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Deputy Director of ORAT

OPERATIONS ROAD TO REVENUE SERVICE

Operations Department Work in Support of System Expansion

COP
Presentation

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02.
When Ops Work Starts

03.
Transit Expansion

04.
Operations Readiness and Transition (ORAT)

05.
Transition to Operations & Pre-Revenue Service

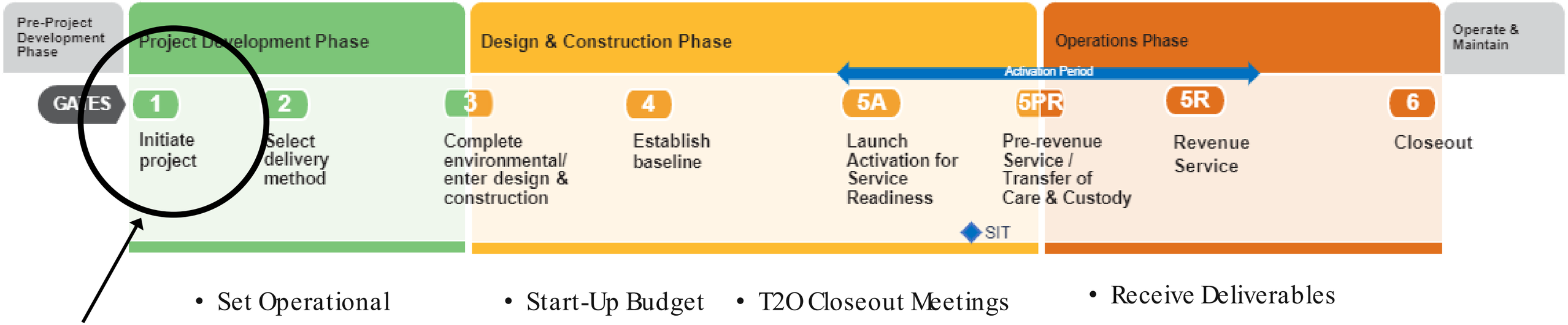
06.
Questions

Why Are We Here

What is Operations Role in System Expansion Projects?

We are here to talk about when the ST Operations Department gets involved in System Expansion Projects, our roles and responsibilities, how we ensure quality, safety and system performance are top of mind when it comes to bringing any new assets online into a Revenue Service environment.

When Operations is Engaged in System Expansion



- Set Operational Requirements
  - Develop Operational Readiness Framework
    - Testing and Commissioning Plan
      - Design Review
- Start-Up Budget Development
  - Staffing Plan
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    - T2O Plan Development
      - Agreements with Municipalities
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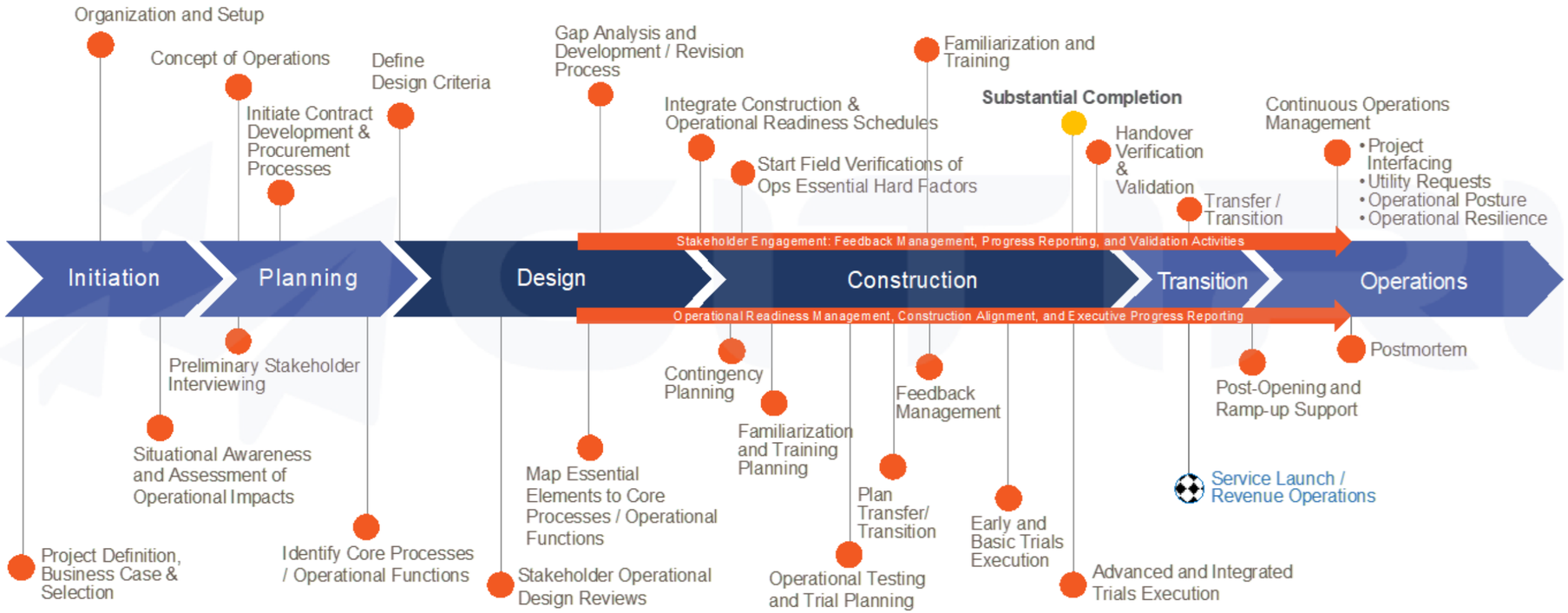
  - Conduct Integrated Operational Trials and Simulations
    - Lessons Learned

Ensuring Operational Readiness

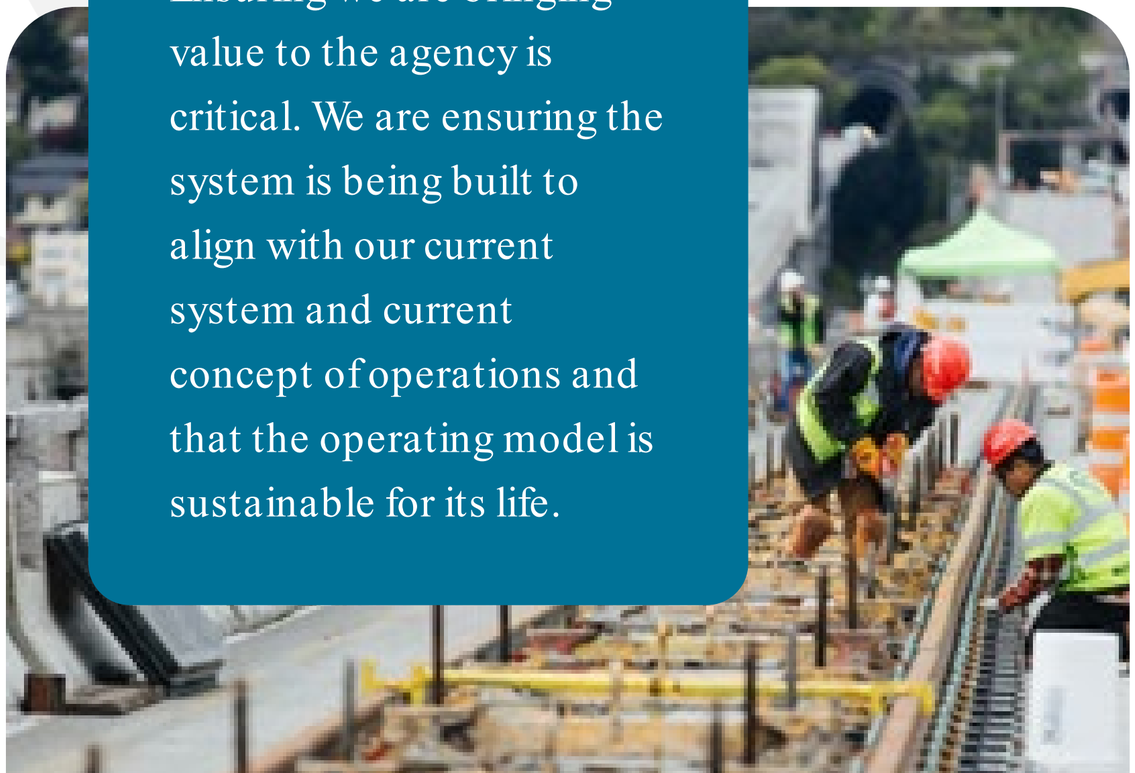
Mapping Operational Elements and Decisions Along Project Lifecycle



Key Teams in Operations Supporting System Expansion

Bringing Value

Ensuring we are bringing value to the agency is critical. We are ensuring the system is being built to align with our current system and current concept of operations and that the operating model is sustainable for its life.



Operations Transit Expansion Division

The Transit Expansion team within Operations manages the critical role of ensuring operational expertise is applied to capital expansion projects. This helps ensure expansion projects are designed and constructed to be maintainable, operable, and safe.

Operations Readiness and Transition (ORAT) Division

ORAT Team ensures that the project is delivering the assets and infrastructure as intended, with all deliverables, training, and documentation required to maintain Operational Readiness for the lifecycle of the assets.

About Transit Expansion

Lessons Learned for Early Ops Involvement

After the initial segment and following extensions, it was determined that the projects needed more focus on Operational requirements from project initiation to ensure that infrastructure and systems were being built with future operations in mind. The Transit Expansion team provides dedicated staff with operational expertise who are embedded within the projects through planning, design, construction and operations transition

Transit Expansion Team

Transit Expansion provides dedicated representatives from Operations that allows the rest of the department to focus on the primary task of operating a railroad. This team reviews the projects to ensure that final design and construction meet the intended purpose for sustainable operations for the next 100 year life of the assets.

About ORAT

Global Best Practice Adoption

Born out of global infrastructure projects in aerospace, healthcare, power, and transportation, Operations Readiness and Transition was developed as a series of processes where checks and balances are put in place to identify and mitigate risks in a project before operational impacts can occur. It's also a process for assessing lifecycle costs and, when brought on early in the program, can help avoid costly change orders both during construction and after operations commence.

ORAT Team and Process

An Experienced Team of operations, training and construction professionals that develops processes, tools, and resources to track key deliverables, documentation, training of staff and accept assets on behalf of Operations. The team also develops plans for Trials and Simulations to ensure that the project being delivered will be sustainable, reliable and meet the Operational Readiness goals of the Agency.

Operations Involvement in System Expansion

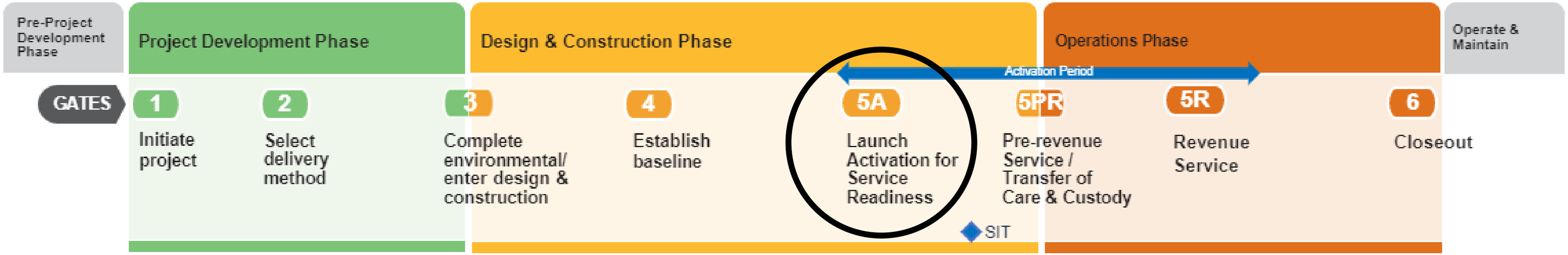
Operational Readiness

This is a measurement of how ready an organization is to bring an new project online into active service. By defining requirements for documentation, training and other key deliverables that will ensure sustainable operations over time

Key Statistics

- 8066 Project Submittals were reviewed by Operations Staff in 2022, including design submittals, product submittals, O&M Manuals, training plans, asset data &more.
- 142 Punchlist Walks and Activities involved Operations Staff in 2022.
- 92 Commissioning and System Integrated Tests were witnessed by Operations staff in 2022.
- 87 Trainings were coordinated and conducted for ST and KC Rail staff in 2020 &2021 in support of OMFE and NGLE including over 20k staff hours of work
- Operations Staff spent over 200k hours in support of System Expansion work in 2022., 1/3 of total staff time.
- It is estimated that over 55 thousand additional assets will be transitioned to operations by 2028, all of which must be validated and accepted by Operations staff

Operations Involvement in Activation Phase



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Activation Phase

Definition of Rail Activation

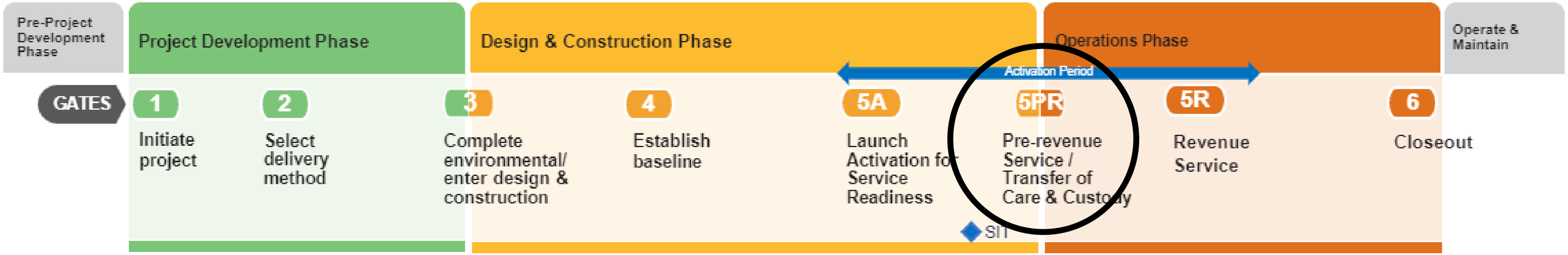
Process in which you take final construction work and initiate Integrated Testing, coordinate agency activities all in support of bringing a completed constructed piece of infrastructure into Revenue Service ensuring all safety oversight is conducted before introducing the public.

Rail Activation Committee & Subcommittees

Rail Activation Committee consists of project personnel and key agency personnel from all departments. Operations personnel from Transit Expansion and ORAT work to lead and support the following 8 Rail Activation Subcommittees:

- IT Readiness Subcommittee
- Transition to Operations Subcommittee
- Safety & Security Certification Review Subcommittee
- Bus Rail Integration Subcommittee
- Systems Integration and Testing Subcommittee
- Pre-Revenue Service and Start-up Subcommittee
- Passenger & Community Readiness Subcommittee
- Fire Life Safety Subcommittee

Work Culminating into Transition to Operations & Start of Pre-Revenue Service



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Transition to Operations

Key Elements

- ST Operations Takes Care Custody and Control of all new Assets
- Project Team no longer has control of the Right of Way
- Track Access is in affect for all new infrastructure
- Project Team acts in a support capacity to Operations

Transition to Operations (T2O)

MAINTENANCE BY OPERATIONS STAFF BEGINS

T2O Plan is followed transition new assets to operations department. ST finalizes maintenance plans for all new infrastructure.

PROJECT KEY ACTIVITIES ARE VERIFIED BY OPERATIONS

Contractor Provided Maintenance Training is Complete

Asset Data is Delivered Complete

Spare Parts and Warranties Delivered

SIT is Complete

Safety Certification Construction Conformance, Draft SSCVR Complete

Construction and Punch List work is complete

Project Document and Deliverables are transferred complete to Transition Library

City and Partner O&M and Use Agreements are complete

Transition to Operations Complete

OPERATIONS KEY ACTIVITIES ARE COMPLETED

Operations and Maintenance Staff is hired and onboarded

Asset Data is uploaded into EAMS and PM's are generated

Fare Collection Equipment is installed, commissioned and put into service

City and Partner O&M and Use Agreements are complete

SOP's and SMP's are updated to new extensions and facilities

Vendor Contracts are updated and budget is assigned

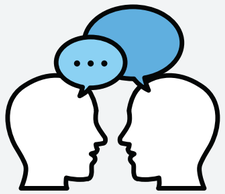
OTHER AGENCY KEY ACTIVITIES ARE VERIFIED

Tested and Commissioned system for 100% Functionality to conduct Emergency Services Familiarization.

Pre-Revenue Service Communication Plan developed for Pre-Revenue.

Risk initiates insurance for all new assets that are transitioned to operations.

IT Readiness is Complete
Infosec Audit Complete



Communications begins passenger communications plan for new opening

Fare Ambassadors are hired and onboarded

Internal Safety Audit is complete

Security Staff is hired and onboarded

Pre-Revenue Service

Schedule & Key Elements

- Operator Training and Certification
- Validation of the System Performance and Operation
- Simulated Service
- Trials and Simulations
- Passenger and Community Readiness for new service

Pre-Revenue Service

PRE-REVENUE SERVICE DEVELOPMENT

Developed Program and Plan to write a detailed Pre-Revenue Plan and Schedule.

PRE-REVENUE SCHEDULE

<table>
<tr><td>Transition to Operations</td><td colspan="3">Pre-Revenue Service (Anticipated 120 Days For 2 Line ELSL)</td><td rowspan="4">Revenue Service</td></tr>
<tr><td rowspan="3">Readiness Review #2 Occurs Prior to Start of Pre-Revenue Service and Ops Care and Custody</td><td>Rail Card Holder Training and Certification (Operator Training)</td><td colspan="2">Simulated Service</td></tr>
<tr><td rowspan="2"></td><td>Simulated Service - Validation Period</td><td>Final Simulated Service - Prep for Open</td></tr>
<tr><td></td><td>* Readines Review 3 (RSD Decision)</td></tr>
</table>

The validation period is post operator training and certification and prior to the final simulated service and PCR work that occurs in the final 30 days of simulated service. Readiness Review #3 would occur post validation period.

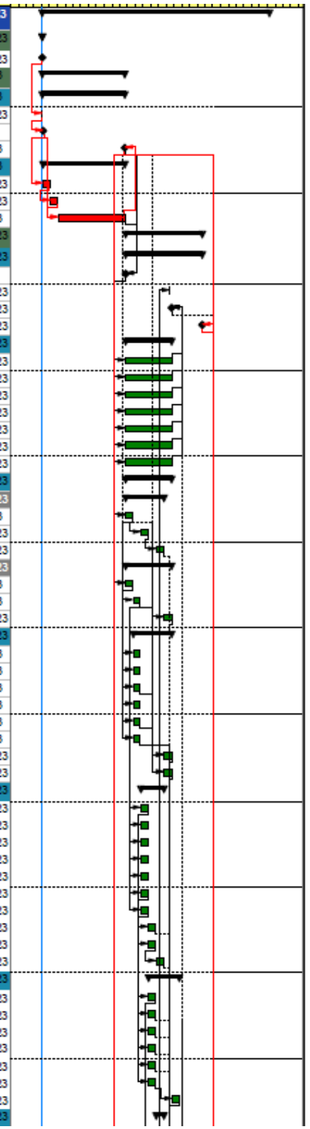
PRE-REVENUE ACTIVITIES

Simulated Service - Validation Period Activities - Schedule by Week

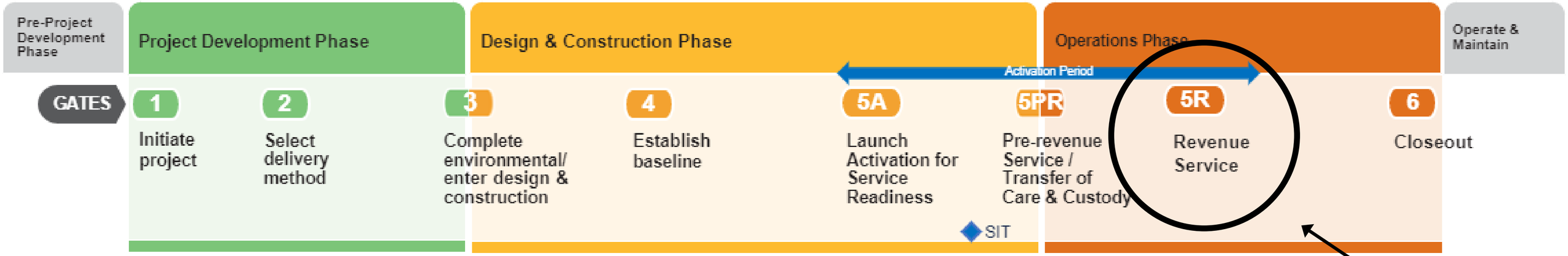
Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Blind Curves and reactions for the operators	X	X	X	X	X	X
Validate SOP 6.16 Track Workers in ROW	X	X	X	X	X	X
Operator shift change at 120th street station	X	X	X	X	X	X
S. Bellevue Turnback timing test	X	X	X	X	X	X
Simulate all maintenance functions in support of starter line operations	X	X	X	X	X	X
Crossings need to be validated, running headways.	X	X	X	X	X	X
Simulate failure mitigation / use of pockets and crossovers / single tracking	X	X	X	X	X	X
Gap train deployment	X			X		X
Simulate All Service Level Planned or Unplanned	X	X				X
Yard failure management scenario		X				
Escalator and Elevator Out Scenarios		X				
Understand Operations with Rail Service Workers at RTS		X				X
NE 120th, what kind of operations in that area		X				
Station announcements via PICS		X				X
GTFS Feed - Does it work as it supposed to		X				
Crossings need to be validated, running headways.			X			
Simulate activation of tunnel access door / Operations response to door opening			X			

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Simulate Fire in the Bellevue Tunnel, Launch EVS from LCC, have employees on train. 3 shifts. wo BFD			X			
Simulate passenger evacuation in tunnel and other high risk areas			X			
Bus Bridge Testing			X			
GTFS Feed - Does it work as it supposed to			X			X
PIMS Validation, VMS Messaging is it accurate?			X		X	X
Simulated loss of TPSS? Proof of redundant power and automatic transfer switches?				X		
Launch EVS Modes from the EVCP				X		
Simulate all maintenance functions in support of starter line operations				X		
Simulate signal priority for FD at grade station on Bellevue Way(?)				X		
Access Point for PSE, simulate access across the ROW				X		
Onboard Train Messaging				X		X
Testing of roll up gates, door locks, etc. via local and remote controls.					X	
Simulate Broken Down Train and Recovery					X	
ETEL's g Elevators to someone					X	X
Escalator and Elevator Out Scenarios					X	
Passenger Transfer					X	
Finalize SOP's and SMP updates						X

Pre-Revenue Service Template		205	01-May-23	21-Nov-23
System Integration Testing		0	01-May-23	01-May-23
PRV1600	System Integration Testing - Complete	0		01-May-23
Operator Familiarization		75	01-May-23	14-Jul-23
Operator Familiarization - Milestones		75	01-May-23	14-Jul-23
PRV1580	Rail Activation Readiness Review #2 - Pre-Revenue Service	1	01-May-23	01-May-23
PRV1540	Operator Familiarization - Start	0	02-May-23	
PRV1090	Operator Familiarization Complete	0		14-Jul-23
Operator Familiarization		74	02-May-23	14-Jul-23
PRV1560	Rail Supervisor and Trainer Training - Certification	7	02-May-23	08-May-23
PRV1570	Operator Training - Certification	7	09-May-23	15-May-23
PRV1040	Operator Familiarization - Based on number of Operators - 2 months	60	16-May-23	14-Jul-23
Simulated Service		70	15-Jul-23	22-Sep-23
Simulated Service - Milestones		70	15-Jul-23	22-Sep-23
PRV1530	Simulated Service Start	0	15-Jul-23	
PRV1590	Rail Activation Readiness Review #3 - Revenue Service	1	24-Aug-23	24-Aug-23
PRV1500	Simulated Service Complete	0		25-Aug-23
PRV1520	Revenue Service Notification Complete	0		22-Sep-23
Simulated Service - Every Week		42	15-Jul-23	25-Aug-23
PRV1000	Blind Curves and Reactions for the Operator Testing	42	15-Jul-23	25-Aug-23
PRV1010	Validate SOP 6.16 Track Workers in ROW	42	15-Jul-23	25-Aug-23
PRV1020	Operator Shift Change at XXX St. Station Testing	42	15-Jul-23	25-Aug-23
PRV1050	Turnback Timing Testing	42	15-Jul-23	25-Aug-23
PRV1060	Simulate All Maintenance Functions in support of operations	42	15-Jul-23	25-Aug-23
PRV1070	Validate Crossings running headways	42	15-Jul-23	25-Aug-23
PRV1080	Simulate Failure mitigation/use of pockets and crossovers/single tracking	42	15-Jul-23	25-Aug-23
Simulated Service - Week #1		42	15-Jul-23	25-Aug-23
Gap Train Deployment		35	15-Jul-23	18-Aug-23
PRV1100	Gap Train Deployment #1	7	15-Jul-23	21-Jul-23
PRV1110	Gap Train Deployment #2	7	29-Jul-23	04-Aug-23
PRV1120	Gap Train Deployment #3	7	12-Aug-23	18-Aug-23
Simulate Planned/UnPlanned		42	15-Jul-23	25-Aug-23
PRV1130	Simulate All Service Level Planned or Unplanned #1	7	15-Jul-23	21-Jul-23
PRV1140	Simulate All Service Level Planned or Unplanned #2	7	22-Jul-23	28-Jul-23
PRV1150	Simulate All Service Level Planned or Unplanned #3	7	19-Aug-23	25-Aug-23
Simulated Revenue Service - Validation Period - Week #2		35	22-Jul-23	25-Aug-23
PRV1160	Yard Failure Management Scenario	7	22-Jul-23	28-Jul-23
PRV1180	Escalator and Elevator Out Scenarios	7	22-Jul-23	28-Jul-23
PRV1190	Understand Operations with Rail Service Workers at #1	7	22-Jul-23	28-Jul-23
PRV1200	Sta?, verify operations in station areas? (NE 120th, what kind of operations in that area)	7	22-Jul-23	28-Jul-23
PRV1210	Station Announcement via PICS #1	7	22-Jul-23	28-Jul-23
PRV1220	Yard Failure Management Scenario	7	22-Jul-23	28-Jul-23
PRV1230	Understand Operations with Rail Service Workers at #2	7	19-Aug-23	25-Aug-23
PRV1240	Station Announcement via PICS #2	7	19-Aug-23	25-Aug-23
Final Simulated Service - Prep for Opening - Week #3		21	29-Jul-23	18-Aug-23
PRV1250	Validate Crossings Running Headways	7	29-Jul-23	04-Aug-23
PRV1260	Simulate Activation of Tunnel Access Door/Operations Response to Door Opening	7	29-Jul-23	04-Aug-23
PRV1270	Simulate Fire in the Bellevue Tunnel, Lauch EVS from LCC, have employees train 3 shifts w/o BFD	7	29-Jul-23	04-Aug-23
PRV1280	Simulate Passenger evacuation in tunnel and other high risk areas	7	29-Jul-23	04-Aug-23
PRV1290	Bus Bridge Testing	7	29-Jul-23	04-Aug-23
PRV1300	GTFS Feed - Does it work as it is supposed to #1	7	29-Jul-23	04-Aug-23
PRV1310	PIMS Validation - Is VMS messaging accurate #1	7	29-Jul-23	04-Aug-23
PRV1320	GTFS Feed - Does it work as it is supposed to #2	7	05-Aug-23	11-Aug-23
PRV1330	PIMS Validation - Is VMS messaging accurate #2	7	05-Aug-23	11-Aug-23
PRV1340	PIMS Validation - Is VMS messaging accurate #3	7	12-Aug-23	18-Aug-23
Final Simulated - Week #4		28	05-Aug-23	01-Sep-23
PRV1350	Simulate Loss of TPSS - Proof of Redundant power and automatic transfer switches	7	05-Aug-23	11-Aug-23
PRV1360	Launch EVS Modes from the EVCP	7	05-Aug-23	11-Aug-23
PRV1370	Simulate all maintenance functions in support of operations	7	05-Aug-23	11-Aug-23
PRV1380	Simulate signal priority for FD at grade station	7	05-Aug-23	11-Aug-23
PRV1390	Access point for PSE, simulate access across the ROW	7	05-Aug-23	11-Aug-23
PRV1400	Verify onboard train messaging #1	7	05-Aug-23	11-Aug-23
PRV1410	Verify onboard train messaging #2	7	26-Aug-23	01-Sep-23
Simulated Service - Week #5		7	12-Aug-23	18-Aug-23



Sustaining Operations after entering Revenue Service



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SOUNDTRANSIT

MONITOR SYSTEM PERFORMANCE

Are the facilities systems operating as designed and intended once the public is introduced? Vertical Transportation, Lighting etc.?

FACILITIES

How are IT systems and Infrastructure reacting to use? Is GTFS on-time? Is the network stable?

IT SYSTEMS

Is the system meeting the public expectations for Passenger Exeperience, Communications, and service performance.

PUBLIC FACING

Is the SCADA , BMS, Fire Alarm System, Fare Collection, CCTV, and all other related OT systems operating as intended? Are systems stable and sustainable for operations?

OT SYSTEMS

SYSTEMS BEING MONITORED

Critical Infrastructure Systems are important to monitor their performance and make immediate adjustments and repairs once you enter Revenue Service. Distraction of another Pre-Revenue Service Period will interfere with this critical time and will lower service quality for the foreseeable future.

33 OT SYSTEM

7 IT SYSTEMS

11 ADDITIONAL SYSTEMS

MONITOR PEOPLE PERFORMANCE

How are people reacting to the new extension? Are dwell times adequate to meet the schedule. Do adjustments need to be made to meet expectation?

PUBLIC

Track and monitor maintenance staff and vendor performance and reaction to events and situations in new extension territory.

MAINTENANCE

Is Security Staff deployed where they should be? Are post orders correct or do they need to be adjusted to new behavior of the public.

SECURITY

SUSTAIN RELIABLE SERVICE

Continuous Improvement

LESSONS LEARNED

Through Lessons Learned ensure that we are recording key wins and opportunities from project execution and system performance and apply those to new and upcoming projects.

THANK YOU

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