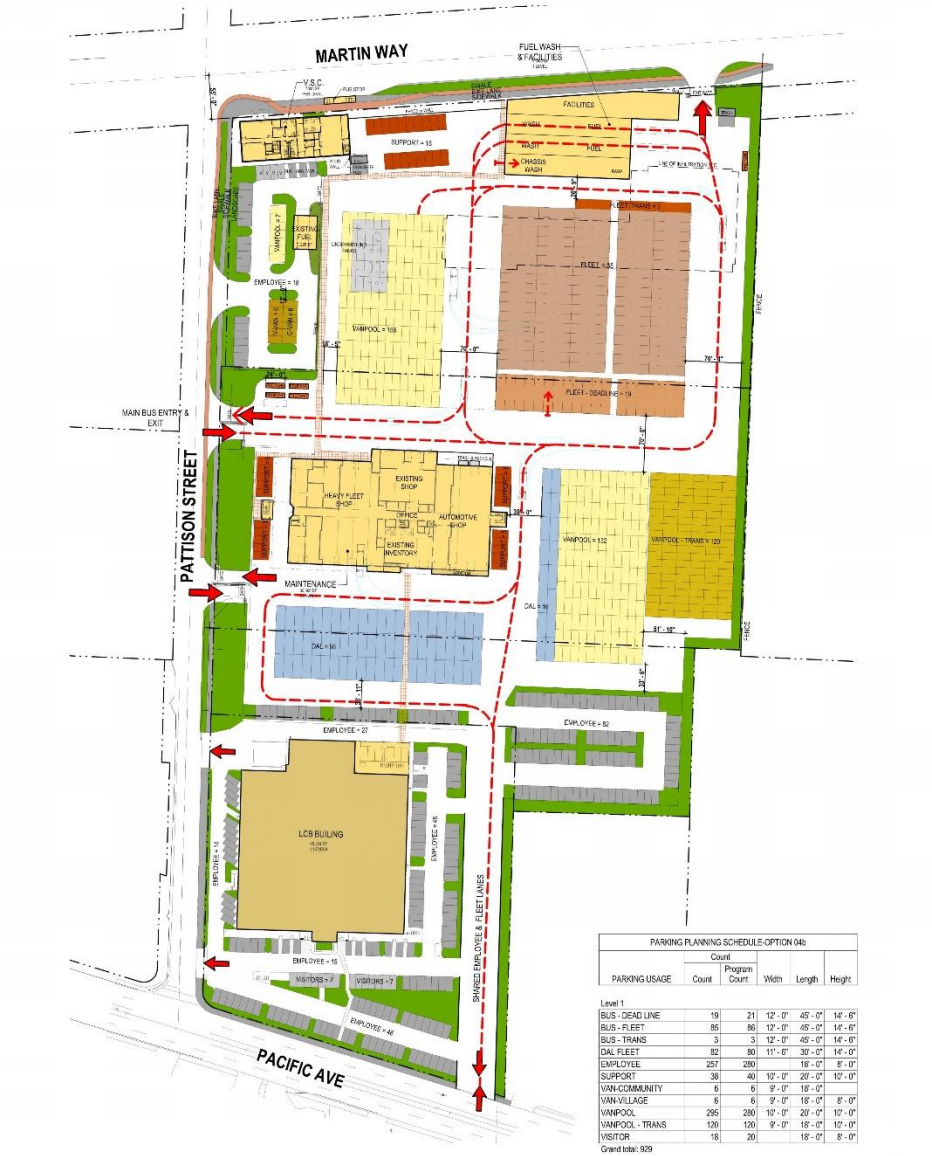
Site Plan - Two Storey Suspended Diagram
Pattison Base Master Plan

Martin Way Concept

The preferred master plan and building layout following the approved conditional use permit (CUP).

- Urban character
  - ✓ Street frontage along Martin Way
  - ✓ Provides screening into the bus yard
  - ✓ Phasable construction, while maintaining site operations
  - ✓ Safe and efficient site operation and traffic flow
  - ✓ Close proximity of operators to fleet.
- Cost Impacts
  - ✓ Larger construction scope
  - ✓ All initial improvements located on only on the north parcel
  - ✓ Delays south parcel zoning improvements
  - ✓ Reduced construction phasing



PARKING PLANNING SCHEDULE-OPTION 04b

PARKING USAGE	Count	Program Count	Width	Length	Height
Level 1					
BUS - DEAD LINE	19	21	12' - 0"	45' - 0"	14' - 6"
BUS - FLEET	86	86	12' - 0"	45' - 0"	14' - 6"
BUS - TRANS	3	3	12' - 0"	45' - 0"	14' - 6"
DAL FLEET	82	80	11' - 6"	30' - 0"	14' - 0"
EMPLOYEE	257	280		18' - 0"	8' - 0"
SUPPORT	38	40	10' - 0"	20' - 0"	10' - 0"
VAN-COMMUNITY	6	6	9' - 0"	18' - 0"	
VAN-VILLAGE	6	6	9' - 0"	18' - 0"	8' - 0"
VANPOOL	295	280	10' - 0"	20' - 0"	10' - 0"
VANPOOL - TRANS	120	120	9' - 0"	18' - 0"	10' - 0"
VISITOR	18	20		18' - 0"	8' - 0"
Grand total: 929					

OPTION G2

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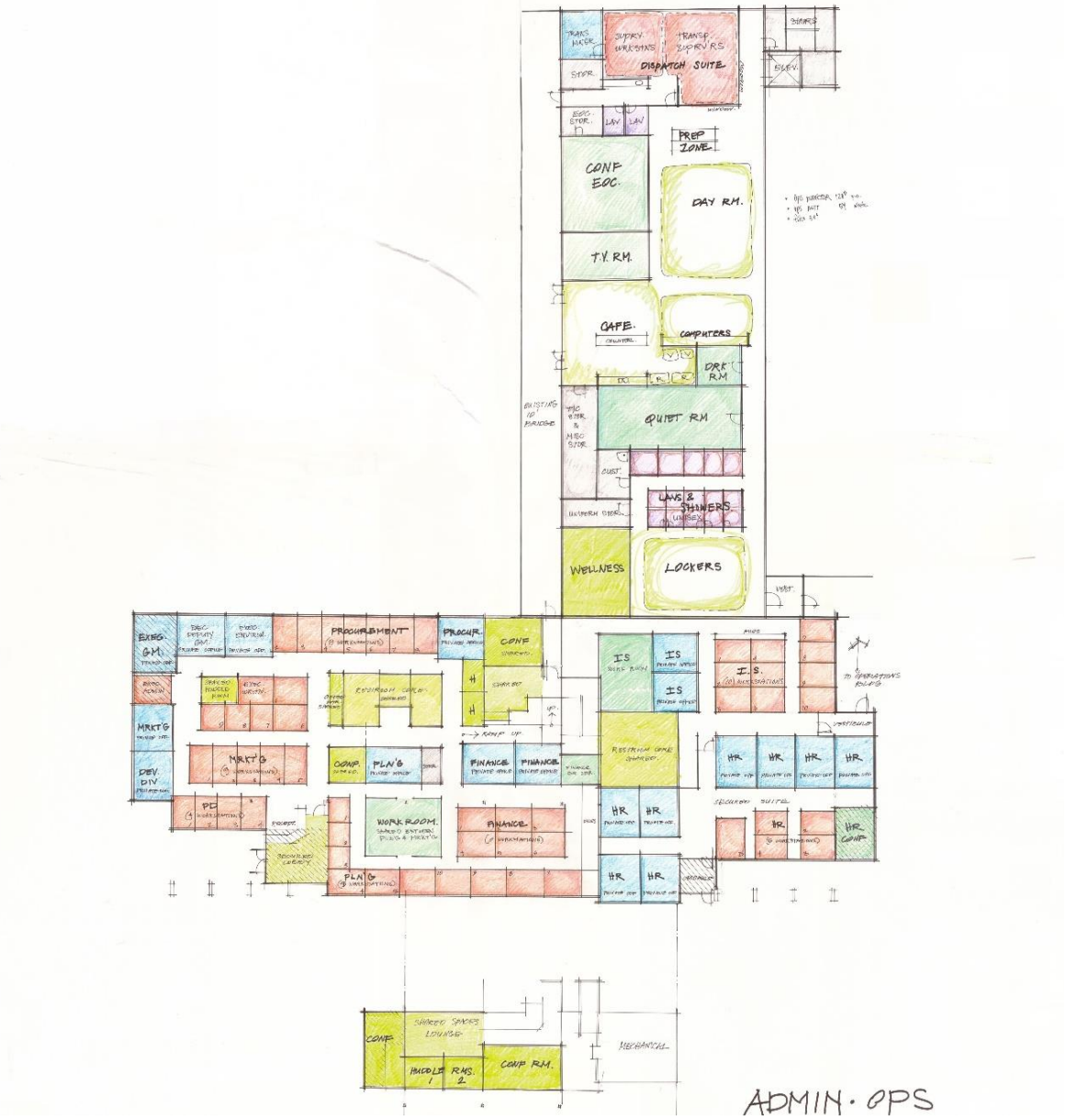
SITE PLAN DESIGN OPTION G2
PATTISON CAMPUS - DESIGN DIRECTION

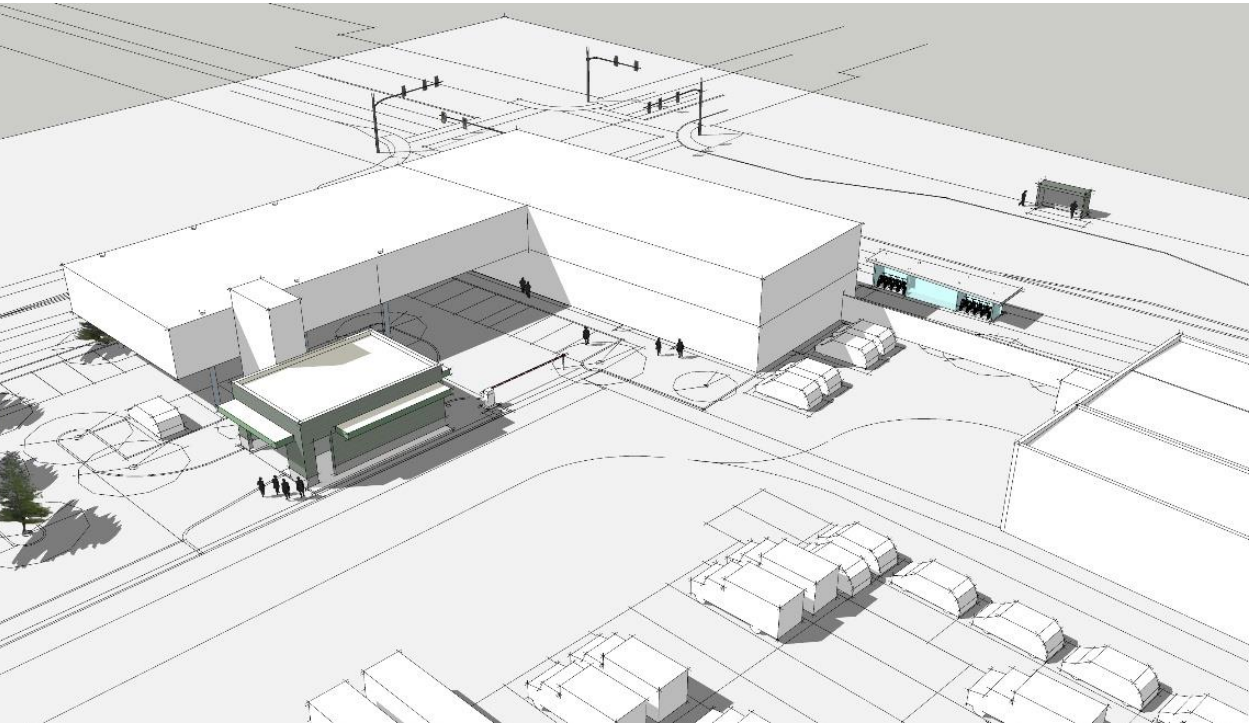
LCB Concept

Multiple concepts were reviewed that incorporated the LCB site.

- Additional acreage for I.T.'s long term future, proved to not be the appropriate decision.
  - ✓ Spreads Admin, Ops, and Maintenance across the entire site
  - ✓ Furthest separation of operators from the fleet
  - ✓ Removal of the existing hill required to flatten out site
- Cost Impacts
  - ✓ Additional site acreage
  - ✓ Increased long term operational costs



Concept space plans were developed for all master plan concepts. These were then further developed in the computer to create accurate floor plans.



Massing studies were also developed to show volumetric shape, adjacencies to existing buildings, and site context to each other. These massing studies became the basis of our BIM models (building information modeling).

Aerial image

View of facilities and fueling lanes from interior of site

Findings & Recommendations

Martin Way Frontage Concept is the preferred concept.

- Avoids new application for CUP and thus potentially 2 year delay
- Maintains close proximity between Ops and Maintenance to the fleet
- Avoids south parcel work (initially).

Benefits:

- ✓ New public face for transit in the community!
- ✓ Integrates public use programs (vanpool and bike shop).
- ✓ Minimal impact to existing operations during construction.
- ✓ Uses buildings to ‘shield’ bus storage and service cycle from public view

View looking towards new signaled intersection

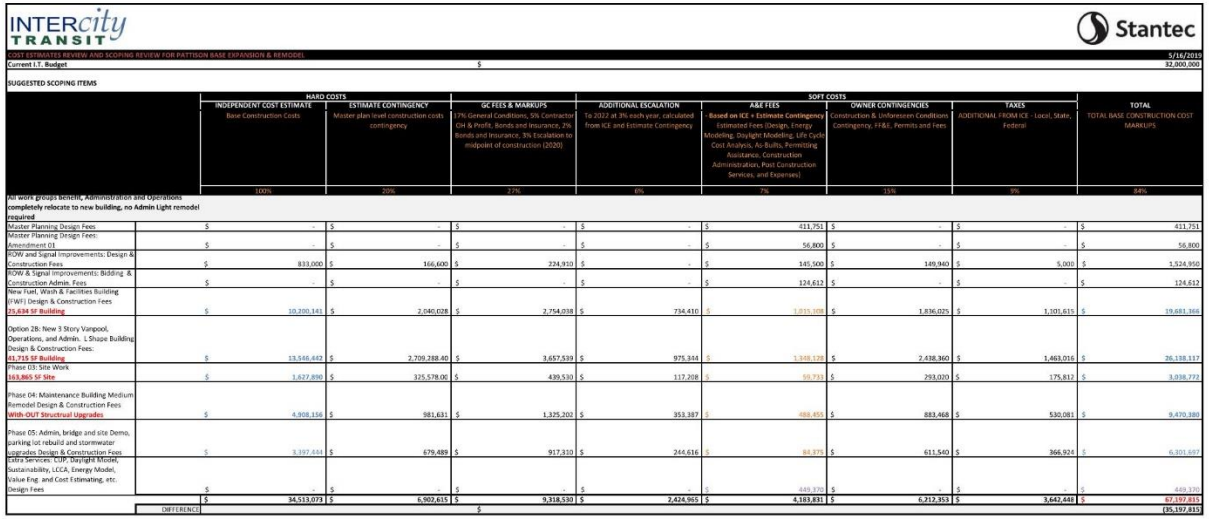

Looking down Pattison

Martin Way & Pattison intersection


New front door and inviting porch

Looking at west elevation along Pattison

Cost Estimating



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COST ESTIMATES REVIEW AND SCOPING REVIEW FOR PATTISON BASE EXPANSION & REMODEL — 5/16/2019

Current I.T. Budget — $ — 32,000,000

SUGGESTED SCOPING ITEMS

	HARD COSTS				SOFT COSTS			
	INDEPENDENT COST ESTIMATE Base Construction Costs	ESTIMATE CONTINGENCY Master plan level construction costs contingency	GC FEES & MARKUPS 17% General Conditions, 5% Contractor OH & Profit, Bonds and Insurance, 2% Bonds and Insurance, 3% Escalation to midpoint of construction (2020)	ADDITIONAL ESCALATION To 2022 at 3% each year, calculated from ICE and Estimate Contingency	A&E FEES - Based on ICE + Estimate Contingency Estimated Fees (Design, Energy Modeling, Daylight Modeling, Life Cycle Cost Analysis, As-Builts, Permitting Assistance, Construction Administration, Post Construction Services, and Expenses)	OWNER CONTINGENCIES Construction & Unforeseen Conditions Contingency, FF&E, Permits and Fees	TAXES ADDITIONAL FROM ICE - Local, State, Federal	TOTAL TOTAL BASE CONSTRUCTION COST MARKUPS
	100%	20%	27%	6%	7%	15%	9%	84%
All work groups benefit, Administration and Operations completely relocate to new building, no Admin Light remodel required								
Master Planning Design Fees	$ -	$ -	$ -	$ -	$ 411,751	$ -	$ -	$ 411,751
Master Planning Design Fees: Amendment 01	$ -	$ -	$ -	$ -	$ 56,800	$ -	$ -	$ 56,800
ROW and Signal Improvements: Design & Construction Fees	$ 833,000	$ 166,600	$ 224,910	$ -	$ 145,500	$ 149,940	$ 5,000	$ 1,524,950
ROW & Signal Improvements: Bidding & Construction Admin. Fees	$ -	$ -	$ -	$ -	$ 124,612	$ -	$ -	$ 124,612
New Fuel, Wash & Facilities Building (FWF) Design & Construction Fees 25,634 SF Building	$ 10,200,141	$ 2,040,028	$ 2,754,038	$ 734,410	$ 1,015,108	$ 1,836,025	$ 1,101,615	$ 19,681,366
Option 2B: New 3 Story Vanpool, Operations, and Admin. L Shape Building Design & Construction Fees: 41,715 SF Building	$ 13,546,442	$ 2,709,288.40	$ 3,657,539	$ 975,344	$ 1,348,128	$ 2,438,360	$ 1,463,016	$ 26,138,117
Phase 03: Site Work 163,865 SF Site	$ 1,627,890	$ 325,578.00	$ 439,530	$ 117,208	$ 59,733	$ 293,020	$ 175,812	$ 3,038,772
Phase 04: Maintenance Building Medium Remodel Design & Construction Fees With-OUT Structrual Upgrades	$ 4,908,156	$ 981,631	$ 1,325,202	$ 353,387	$ 488,455	$ 883,468	$ 530,081	$ 9,470,380
Phase 05: Admin, bridge and site Demo, parking lot rebuild and stormwater upgrades Design & Construction Fees	$ 3,397,444	$ 679,489	$ 917,310	$ 244,616	$ 84,375	$ 611,540	$ 366,924	$ 6,301,697
Extra Services: CUP, Daylight Model, Sustainability, LCCA, Energy Model, Value Eng. and Cost Estimating, etc. Design Fees	$ -	$ -	$ -	$ -	$ 449,370	$ -	$ -	$ 449,370
	$ 34,513,073	$ 6,902,615	$ 9,318,530	$ 2,424,965	$ 4,183,831	$ 6,212,353	$ 3,642,448	$ 67,197,815
DIFFERENCE			$					($5,197,815)

Independent cost estimates prepared by cost estimating professionals were developed for all concepts to aid in the decision making process.

Cost Estimate Analysis

- ✓ All master plan concepts
- ✓ “Light, medium, and heavy” remodels of existing buildings
- ✓ Site Costs for north and south parcels
- ✓ Expanded to include all soft costs and escalation to capture full project concept costs

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Zero Emission Bus Planning

What is a Zero Emission Bus?

Battery Electric Bus (BEB)

- Propulsion occurs from electricity directly stored in batte
- Fueling occurs by recharging batteries

Hydrogen-Electric Bus

- Propulsion occurs from hydrogen stored in fuel cells that is converted into electricity for propulsion
- Fueling occurs by refilling hydrogen.

Unknown & Future Technologies?

- TBD

Transitioning to ZEB is like flicking a switch…**right?**

Biggest headaches for your peers…

Infrastructure and On-Site Spatial Requirements

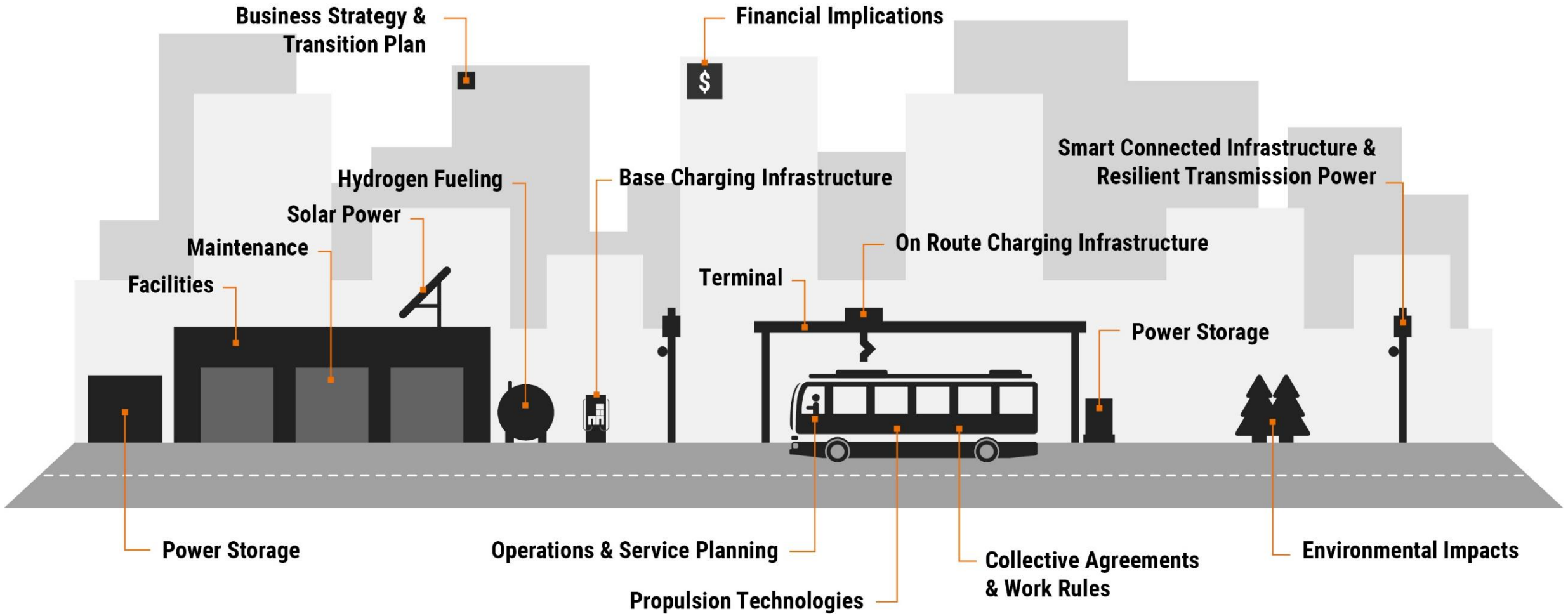
- Provide grid resiliency (minimum two transmission feeds to substation, 7 figures $)
- Getting on-street infrastructure set up to enable operations
- Finding available land for large substations
- Respecting land-use planning
- Retrofitting existing garages not programmed for ZEBs
- Lack of power supply driving up operational costs

But there are others as well…

Fleet

- Complement likely to increase with ZEBs
- Aligning specific route requirements with propulsion technology
- Larger spare ratio to account for garage charging
- Anticipating “cut-over” given preexisting asset management plans
- Managing road calls – what’s repairable? what’s not?
- Developing specs and managing warranty claims
- Extreme weather (hot/cold) performance

Want Success?
Align the pieces before you start!



Cost Planning

Service Planning and Operations

- New service plans
- On-street charging vs. base charging?
- Increased labor costs
- Operator training
- On time performance issues – more recovery time to keep schedule
- Work rules & collective bargaining agreements – can we align them with new operating needs?

Capital Improvements and Training

- Start-up investment costs
- Life cycle cost analysis
- Maintenance and Repair Requirements
- Life cycle, preventative maintenance and repair estimates
- Retraining maintenance and operations staff
- Retooling garages
- Maintain operations while under construction

Fiscal Realities & Funding Sources

- **Establish the financial model and business case**
  - Potentially increased operational costs
  - Full life cycle cost of each vehicle
  - Planning and Capital Improvement costs
  - Include training in the planning costs (ops and maint)

- **Evaluate potential funding sources**
  - Local government
  - Current or potential for carbon taxes?
  - Potential utility agreements
  - State government
  - Federal government

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Scope	Phyiscal plug-in charging		Overhead arch structure with pantograph		Underslab induction charging		Overhead canopy structure with pantograph	
	Planning Assumptions	Estimated Cost	Planning Assumptions	Estimated Cost	Planning Assumptions	Estimated Cost	Planning Assumptions	Estimated Cost
	150 kW plug in charging cabinets within islands every 2 tracks		150 kW charging cabinets connected to overhead pantograph charging units every 6 tracks		150 kW charging cabinets connected to underslab induction charging units every 6 tracks		150 kW charging cabinets connected to overhead pantograph charging units every 6 tracks	
Number of Buses							300	
150 kW Charging Cabinet							150	
Charging equipment costs installed [1, 5]	$7							$38,250,000
150 kW Charger cabinet/controller with J1772 plug								$21,750,000
150 kW equipment/routing costs	Unc							$300,000
Overhead arch structure								$0
Overhead steel structure canopy								$8,800,000
Added Electrical Costs / Year [4]								$0
PROTECTION BELT - 24" (TBD) Raised Curbs	$20/							$280,800
PROTECTION SUSPENDERS - Bollards ($9K, each)	4							$5,400,000
SUBTOTAL								$74,780,800
CONTINGENCY & ESCALATION								$18,695,200
Cost per bus parking space								**$311,587**
Comparison to Baseline Standard (at grade every 2 tracks)	84% fewer buses than the 300 bus goal	100%	Meets 100% of the 300 bus goal	108%	Meets 100% of the 300 bus goal	153%	Meets 100% of the 300 bus goal	122%

Currently, additional per bus planning costs = $255K to $390K for on site Depot Charging . . . .

BUT

Battery technology is constantly improving which should lower initial up-front capital costs as battery storage capabilities increase.

AND

Battery ownership discussion is happening, whereas vehicle manufactures actually own the batteries, and replace/repair as a condition of the fleet procurement contract.

Notes:

1) Per-bus costs are estimated from per-unit costs for charger base + associated dispenser type + 50% for contractor installation and markups.
2) 'Pantograph down' dispenser; charger base is same as plug-in; interface is per tentative standard of J3105.
3) Not Used
4) Inductive chargers have energy-transmission loss of about 10%.
5) Costs are for charger bases and dispensers. Upstream costs for switching, transformers, substation and other upstream electrical are not included but would be similar for each model.

Planning for Success

Power, Infrastructure & Ops 1

- Develop requirements for a pilot for initial implementation, matching propulsion type to appropriate route assignments
- Charging/Fueling: Identify infrastructure needs for charging system and facility space impacts; consider operational constraints
- Evaluate ZEB fleet power requirements versus current delivery capacity
- Manage charging opportunities through software and hardware utilization to minimize peak rates
- Identify additional sources of power to support ZEB fleet requirements (grid/solar/battery)
- Review options for onsite primary and back up generation and storage
- Commissioning and “cut-over” phasing
- Develop decommissioning plan for current infrastructure

Plan to Succeed – We're Making History!

"Design-out" failure from the start

- Lots of unknowns
- Peer lessons-learned inform our approach
- Plan now, plan for the unknown, plan for planning updates!
- Contingency budgeting

Develop Transition and Implementation Strategy

- Get it right by aligning the pieces
- Define what success looks like to you

Know the Risks

- But the biggest risk is doing nothing and being un-prepared!

Be Patient

- Technology is constantly changing

ZEB Infrastructure Site Planning

The current master plan allocates space for future ZEB infrastructure equipment.

- Power Feed from Martin Way
  - ✓ Off-site sub-station(s) required
  - ✓ All on-site equipment owned & maintained by I.T.
  - ✓ Most likely feed exist. Bus Storage with overhead charging, but could also feed underground
  - ✓ Maintains safe and efficient site operation and traffic flow
- Cost Impacts
  - ✓ Additional phases of construction
  - ✓ Will affect Bus Storage parking to construct
  - ✓ Will trigger south parcel storm water improvements (if not already constructed)
  - ✓ Potentially add an Energy Management Building on site

Questions & Comments