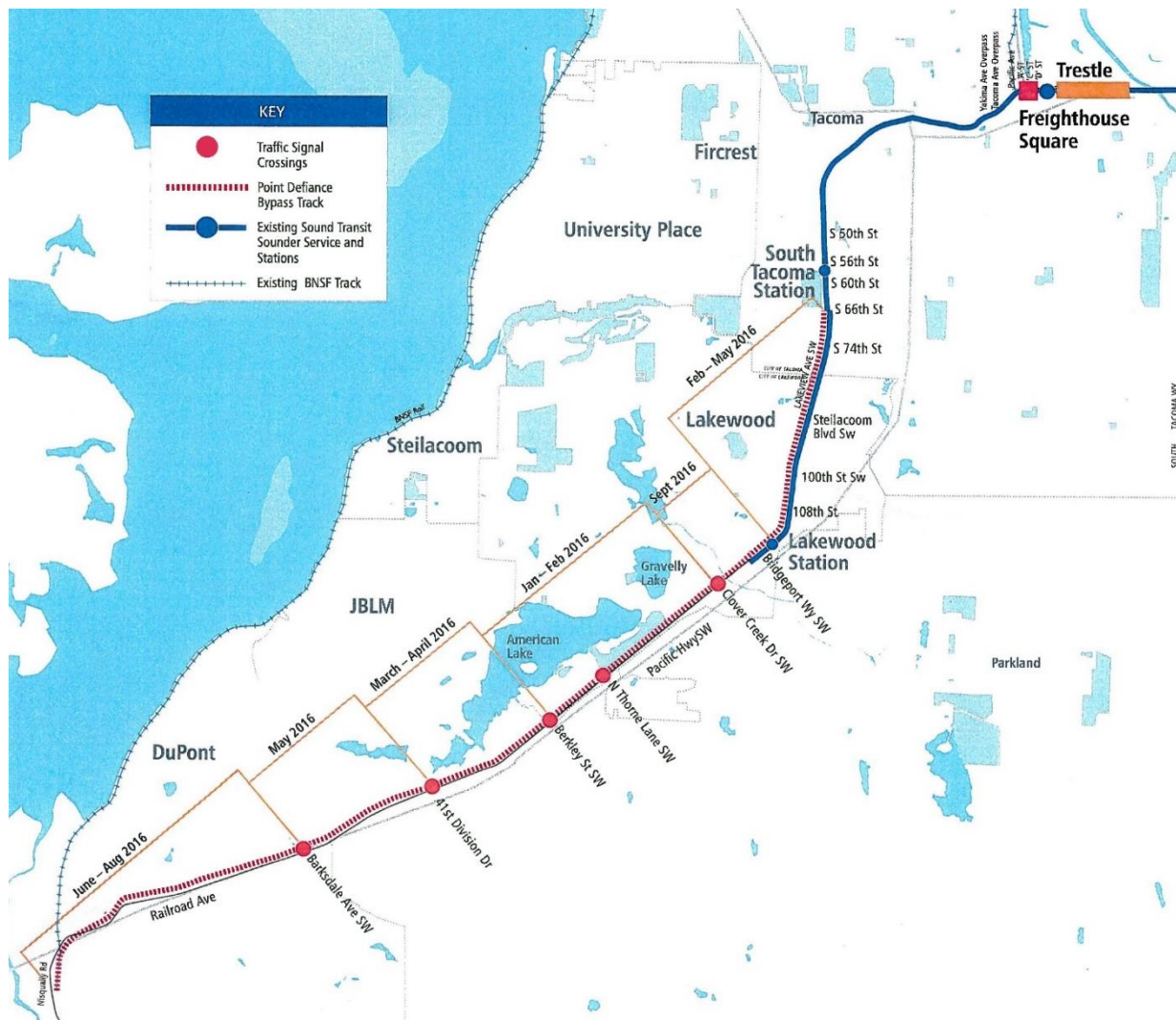


Safety Certification Verification Report (SSCVR) for Point Defiance Bypass Track & Signals Improvements Project



Prepared by

Mari Riley-Hite

Sound Transit System Safety & Assurance

October 27, 2017

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INTRODUCTION

The Sound Transit Safety and Quality Assurance (SQA) Division utilizes a comprehensive safety and security certification program to verify elements of a safe and secure transit system have been incorporated in the design and construction phases of a transit project. The Safety and Security Certification Verification Report (SSCVR) enclosed demonstrates that the Point Defiance Bypass Track & Signal Improvements Project between Lakewood and Nisqually is acceptable from a safety and security critical standpoint. All outstanding items from the safety certification program requirements have been identified, and mitigated to the lowest practical risk level.

BACKGROUND

The Sound Transit certification program covers numerous areas of the project such as design, construction, testing, Fire/Life Safety, emergency response training, and operational plan and procedures. This certification methodology is described in the Agency Safety and Security Management Plan (SSMP) and the Safety Certification Program Plan (SSCP). The Director of Safety and Quality Assurance oversees this program.

A Preliminary Hazard Analysis (PHA) workshop was conducted March 12, 2015 to produce the initial certifiable items list. The list was further developed by the Sound Transit System Safety and Security teams to mitigate the identified hazards down to the lowest practical risk level by applying mitigations and working with design teams to obtain the Safety and Security Requirements from Design Criteria, Building Codes, and industry standards.

Design Engineering Consultants provided support for verification of design conformance to the safety and security requirements during the design phase of the Project. Construction Contractors and Sound Transit Construction Management provided verification of construction conformance requirements during the construction phase. Sound Transit System Safety managed and verified the hazard resolutions of the safety certification process throughout the Project.

A. The following is a brief description of the verification activities:

- Preliminary Hazards Analysis (PHA)

The Design Consultants, ST SQA, ST Design Engineering & Construction Management (DECM), ST Operations, City of Tacoma, City of Lakewood, DuPont Fire, Amtrak, Tacoma Rail collaborated to develop the Preliminary Hazards Analysis (PHA) to identify hazards and rank hazards by their severity and probability of occurrence.

- Certifiable Items List (CIL)

The first step of safety certification is to identify the individual items that are critical to the Safety and Security of Sound Transit customers, employees, emergency responders, or general public. These are referred to as "Certifiable Items". A log of major certifiable elements and their sub-elements is referred to as the Certifiable Items List (CIL). The Point Defiance Bypass CIL consists of the following Elements: Stations, Guideway, Signaling, Communications, Traffic Control, Fire/Life Safety, Safety & Security Plans, Procedures & Training.

- Verification Matrix (VM)

From the CIL, a Verification Matrix (VM) was prepared by Sound Transit System Safety and Assurance. The VM lists all hazards identified on the for each certifiable item, and tracks sequential verification of hazards' mitigation of Safety and Security requirements to an acceptable risk level through Design, Construction, Testing and Operations via the Safety & Security Information Management System (SSIMS) database.

- Design

The Design Team provided documentation for the design conformance verification for each identified certifiable item and backup documentation to support certification in the Safety & Security Information Management System (SSIMS) database. The Design Engineering Consultants provided a signed Letter of Compliance confirming that the safety related provisions of the Sound Transit Design Criteria and applicable jurisdictional and industry codes and standards are incorporated into the contract documents. The Letter of Compliance is included in this report.

- Construction

The Construction Contractors provided to the Construction Management team; documentation for the construction conformance verification for each identified certifiable item and backup documentation to support certification in the Safety & Security Information Management System (SSIMS) database. Construction Contractors provided a signed Letter of Compliance confirming that the safety related provisions of the Contract Specifications were built and/or installed according to the Contract Specifications. The Letter of Compliance is included in this report.

The Construction Contractors prepared and submitted contract specific test plans and procedures for contractually required tests. The Construction Manager provided approval of Construction Testing & Commissioning Levels 1 – 2 Test Plans and test results documentation for the conformance verification for each identified certifiable item. Certification verification is maintained in the Safety & Security Information Management System (SSIMS) database.

- Integration Testing & Commissioning Levels 3 -4

Integration testing and Commissioning was witnessed by the Designers and SQA to verify that the interfaces of different contractual equipment are fully functional. The Systems Designer and Construction Contractor prepared the Integration Test Program Plan and a report for each test including the pass/fail criteria. The list of integration tests was identified in the Test Program Plan. A Certificate of Completion was issued for the Integration Test Plan & Procedures, and the Integration Test Reports at the conclusion of the tests. The certificate was signed by the Project Director, Deputy Director of Systems Engineering & Integration and the Director of SQA. The Certificate of Test Integration Completion is included in this report.

- Fire / Life Safety

Fire / Life Safety requirements were addressed by the representatives from municipal Fire, Police and Building Departments, SQA and representatives from the various Sound Transit and consultant design groups via discussions in Project meetings, and issues are tracked on action item logs.

Emergency Response Exercises are developed and coordinated by the ST Emergency Management group. All emergency response exercises are witnessed by SQA to verify that the operators and emergency responders are adequately prepared to handle transit emergencies.



- **Safety/Security Plans, Procedures and Training**

Safety plans help to enforce a pro-active safety philosophy implemented during the design, construction and continued into operations phases of the system. The plans set forth the requirements to identify, evaluate, and minimize or eliminate safety risks in early stages of the project, address the implementation of the established safety criteria and recognize, evaluate, and control hazardous activities or conditions during operations. The Safety Plans applicable for the Point Defiance Bypass Track & Signals Improvements Project include; ST Agency Safety/Security Management Plan (SSMP), ST Agency Safety/Security Certification Plan (SSCP), Sounder Commuter Rail System Safety Program Plan (SSPP).

Sounder Commuter Rail has established Standard Operating Procedures (SOPs), Standard Maintenance Procedures (SMPs), Rulebook. Any Operating Procedures (SOPs) and/or Standard Maintenance Procedures (SMPs) developed for Point Defiance Bypass Project are according to recognized industry and agency safety standards. Operational, Station and Customer Signage was developed in compliance with the Sound Transit Signage Design Manual. ST Operations personnel provided backup documentation of safety/security requirements conformance for each identified certifiable item to support certification in the Safety & Security Information Management System (SSIMS) database.

System Readiness Training is overseen by ST Sounder Operations to address the inherent hazards of ST operations. Training requirements for ST operators and maintenance crew consists of training courses prepared by equipment manufacturers for the operation and maintenance of their equipment, as well as training requirements that are identified in the Contract documents. ST Operations personnel provided backup documentation of safety/security requirements conformance for each identified certifiable item to support certification in the Safety & Security Information Management System (SSIMS) database.

- **Certificates of Conformance**

When the design conformance and construction conformance documentation was verified, the Safety Plans and Procedures had been vetted and approved, and listed training sessions had been satisfactorily conducted, an Element Certificate of Conformance is signed by The Project Director, Commuter Rail Operations Manager, Director of Public Safety and Director of SQA. Those Certificates of Conformance are included in this report.

Conformance Certificates are an end result of thorough examination and verification by Sound Transit SQA, Design Engineering, Construction Management, Security and Operations Staff. Certificates are not issued until full verification of the item being certified for safety critical requirements is completed, or exceptions to completed work are listed on the certificates including any necessary work arounds. Supporting documentation for the certificates is filed with all other essential Safety Certification documentation in Safety & Security Information Management System (SSIMS) database, maintained by SQA System Safety & Assurance Division.

MEMO



November 13, 2017

TO: Peter Rogoff, Chief Executive Officer
Mike Harbour, Deputy Chief Executive Officer

FROM: [REDACTED] Salah Al-Tamimi, Chief Safety Officer

SUBJECT: Sounder Commuter Rail – Sounder Point Defiance Bypass Safety Certification

Based upon review and examination of available documents from Civil/Facilities, Systems, Construction Management, Operations, and Safety, the Sounder Point Defiance Bypass Project is considered safe and secure for transition to operational use and service.

Sound Transit Safety & Quality Assurance and Security have reviewed, checked and verified all safety and security related systems and infrastructure have been constructed and commissioned in accordance with project design requirements, operational procedures, and agency standards. The Sounder Point Defiance Bypass Project has been verified for safe and secure operations and train service activities.

The project team has verified with documented compliance to the Sound Transit Agency Safety Certification Program Plan (SCPP) and the Sounder System Safety Program Plan (SSPP). This verification has been compiled into the attached, project-specific Safety & Security Certification Verification Report (SSCVR). This report includes the paper and electronic record of our chain-of-custody documentation establishing the project has been designed and constructed to applicable codes and standards, and construction specification and operational requirements have been verified. The project has completed a safety-readiness review for transition to operations.

It is my recommendation that the Sounder Point Defiance Bypass Project be considered safety and security certified. Concurrence by Operations, Security and Construction Management is demonstrated by the included letters from Sound Transit Commuter Rail Operations Manager, Director of Public Safety, and Project Director, Point Defiance Bypass Track & Signal Improvements Project.

cc: Bonnie Todd, Executive Director, Operations
Ahmad Fazel, Executive Director, Design, Engineering, Construction Management
Michael Perry, Deputy Executive Director, Transportation & Maintenance
Joe Gildner, Deputy Executive Director, Business & Construction Services
Mark Johnson, Project Director, Sounder
Robert Taaffe, Senior Construction & System Safety Manager

SOUND TRANSIT SOUNDER COMMUTER RAIL



AGENCY SAFETY AND SECURITY CERTIFICATION FOR PROJECT: POINT DEFIANCE BYPASS TRACK & SIGNAL IMPROVEMENTS

Project System Readiness Certificate

Completion of this Certificate exhibits concurrence that, for the Point Defiance Bypass Track & Signal Improvements Project; 1. a complete safety and security verification report has been prepared with resolutions for all identified exceptions noted, 2. the system functionality has been satisfactorily demonstrated during a pre-revenue service operation, and 3. the system is sufficiently complete, safe and ready for use in revenue operations.

Recommendation to proceed with revenue service for Point Defiance Bypass Track & Signal Improvements Project; rail infrastructure improvements to portions of the Sound Transit owned Lakewood Corridor in Pierce County with the goal of improving Washington's Amtrak Cascades service between Portland, Oregon and Vancouver, B.C.

Exceptions and Workarounds are noted on each specific Element Certificate. The exceptions and workarounds listed will be tracked to completion and verified for certification.

The undersigned acknowledge and concur with this recommendation to proceed with revenue service.

Mark Johnson
Project Director, Point Defiance Bypass
Sound Transit

10/24/2017

Date

Ken Cummins
Director of Public Safety
Sound Transit

25 OCT 2017

Date

Bonnie Todd
Executive Director of Operations
Sound Transit

10-25-17

Date

Ahmad Fazel
Executive Director of DECM
Sound Transit

10/30/17

Date

Salah Al-Tamimi
Chief Safety Officer
Sound Transit

10/31/17

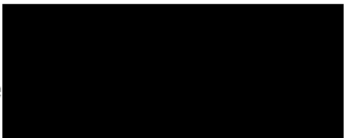
Date

MEMO



October 17, 2017

TO: Salah Al-Tamimi, Chief Safety Officer

FROM: Robert Taaffe, Senior Construction and System Safety Manager 

SUBJECT: Sounder Commuter Rail – Sounder Point Defiance Bypass Safety Certification

Based upon review and examination of available documents from Civil/Facilities, Systems, Construction Management, Operations, and Safety, the Sounder Point Defiance Bypass Project is considered safe and secure for transition to operational use and service.

Sound Transit Safety & Quality Assurance and Security have reviewed, checked and verified all safety and security related systems and infrastructure have been constructed and commissioned in accordance with project design requirements, operational procedures, and agency standards. The Sounder Point Defiance Bypass Project has been verified for safe and secure operations and train service activities.

The project team has verified with documented compliance to the Sound Transit Agency Safety Certification Program Plan (SCPP) and the Sounder System Safety Program Plan (SSPP). This verification has been compiled into the attached, project-specific Safety & Security Certification Verification Report (SSCVR). This report includes the paper and electronic record of our chain-of-custody documentation establishing the project has been designed and constructed to applicable codes and standards, and construction specification and operational requirements have been verified. The project has completed a safety-readiness review for transition to operations.

It is my recommendation, with concurrence by Operations and the Construction Manager that the Sounder Point Defiance Bypass Project be considered safety and security certified.

cc: Mari Riley-Hite, System Assurance Specialist
Bien Mai, Interim Safety Assurance Supervisor
Dale Lewis, Operational Senior Safety Manager

MEMO



September 21, 2017

TO: Salah Al-Tamimi, Safety & Quality Assurance Director

FROM: Mark Johnson, Project Director, Point Defiance Bypass Track & Signal Improvements Project

SUBJECT: Sounder Commuter Rail - Point Defiance Bypass Track & Signal Improvements Safety Certification

This letter documents that all the requirements of the Safety Certification Program Plan (SSCP) have been met, and confirms the safety and security-readiness of the Point Defiance Bypass Track & Signals Project. Safety & Security Certificates have been signed with any exceptions noted on each Certificate.


Based upon the recommendation of the Point Defiance Bypass Track & Signal Improvements Project Manager, I am confident that the Point Defiance Bypass is safe to open for revenue service.

Cc: Peter Rogoff, Chief Executive Officer
Mike Harbour, Deputy Chief Executive Officer
Bonnie Todd, Operations Executive Director

December 4, 2017

TO: Bonnie Todd, Executive Director of Operations

COPY: Michael Perry, Deputy Executive Director of Transportation and Maintenance
Salah Al-Tamimi, Chief Safety Officer
Robert Taaffe, Senior Construction Safety Manager

FROM: Martin Young, Commuter Rail Operations Manager 

SUBJECT: Point Defiance Bypass Safety Certification

The Sounder Operation Division has coordinated closely with DECM Department and the SQA Division for the Safety Certification of the Point Defiance Bypass Track and Signal Improvement Project.

The Point Defiance Bypass project is ready for passenger service as verified by the completed readiness certification dated October 25, 2017.

Please call with any questions.

MEMO



September 5, 2017

TO: Salah Al-Tamimi, Safety & Quality Assurance Director
FROM: Kenneth Cummins, Director of Public Safety [REDACTED]
SUBJECT: Sounder Commuter Rail – Point Defiance Bypass Track & Signals Project
Safety Certification

Sound Transit Security has reviewed and verified security-related documentation from Civil/Facilities, System, Construction Management, Operations, and Safety. We have found this documentation to be consistent with transit industry practice to address security-related codes and specifications. Based on verification of contract requirements and operational documents, the Sounder Commuter Rail Point Defiance Bypass Track & Signals Project is considered security-ready for revenue operations subject to the exceptions and work-arounds identified.

Sound Transit Security recommends that the Point Defiance Bypass Project be opened to the public for revenue service.

Cc: Peter Rogoff, Chief Executive Officer
Mike Harbour, Deputy Chief Executive Officer
Bonnie Todd, Operations Executive Director



SAFETY & QUALITY ASSURANCE

**SOUNDER POINT DEFIANCE BYPASS
TRACK & SIGNAL IMPROVEMENTS
SAFETY & SECURITY CERTIFICATION VERIFICATION REPORT**

PHA, TVA, CIL SUMMARY

The Design Consultants, ST SQA, ST Design Engineering & Construction Management (DECM), ST Operations, City of Tacoma, City of Lakewood, DuPont Fire, Amtrak, Tacoma Rail collaborated to develop the Preliminary Hazards Analysis (PHA) including Threat and Vulnerabilities Assessment (TVA) items, and the Certifiable Items List (CIL). These documents identify hazards and vulnerabilities, rank hazards and vulnerabilities by their severity and probability of occurrence, and to propose mitigations that reduce the safety and security risks to the lowest practical level.

As a result of Presidential Directives, additional focus has been directed at, not only assessing the potential for harm resulting from intentional acts or circumstances such as crime, but from terrorist activity as well. Mentioned within the assessments are mitigations that reduce the security risk, therefore much of the data developed from these assessments is considered Security Sensitive Information (SSI) and is available only upon request from the Sound Transit Security Division.

The documents herein exhibit that safety and security requirements have been identified and addressed as recorded in the enclosed PHA, TVA and CIL.

**Point Defiance Bypass
Preliminary Hazard Analysis**

Revision 2
4/21/2015

PHA FOR POINT DEFIANCE EXTENSION OF SOUNDER-AMTRAK											
HAZARD RISK INDEX											
						IA, IB, IC, IIA, IIB, IIIA	UNACCEPTABLE				
						ID, IIC, IID, IIIB, IIIC	UNDESIRABLE				
						IE, IIE, IIB, IIE, IVA, IVB	ACCEPTABLE W/ REVIEW				
						IVC, IVD, IVE	ACCEPTABLE				
Hazard No.	Sub-system	Location/ Scenario	Hazard Description	Potential Cause	Effect/ Consequence	Initial Risk	Existing Mitigation Measures	Recommended Mitigation Measures	Suggested Resolution (Safety Verification)	Residual Risk	Remarks/Comments
SCR-PDB-002	Guideway	66th to Bridgeport / Derailment of Train	Access/egress by emergency forces hazardous, difficult, and/or slow.	Train derailment blocks access to 66th	Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	ID	1. Emergency access via maintainers service road. 2. Current Sounder Alignment jurisdictions have been trained and are familiar with the system.	1. Identify all Fire/Life Safety jurisdictions along Entire Alignment 2. Tabletop drills and exercises for all agencies involved 3. Predetermine default emergency staging areas along alignment 4. Develop procedures to ensure that emergency access is unobstructed, adequately lighted 5. Add maintenance service roads where possible 6. Identify and practice emergency access routes.	1. Training on train sets for all Fire and Police Dept. 2. Plan & practice emergency response routes 3. Tabletop Exercises 4. Emergency Drills 5. Emergency Responder's Manual 6. Emergency Response Plan 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	IE	To be updated via Operations Meeting
SCR-PDB-004	Guideway	41st Division to Barksdale	Access/egress by emergency forces hazardous, difficult, and/or slow.	First responder prioritization	Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	ID	1. Current Sounder Alignment jurisdictions have been trained and are familiar with the system.	1. Identify all Fire/Life Safety jurisdictions along Entire Alignment 2. Tabletop drills and exercises for all agencies involved 3. Predetermine default emergency staging areas along alignment 4. Develop procedures to ensure that emergency access is unobstructed, adequately lighted 5. Add maintenance service roads where possible 6. Identify and practice emergency access routes.	1. Training on train sets for all Fire and Police Dept. 2. Plan & practice emergency response routes 3. Tabletop Exercises 4. Emergency Drills 5. Emergency Responder's Manual 6. Emergency Response Plan 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	IE	To be updated via Operations Meeting
SCR-PDB-006	Guideway	Thorne Lane to Berkeley 41st Division to Barksdale Berkeley to 41st Division Barksdale to Nisqually	Access/egress by emergency forces hazardous, difficult, and/or slow.	Limited Emergency Access Points	Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	ID	1. Current Sounder Alignment jurisdictions have been trained and are familiar with the system.	1. Identify all Fire/Life Safety jurisdictions along Entire Alignment 2. Tabletop drills and exercises for all agencies involved 3. Predetermine default emergency staging areas along alignment 4. Develop procedures to ensure that emergency access is unobstructed, adequately lighted 5. Add maintenance service roads where possible 6. Identify and practice emergency access routes.	1. Training on train sets for all Fire and Police Dept. 2. Plan & practice emergency response routes 3. Tabletop Exercises 4. Emergency Drills 5. Emergency Responder's Manual 6. Emergency Response Plan 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	IE	To be updated via Operations Meeting
SCR-PDB-009	Guideway	Thorne Lane to Berkeley Bridgeport to Gravelly Lake Berkeley to 41st Division	Access/egress by emergency forces hazardous, difficult, and/or slow.	Property Encroachments ROW width varies; limits access Corridor fence less than 15 ft. from tracks at Camp Murray	Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	ID	1. Current Sounder Alignment jurisdictions have been trained and are familiar with the system.	1. Identify all Fire/Life Safety jurisdictions along Entire Alignment 2. Tabletop drills and exercises for all agencies involved 3. Predetermine default emergency staging areas along alignment 4. Develop procedures to ensure that emergency access is unobstructed, adequately lighted 5. Add maintenance service roads where possible 6. Identify and practice emergency access routes.	1. Training on train sets for all Fire and Police Dept. 2. Plan & practice emergency response routes 3. Tabletop Exercises 4. Emergency Drills 5. Emergency Responder's Manual 6. Emergency Response Plan 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	IE	To be updated via Operations Meeting

**Point Defiance Bypass
Preliminary Hazard Analysis**

Revision 2
4/21/2015

PHA FOR POINT DEFIANCE EXTENSION OF SOUNDER-AMTRAK						IA, IB, IC, IIA, IIB, IIIA	UNACCEPTABLE				
						ID, IIC, IID, IIIB, IIIC	UNDESIRABLE				
						IE, IIE, IID, IIIE, IVA, IIVB	ACCEPTABLE W/ REVIEW				
						IVC, IVD, IVE	ACCEPTABLE				
Hazard No.	Sub-system	Location/ Scenario	Hazard Description	Potential Cause	Effect/ Consequence	Initial Risk	Existing Mitigation Measures	Recommended Mitigation Measures	Suggested Resolution (Safety Verification)	Residual Risk	Remarks/Comments
SCR-PDB-011	Guideway	Barksdale to Nisqually / Accident or Incident Location	Access/egress by employees or emergency forces hazardous, difficult and slow due to problems in access routes	Access routes hazardous in themselves (e.g. rough, dark, steep, slippery).	Hazards relating to path itself could produce falls and minor injuries. Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	ID	1. Current Sounder Alignment jurisdictions have been trained and are familiar with the system.	1. Identify all Fire/Life Safety jurisdictions along Entire Alignment 2. Tabletop drills and exercises for all agencies involved 3. Predetermine default emergency staging areas along alignment 4. Develop procedures to ensure that emergency access is unobstructed, adequately lighted 5. Add maintenance service roads where possible 6. Identify and practice emergency access routes.	1. Training on train sets for all Fire and Police Dept. 2. Plan & practice emergency response routes 3. Tabletop Exercises 4. Emergency Drills 5. Emergency Responder's Manual 6. Emergency Response Plan 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	IE	To be updated via Operations Meeting
SCR-PDB-013	Guideway	Bridgeport to Gravelly Lake	Collision between train and pedestrian(s)	Elementary school near Bridgeport Way grade crossing	Potential fatality, major/minor Injury, service disruption.	IC	1. Existing elementary school fence, Owned and maintained by the school	1. Adjacent Residence / Business Public Education for Rail Safety 2. School Crossing Guards 3. Install adequate fencing near crossings and areas where intrusion or trespass may be frequent or most likely 4. Install adequate safety warning devices at crossings 5. Install adequate signage near legal crossings and along track way.	1. Adjacent Residence / Business Public Education for Rail Safety 2. Fence maintenance agreement / permanent replacement of Elementary School Fence. 3. Install adequate fencing as indicated on plans. 4. Install adequate safety warning devices at crossings according to plans 5. Install adequate signage near legal crossings as indicated on plans	ID	
SCR-PDB-016	Guideway	All Grade Crossings	Collision between train and pedestrian(s)	Pedestrians unaware of double track or increase in frequency and speed of trains	Potential fatality, major/minor Injury, service disruption.	IC	1. Grade crossings exist but are rarely used. 2. Slow train speeds (10mph) if used	1. "LOOK" or "High Speed Trains Travel in Both Directions" signage 2. Other signage according to MUTCD standards 3. Emergency Notification System (ENS) signs posted conspicuously 4. Adjacent Residence / Business Public Education for Rail Safety 5. Install adequate fencing near crossings and areas where intrusion or trespass may be frequent or most likely 6. Install adequate safety warning devices at crossings 7. Install adequate signage near legal crossings and along track way.	1. Public Outreach and Education 2. Signage according to MUTCD standards as indicated in plans 3. Emergency Notification System (ENS) signs posted conspicuously 4. Adjacent Residence / Business Education for Rail Safety 5. Install adequate fencing as indicated on plans. (Coordination of fencing between ST and WSDOT). 6. Install adequate safety warning devices at crossings 7. Install adequate signage near legal crossings and along track way.	ID	
SCR-PDB-018	Guideway	Areas where illegal trespassing is likely Pedestrian access on Clover Creek bridge	Collision between train and pedestrian(s)	Trespassing	Potential fatality, major/minor Injury, service disruption.	IC	1. Skywalk bridge to neighborhood north of Lakewood Station. 2. Intermittent Fencing	1. Adjacent Residence / Business Public Education for Rail Safety 2. Install adequate fencing near crossings and areas where intrusion or trespass may be frequent or most likely 3. Install adequate safety warning devices at crossings 4. Install adequate signage near legal crossings and along track way.	1. Adjacent Residence / Business Public Education for Rail Safety 2. Fence maintenance agreement / permanent replacement of Elementary School Fence. 3. Install adequate fencing as indicated on plans. 4. Install adequate safety warning devices at crossings 5. Install adequate signage near legal crossings	ID	

**Point Defiance Bypass
Preliminary Hazard Analysis**

Revision 2
4/21/2015

PHA FOR POINT DEFIANCE EXTENSION OF SOUNDER-AMTRAK						IA, IB, IC, IIA, IIB, IIIA	UNACCEPTABLE				
						ID, IIC, IID, IIIB, IIIC	UNDESIRABLE				
						IE, IIE, IID, IIIE, IVB, IVD	ACCEPTABLE W/ REVIEW				
						IVC, IVD, IVE	ACCEPTABLE				
Hazard No.	Sub-system	Location/ Scenario	Hazard Description	Potential Cause	Effect/ Consequence	Initial Risk	Existing Mitigation Measures	Recommended Mitigation Measures	Suggested Resolution (Safety Verification)	Residual Risk	Remarks/Comments
SCR-PDB-025	Guideway	66th to Bridgeport	Collision between train and fixed structure	Business property encroachments	Potential fatality, derailment, major/minor Injury, property damage, service disruption.	IC	1. Right of Entry requirements.	1. Develop procedures to ensure adequate clearance of tracks from existing and future fixed structures adjacent to tracks. 2. Procedures for periodic inspection and maintenance to ensure no obstructions are in ROW.	1. Adequate ROW track clearance 2. ROW inspection procedures 3. Actively inspecting for business property encroachments 4. Post orders for security and property staff 5. Land use approval requirements	IID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases
SCR-PDB-026	Guideway	Barksdale to Nisqually	Collision between train and fixed structure	Interchange Bridge Columns within ROW	Potential fatality, derailment, major/minor Injury, property damage, service disruption.	ID	1. Existing columns are built extra heavy (similar to crash walls)	1. Enforce timetable speed restrictions along alignment (PTC) 2. Develop inspection and maintenance procedures to assure frequent debris clearance from all tracks 3. Develop inspection and maintenance procedures to assure the structural integrity of the tracks 4. Verify train speed vs. sight distances 5. Verify ROW inspection procedures	1. Enforce timetable speed restrictions along alignment (PTC) 2. Inspection and maintenance procedures to assure frequent debris clearance from all tracks 3. Inspection and maintenance procedures to assure the structural integrity of the tracks 4. All existing columns are built extra heavy (similar to crash walls)	IE	Requires Safety Certification verification during integrated testing, commissioning, and operational phases
SCR-PDB-028	Guideway	Overpasses	Collision between train and foreign object	Debris thrown from Overpass	Potential fatality, derailment, major/minor Injury, property damage, service disruption.	IIC	1. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations	1. Enforce speed restrictions along alignment. 2. Develop inspection and maintenance procedures to assure frequent debris clearance from all tracks 3. Provide overpass fencing on Gravelly Lake Dr. SW and Mounts Rd. SW	VERIFY: 1. Train speed vs. sight distances 2. ROW inspection procedures	IID	Add to Monitor List
SCR-PDB-029	Guideway	Berkeley to 41st Division Gravelly Lake to Thorne Lane Barksdale to Nisqually	Collision between train and foreign object	Falling Trees Trees adjacent to tracks (Heavily wooded both sides)	Potential fatality, derailment, major/minor Injury, property damage, service disruption.	IC	1. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations	1. Enforce speed restrictions along alignment. 2. Develop inspection and maintenance procedures for underbrush/debris clearance on alignment according to 49 CFR 213.37 - Vegetation	1. Clearing and trimming/pruning Trees within the ROW. 2. Tree stumps left for Soil stabilization 3. Tree survey	ID	
SCR-PDB-032	Guideway	Barksdale to Nisqually	Collision between train and grade crossing user(s)	Complex intersection geometry resulting in motorists and pedestrian judgment errors	Potential fatality, major/minor Injury, property damage, service disruption.	IC	1. Grade Crossing System Incorporated with "Fail-Safe" Design 2. Pavement Markings 3. Cross buck Signs 4. Mounted Flashing Light Signals 5. Automatic Gates for Roadway 6. Stop Lines (Roadway) 7. Audible Warning Devices – Warning Bells 8. Wayside Horns 9. Constant warning devices for train detection.	1. Ensure safe right-of-way design, appropriate signage, encroachment detection/warning devices, and public education 2. Arrange diagnostic team to review proposed grade crossing design 3. Continued review of pedestrian/motorists intersection design through final site inspection and test. 4. Pedestrian gates	1. Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection 10. Public Outreach and Education 11. Signal Pre-emption Coordination 12. New traffic signals according to plans	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases

**Point Defiance Bypass
Preliminary Hazard Analysis**

PHA FOR POINT DEFIANCE EXTENSION OF SOUNDER-AMTRAK						IA, IB, IC, IIA, IIB, IIIA	UNACCEPTABLE				
						ID, IIC, IID, IIIB, IIIC	UNDESIRABLE				
						IE, IIE, IID, IIIE, IVB,	ACCEPTABLE W/ REVIEW				
						IVC, IVD, IVE	ACCEPTABLE				
Hazard No.	Sub-system	Location/ Scenario	Hazard Description	Potential Cause	Effect/ Consequence	Initial Risk	Existing Mitigation Measures	Recommended Mitigation Measures	Suggested Resolution (Safety Verification)	Residual Risk	Remarks/Comments
SCR-PDB-033	Grade Crossing	Grade Crossings located at: <i>Clover Creek, N. Thom Ln., Berkeley, 41st Division, & Barksdale</i>	Collision between train and grade crossing user(s)	Crossing intersections improperly engineered (inadequate warning devices, incorrect timing, inadequate stopping distance, inadequate traffic control, etc.)	Potential fatality, major/minor Injury, property damage, service disruption.	IC	1. Grade Crossing System Incorporated with "Fail-Safe" Design 2. Pavement Markings 3. Cross buck Signs 4. Mounted Flashing Light Signals 5. Automatic Gates for Roadway 6. Stop Lines (Roadway) 7. Audible Warning Devices – Warning Bells 8. Wayside Horns 9. Constant warning devices for train detection.	1. Ensure safe right-of-way design, appropriate signage and public education 2. Arrange diagnostic team to review proposed grade crossing design 3. Emergency Notification System (ENS) signs posted conspicuously 4. Traffic Signal Pre-emption.	1. Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection 10. Public Outreach and Education 11. Signal Pre-emption Coordination 12. New traffic signals according to plans	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases
SCR-PDB-034	Grade Crossing	Grade Crossings located at: <i>Clover Creek, N. Thom Ln., Berkeley, 41st Division, & Barksdale</i>	Collision between train and grade crossing user(s)	Driving or walking around gates	Potential fatality, major/minor Injury, property damage, service disruption.	IC	1. Grade Crossing System Incorporated with "Fail-Safe" Design 2. Pavement Markings 3. Cross buck Signs 4. Mounted Flashing Light Signals 5. Automatic Gates for Roadway 6. Stop Lines (Roadway) 7. Audible Warning Devices – Warning Bells 8. Wayside Horns 9. Constant warning devices for train detection.	1. Fencing along both sides of tracks around grade crossings (to enforce channelization) 2. Channelization 3. No trespassing signage 4. Public Education for Rail Safety 5. Physical barriers to prevent vehicles from going around gates.	1. Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection 10. Public Outreach and Education 11. Signal Pre-emption Coordination 12. Enforcement (Police/Security) 13. Channelization according to Plans	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases
SCR-PDB-039	Grade Crossing	Grade Crossings located at: <i>Clover Creek, N. Thom Ln., Berkeley, 41st Division, & Barksdale</i>	Collision between train and grade crossing user(s)	Lack of advance warning signs	Potential fatality, major/minor Injury, property damage, service disruption.	IC	1. Grade Crossing System Incorporated with "Fail-Safe" Design 2. Pavement Markings 3. Cross buck Signs 4. Mounted Flashing Light Signals 5. Automatic Gates for Roadway 6. Stop Lines (Roadway) 7. Audible Warning Devices – Warning Bells 8. Wayside Horns 9. Constant warning devices for train detection.	1. Design grade crossing according to MUTCD guidelines 2. Channelization 3. Clear sight distances of track from roadway 4. Emergency Notification System (ENS) signs posted conspicuously 5. Pedestrian gates for high volume pedestrian traffic. 6. Ensure safe right-of-way design, appropriate signage and public education. 7. Arrange diagnostic team to review proposed grade crossing design.	1. "Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection 10. Signage according to plans 11. Channelization 12. Clear sight distances of track from roadway 13. Emergency Notification System (ENS) signs posted	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases

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PHA FOR POINT DEFIANCE EXTENSION OF SOUNDER-AMTRAK						IA, IB, IC, IIA, IIB, IIIA	UNACCEPTABLE				
						ID, IIC, IID, IIIB, IIIC	UNDESIRABLE				
						IE, IIE, IID, IIIE, IVA, IVE	ACCEPTABLE W/ REVIEW				
						IVC, IVD, IVE	ACCEPTABLE				
Hazard No.	Sub-system	Location/ Scenario	Hazard Description	Potential Cause	Effect/ Consequence	Initial Risk	Existing Mitigation Measures	Recommended Mitigation Measures	Suggested Resolution (Safety Verification)	Residual Risk	Remarks/Comments
SCR-PDB-040	Guideway	Grade Crossings located at: <i>Clover Creek, N. Thom Ln., Berkeley, 41st Division, & Barksdale</i>	Collision between train and grade crossing user(s)	Obstructed sight distances	Potential fatality, major/minor Injury, property damage, service disruption.	IC	1. Grade Crossing System Incorporated with "Fail-Safe" Design 2. Pavement Markings 3. Cross buck Signs 4. Mounted Flashing Light Signals 5. Automatic Gates for Roadway 6. Stop Lines (Roadway) 7. Audible Warning Devices – Warning Bells 8. Wayside Horns 9. Constant warning devices for train detection.	1. Clearing of vegetation to allow adequate sight distance 2. Removal/relocation of objects obstructing sight distance 3. Design roadways with clear lines of sight 4. Emergency Notification System (ENS) signs posted conspicuously 5. Pedestrian gates for high volume pedestrian traffic. 6. Arrange diagnostic team to review proposed grade crossing design.	1. "Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection. 10. Clearing of vegetation to allow adequate sight distance 11. Trespass fence height 42" for 250ft from the grade crossing. 12. Emergency Notification System (ENS) signs posted	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases
SCR-PDB-042	Guideway	66th to Bridgeport	Collision between train and Lakewood Station patrons	Amtrak train passes by station without stopping	Potential fatality, major/minor Injury, service disruption.	IC	1. Tactile warning tiles at edge of platform 2. Stand Behind Yellow Line (pavement paint)	1. "LOOK" or "High Speed Trains Travel in Both Directions" signage 2. Other signage according to MUTCD standards 3. Adjacent Residence / Business Public Education for Rail Safety 4. Operating rules and procedures for use of horn and train speed.	1. "High speed train" signage at stations 2. Operating procedures and speed for passing a passenger station 3. Warning procedures for train when passing a passenger station 4. Public Outreach & Education	ID	
SCR-PDB-046	Guideway	Barksdale to Nisqually	Collision between train and pedestrian(s)	Golf course unfenced	Potential fatality, major/minor Injury, service disruption.	IC	1. Existing fencing on Fort Lewis golf course.	1. Design fencing and warning signs in alignment areas where intrusion is likely 2. Public Education for Rail Safety.	1. Rail safety education & outreach 2. Adequate fencing as indicated in plans. 3. Golf Course Outreach / Education	ID	
SCR-PDB-059	Grade Crossing	Grade Crossings located at: <i>Clover Creek, N. Thom Ln., Berkeley, 41st Division, & Barksdale</i>	Collision between train and roadway vehicle at grade crossing or in the alignment	Highway vehicle fails to stop at stop bar and front end fouls tracks	Potential fatalities, major/minor Injuries, property damage, service disruption.	IC	1. Grade Crossing System Incorporated with "Fail-Safe" Design 2. Pavement Markings 3. Cross buck Signs 4. Mounted Flashing Light Signals 5. Automatic Gates for Roadway 6. Stop Lines (Roadway) 7. Audible Warning Devices – Warning Bells 8. Wayside Horns 9. Constant warning devices for train detection.	1. Design grade crossing according to MUTCD guidelines 2. Locate crossing gate sufficiently back to account for vehicles failing to stop at stop bar 3. Organize diagnostic team to review grade crossing design 4. Illuminate crossing 5. Improve vehicle sight distance of crossing approach 6. Coordinate traffic control device upgrades and design intersection interface with adjacent intersection traffic signals (Traffic Pre-emption) 8. Emergency Notification System (ENS) signs posted conspicuously 9. Arrange diagnostic team to review proposed grade crossing design.	1. "Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection. 10. Signal Pre-emption 11. Enforcement (Police/Security) 12. Crossing Illumination 13. Channelization 14. Public outreach and Education	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases

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						ID, IIC, IID, IIIB, IIIC	UNDESIRABLE				
						IE, IIE, IID, IIIE, IVA, IVD	ACCEPTABLE W/ REVIEW				
						IVC, IVD, IVE	ACCEPTABLE				
Hazard No.	Sub-system	Location/ Scenario	Hazard Description	Potential Cause	Effect/ Consequence	Initial Risk	Existing Mitigation Measures	Recommended Mitigation Measures	Suggested Resolution (Safety Verification)	Residual Risk	Remarks/Comments
SCR-PDB-060	Guideway	All Grade Crossings	Collision between train and roadway vehicle at grade crossing or in the alignment	Insufficient train approach warning time related to train speed	Potential fatality, major/minor Injury, property damage, service disruption.	IC	<ol style="list-style-type: none"> Grade Crossing System Incorporated with "Fail-Safe" Design Pavement Markings Cross buck Signs Mounted Flashing Light Signals Automatic Gates for Roadway Stop Lines (Roadway) Audible Warning Devices – Warning Bells Wayside Horns Constant warning devices for train detection. 	<ol style="list-style-type: none"> Design to ensure grade crossing warning time is correlated with train speed System integration testing for grade crossings to ensure sufficient warning time. Design train detection circuits on fail-safe principle per MUTCD standard. Provide appropriate signage according to MUTCD standards (speed limits), and safety warning devices (Cross buck, track signs, etc.) Provide appropriate lane barriers and active/passive warning devices. Channelization Ensure proper sight lines Train operators to follow FRA regulations for grade crossings Emergency Notification System (ENS) signs posted conspicuously Future PTC 	<ol style="list-style-type: none"> "Fail-Safe Crossing Pavement Markings Cross buck Signs Red Flashing Signals Automatic Gates Stop Lines(painted) Audible Warning Bells Wayside Horns Constant warning train detection. Signal Pre-emption PTC regulated train speed Commissioning & testing during System Integration 	IE	Requires Safety Certification verification during integrated testing, commissioning, and operational phases
SCR-PDB-061	Grade Crossing	Grade Crossings located at: <i>Clover Creek, N. Thom Ln., Berkeley, 41st Division, & Barksdale</i>	Collision between train and roadway vehicle at grade crossing or in the alignment	<p>Motorist misjudges turn and enters ROW</p> <p>Roadway vehicle: driver fails to or is unable to stop within safe braking distances</p> <p>Roadway vehicle operator for any reason enters crossing when warning is activated</p>	Potential fatality, major/minor Injury, property damage, service disruption.	ID	<ol style="list-style-type: none"> Grade Crossing System Incorporated with "Fail-Safe" Design Pavement Markings Cross buck Signs Mounted Flashing Light Signals Automatic Gates for Roadway Stop Lines (Roadway) Audible Warning Devices – Warning Bells Wayside Horns Constant warning devices for train detection. 	<ol style="list-style-type: none"> Design train detection circuits on fail-safe principle per MUTCD standard Provide appropriate signage according to MUTCD Standards (speed limits), and safety warning devices (Cross buck, track signs, etc.) Provide appropriate lane barriers and active/passive warning devices Channelization Ensure proper sight lines Train operators to follow FRA regulations for grade crossings Emergency Notification System (ENS) signs posted conspicuously Arrange diagnostic team to review proposed grade crossing design. 	<ol style="list-style-type: none"> "Fail-Safe Crossing Pavement Markings Cross buck Signs Red Flashing Signals Automatic Gates Stop Lines(painted) Audible Warning Bells Wayside Horns Constant warning train detection. Signal Pre-emption Enforcement (Police/Security) Crossing Illumination Channelization Bollards used for wider ROW at grade crossings Public Outreach and Education 	IE	Requires Safety Certification verification during integrated testing, commissioning, and operational phases

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IA, IB, IC, IIA, IIB, IIIA	UNACCEPTABLE
ID, IIC, IID, IIIB, IIIC	UNDESIRABLE
IE, IIE, IID, IIIE, IVA, IVE	ACCEPTABLE W/ REVIEW
IVC, IVD, IVE	ACCEPTABLE

Hazard No.	Sub-system	Location/ Scenario	Hazard Description	Potential Cause	Effect/ Consequence	Initial Risk	Existing Mitigation Measures	Recommended Mitigation Measures	Suggested Resolution (Safety Verification)	Residual Risk	Remarks/Comments
SCR-PDB-064	Grade Crossing	Grade Crossings located at: <i>Clover Creek, N. Thorn Ln., Berkeley, 41st Division, & Barksdale</i>	Collision between train and roadway vehicle at grade crossing or in the alignment	Stopping on Tracks	Potential fatality, major/minor Injury, property damage, service disruption.	IB	<ol style="list-style-type: none"> Grade Crossing System Incorporated with "Fail-Safe" Design Pavement Markings Cross buck Signs Mounted Flashing Light Signals Automatic Gates for Roadway Stop Lines (Roadway) Audible Warning Devices – Warning Bells Wayside Horns Constant warning devices for train detection. 	<ol style="list-style-type: none"> Coordinate traffic control device upgrades and design intersection interface with adjacent intersection traffic signals (Traffic Pre-emption) Provide sufficient queuing for traffic between grade crossing and adjacent intersection Install DO NOT STOP ON TRACKS signage Pavement markings clearly indicating fouling area Public education on Rail Safety Evaluate crossing for potential sight obstructions. Emergency Notification System (ENS) signs posted conspicuously in compliance with CFR Part 49. . 	<ol style="list-style-type: none"> "Fail-Safe Crossing Pavement Markings Cross buck Signs Red Flashing Signals Automatic Gates Stop Lines(painted) Audible Warning Bells Wayside Horns Constant warning train detection. Signal Pre-emption Enforcement (Police/Security) Crossing Illumination Channelization Public Outreach and Education Queue cutter according to plans Additional signals according to plans 	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases
SCR-PDB-065	Guideway	41st Division to Barksdale	Collision between train and roadway vehicle at grade crossing or in the alignment	Traffic queues backup and stop on tracks due to High Security Level Inspection or Emergency Shutdown at Military Bases	Potential fatality, major/minor Injury, property damage, service disruption.	IB	<ol style="list-style-type: none"> Grade Crossing System Incorporated with "Fail-Safe" Design Pavement Markings Cross buck Signs Mounted Flashing Light Signals Automatic Gates for Roadway Stop Lines (Roadway) Audible Warning Devices – Warning Bells Wayside Horns Constant warning devices for train detection. 	<ol style="list-style-type: none"> Provide traffic signal system with pre-emption. Design train detection circuits on fail-safe principle per MUTCD standard. Provide appropriate signage (speed limits), and safety warning devices (Cross buck, track signs, etc.) Provide appropriate lane barriers and active/passive warning devices. Channelization and un-mountable curbs Ensure proper sight lines Pavement marking clearly indicating fouling area. Install DO NOT STOP ON TRACKS signage Emergency Notification System (ENS) signs posted conspicuously Public education on Rail Safety 	<ol style="list-style-type: none"> "Fail-Safe Crossing Pavement Markings Cross buck Signs Red Flashing Signals Automatic Gates Stop Lines(painted) Audible Warning Bells Wayside Horns Constant warning train detection. Signal Pre-emption and coordination with adjacent traffic signals (Commissioning and testing during System Integration) Enforcement (Police/Security) Crossing Illumination Channelization Public Outreach and Education Queue cutter according to plans Additional signals according to plans 	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases

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PHA FOR POINT DEFIANCE EXTENSION OF SOUNDER-AMTRAK						IA, IB, IC, IIA, IIB, IIIA	UNACCEPTABLE				
						ID, IIC, IID, IIIB, IIIC	UNDESIRABLE				
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						IVC, IVD, IVE	ACCEPTABLE				
Hazard No.	Sub-system	Location/ Scenario	Hazard Description	Potential Cause	Effect/ Consequence	Initial Risk	Existing Mitigation Measures	Recommended Mitigation Measures	Suggested Resolution (Safety Verification)	Residual Risk	Remarks/Comments
SCR-PDB-069	Grade Crossing	All Grade Crossings Barksdale Short Storage	Collision between train and roadway vehicle at grade crossing or in the alignment	Truck or other long vehicle stops on tracks due to traffic backup from adjacent intersection controlled by traffic signals	Potential major/minor injury, potential fatality, derailment, equipment damage, service disruption.	IB	1. Grade Crossing System Incorporated with "Fail-Safe" Design 2. Pavement Markings 3. Cross buck Signs 4. Mounted Flashing Light Signals 5. Automatic Gates for Roadway 6. Stop Lines (Roadway) 7. Audible Warning Devices – Warning Bells 8. Wayside Horns 9. Constant warning devices for train detection.	1. Design grade crossing according to MUTCD guidelines 2. Locate crossing gate sufficiently back to account for vehicles failing to stop at stop bar 3. Organize diagnostic team to review grade crossing design 5. Illuminate crossing 6. Improve vehicle sight distance of crossing approach 7. Coordinate traffic control device upgrades and design intersection interface with adjacent intersection traffic signals (Traffic Pre-emption) 8. Emergency Notification System (ENS) signs posted conspicuously.	1. "Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection. 10. Signal Pre-emption and coordination with adjacent traffic signals (Commissioning and testing during System Integration) 11. Enforcement (Police/Security) 12. Crossing Illumination 13. Channelization 14. Public Outreach and Education 15. Queue cutter according to plans 16. Additional signals according to plans	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases
SCR-PDB-070	Guideway	Barksdale to Nisqually Gravelly Lake to Thome Lane Thome Lane to Berkeley	Collision between train and vehicle on track	I-5 Vehicle loses control and drives onto track	Potential fatality, derailment, major/minor Injury, property damage, service disruption.	IC	1. Intermittent highway barriers.	1. Barriers alongside all roadways or highways where elevation exceeds track grade	1. Barriers to be provided in identified areas of concern.	ID	To be updated after barrier locations are decided.
SCR-PDB-073	Guideway	66th to Bridgeport	Collision between train and vehicle on track	Vehicle enters ROW from Bridgeport Way	Potential fatality, derailment, major/minor Injury, property damage, service disruption.	ID	1. Grade Crossing System Incorporated with "Fail-Safe" Design 2. Pavement Markings 3. Cross buck Signs 4. Mounted Flashing Light Signals 5. Automatic Gates for Roadway 6. Stop Lines (Roadway) 7. Audible Warning Devices – Warning Bells 8. Wayside Horns 9. Constant warning devices for train detection.	1. Provide roadway illumination at the crossing to better illuminate the railroad environment. 2. Design grade crossing according to MUTCD guidelines 3. Coordinate roadway signage with local jurisdiction traffic department 4. Bollards for wider ROW areas	1. "Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection. 10. Provide roadway illumination at the crossing to better illuminate the railroad environment. 11. Pre-emption signal & activation 12. Public Outreach and Education	IE	Requires Safety Certification verification during integrated testing, commissioning, and operational phases
SCR-PDB-076	Guideway	Entire Alignment	Collision between train and wayside object	Vehicles parked at business or residence adjacent to the ROW	Major/minor Injury, property damage, service disruption.	IIC		1. Design fencing and warning signs along alignment areas where intrusion is likely 2. Implement public rail safety education programs 3. Define property lines 4. Enforcement of parking regulations.	1. Adequate ROW track clearance 2. ROW inspection procedures through security, maintenance and property patrols 3. Fencing according to plans	IID	

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Hazard No.	Sub-system	Location/ Scenario	Hazard Description	Potential Cause	Effect/ Consequence	Initial Risk	Existing Mitigation Measures	Recommended Mitigation Measures	Suggested Resolution (Safety Verification)	Residual Risk	Remarks/Comments
SCR-PDB-082	Guideway	Entire Alignment	Derailment	Business / Industry / Yard Train Turnout Failures	Potential fatality, major/minor Injury, property damage, service disruption.	ID	1. Develop procedures for maintenance and proper operation of switches. 2. SOP's for operations and communication with control. 3. Signal system detects train cars on tracks 4. Signal system detects position of switches	1. Ensure monthly inspections according to 49 CFR 213.235 - Inspection of switches, track crossings, and lift rail assemblies or other transition devices on moveable bridges 2. Future PTC project.	1. PTC point located at all switches and monitored. 2. All switches are maintained by MOW 3. ST Security, MOW, and Property Patrol and Inspections 3. Switch heaters provided at power switches	IE	Requires Safety Certification verification during integrated testing, commissioning, and operational phases
SCR-PDB-089	Guideway	Gravelly Lake to Thorne Lane	Explosion	Derailment of train hits propane tank storage facility (Ferrellgas) Accidental/ Intentional Discharge	Potential fatality, major/minor Injury, property damage, service disruption.	ID		1. Identify facilities, pipelines, truck routes near station whose operation involve toxic/flammable gases 2. Relocate pipeline/facility as necessary.	1. Alignment meets design criteria 2. ROW clearances from structures 3. Track inspection 4. Ferrellgas site to build blast wall or to move facility.	IE	
SCR-PDB-091	Bridges	Entire Alignment	Fire/smoke under bridge structure	Adjacent fire/smoke spreads; ignition of flammable materials Vehicle accident under bridge structure	Potential loss of load bearing capacity, potential major/minor injury, potential fatality, derailment, equipment and property damage, service disruption.	ID	1. SOP 2. ST Security/MOW/Property Patrols and inspections on current Sounder track	1. Design structures with non-combustible materials 2. Design equipment and systems to eliminate flammable materials 3. Develop inspection and maintenance procedures for underbrush/debris clearance from underpasses according to 49 CFR 213.37 - Vegetation 4. Develop procedures for fire incidents 5. Inspection and maintenance procedures according to 49 CFR 237 Bridge Safety Standards.	1. Alignment meets design criteria 2. ROW clearances from structures 3. Track inspection 4. Vegetation clearing 5. MOW, Property and Security patrols	IE	
SCR-PDB-094	Guideway	Entire Alignment	Flood on alignment	Heavy Rain / Water main break	Potential track damage, derailment, potential major/minor injury, potential fatality, equipment damage, service disruption.	IC		1. Design for adequate drainage, water diversion, or raised track in flood prone alignment areas 2. Inspection and maintenance procedures to assure all drainage water diversion systems are operational according to 49 CFR 213.33 Drainage 3. Standard operating procedures and Rulebook to require reduced speed during heavy rain with reduced visibility.	1. Alignment meets design criteria 2. ROW clearances from structures 3. Track inspection 4. Subgrade and ballast compaction, slopes, grade, & drainage 5. Drainage basins located on both sides of track 6. Water mains upgraded and reinforced.	ID	
SCR-PDB-100	Guideway	Entire Alignment	Foreign object(s) on alignment	Rock/mudslide	Potential track damage, potential derailment, potential major/minor injury, potential fatality, equipment damage, service disruption.	IC	1. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations.	1. Design to provide clearance from trees and rockslide areas and fencing where appropriate 2. Provide disaster warning system (wayside mudslide/rockslide warning system) 3. 49 CFR 213.233 - Track inspections	1. Adequate ROW track clearance 2. ROW inspection procedures 3. Fencing placed according to plans 4. Geotechnical surveys for rock/mudslide areas. Tree stumps left for soil stabilization	ID	
SCR-PDB-101	Guideway	Entire Alignment	Foreign object(s) on alignment	Structural failure of bridge	Potential track damage, potential derailment, potential major/minor injury, potential fatality, equipment damage, service disruption.	IC	1. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations.	1. Inspection and maintenance procedures to verify structural integrity of structures above and adjacent to alignment according to 49 CFR 213.233 - Track inspections 2. Inspection and maintenance procedures according to 49 CFR 237 Bridge Safety Standards.	1. Adequate ROW track clearance 2. ROW inspection procedures 3. Fencing and signage according to plans 4. Structural upgrades to bridges and replacement of one bridge.	ID	

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						IVC, IVD, IVE	ACCEPTABLE				
Hazard No.	Sub-system	Location/ Scenario	Hazard Description	Potential Cause	Effect/ Consequence	Initial Risk	Existing Mitigation Measures	Recommended Mitigation Measures	Suggested Resolution (Safety Verification)	Residual Risk	Remarks/Comments
SCR-PDB-102	Guideway	Entire Alignment	Foreign object(s) on alignment	Vandalism / Criminal activity	Potential track damage, potential derailment, potential major/minor injury, potential fatality, equipment damage, service disruption.	IC	1. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations	1. Inspection and maintenance procedures to verify structural integrity of structures above and adjacent to alignment 2. Design fencing and warning signs where intrusion is likely.	1. Adequate ROW track clearance 2. ROW inspection procedures 3. Fencing according to plans 4. Security patrols 5. Signage placed according to plans 6. MOW and Property Management inspections and procedures	ID	
SCR-PDB-108	Guideway	Entire Alignment	Poor visibility on restricted alignment	Plant growth blocks view of signal or crossing.	Potential collision, injury, equipment damage, service disruption.	IIC	1. Standard operating procedures and Rulebook to require train operation at reduced speed when weather affects visibility and train braking performance or alignment configuration reduces forward sight distance.	1. Design to provide removal of trees, shrubs, and brush from signal and grade crossing sight lines; integration testing to verify adequate sight lines according to 49 CFR 213.37 - Vegetation 2. Inspection and maintenance procedures to require vegetation control.	1. Track inspection procedures 2. Track speed is appropriate for Superelevation 3. Trees directly on the grade crossing or ROW are cleared. 4. All vegetation within 250 ft. of the grade crossing is cleared 5. Fencing is shortened to 42" within 250ft of the crossing.	IID	
SCR-PDB-113	Guideway	41st Division to Barksdale	Train overpass structure failure due to impact	Over height truckload/ military vehicle strikes overpass structure	Potential loss of load bearing capacity, potential major/minor injury, potential fatality, derailment, equipment and property damage, service disruption.	IC	1. Maximum height signage	1. Design structure in accordance with state vertical and horizontal clearance requirements 2. Height clearance check bars on Northern side of Pendleton Ave 3. Provide highly visible "Maximum Height" signage on Northern side of Pendleton Ave. 4. Remove any line of sight obstructions for height clearance signage 5. Develop inspection and maintenance procedures to assure frequent inspection of bridges 6. Coordinate with JBLM for education for Rail Safety 7. Inspection and maintenance procedures according to 49 CFR 237 Bridge Safety Standards.	1. Alignment meets design criteria 2. ROW clearances from structures 3. Track inspection 4. Pendleton Ave Bridge to be raised 9" 5. Height check predictor to be placed on roadway	ID	
SCR-PDB-122	Guideway	Entire Alignment	Excessive track wear	Stopping train on curve with increased Superelevation	Potential derailment, equipment damage, major/minor injuries	IC		1. Engineering, Operation Rules 2. Identify stopping locations for trains 3. Ensure curves; elevation and speed limitations are designed according to 49 CFR 213.57 4. Develop inspection and maintenance procedures according to 49 CFR 213.233 Track Inspection 5. Future PTC.	1. Restrictions on mainlines for stoppage or slow speeds of heavy freight on certain mainlines in specific areas. 2. Track inspection through MOW 3. Tonnage per year on tracks is light and not excessive.	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases

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Hazard No.	Sub-system	Location/ Scenario	Hazard Description	Potential Cause	Effect/ Consequence	Initial Risk	Existing Mitigation Measures	Recommended Mitigation Measures	Suggested Resolution (Safety Verification)	Residual Risk	Remarks/Comments
SCR-PDB-123	Guideway	Track Curves	Derailment	Train speed not within specified limits at track curves	Potential derailment, equipment damage, major/minor injuries	IC	1. Timetable	1. Ensure curves; elevation and speed limitations are designed according to 49 CFR 213.57 2. Develop inspection and maintenance procedures according to 49 CFR 213.233 Track Inspection 3. Future PTC.	1. PTC regulated speeds according to timetables. 2. SOP	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases
SCR-PDB-124	Guideway	Track Curves	Derailment	Track Superelevation not within designed limits at track curves	Potential derailment, equipment damage, major/minor injuries	IC	1. Timetable	1. Ensure curves; elevation and speed limitations are designed according to 49 CFR 213.57 2. Develop inspection and maintenance procedures according to 49 CFR 213.233 Track Inspection.	1. Restrictions on mainlines for stoppage or slow speeds of heavy freight on certain mainlines in specific areas. 2. Quality Control through Construction 3. Track inspection through MOW 4. Track maintained through MOW	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases
SCR-PDB-130	Grade Crossing	41st Division Crossing	Collision between train and roadway vehicle at grade crossing or in the alignment	Traffic queues backup at rush hour and exceed ramp storage length due to accident or heavy traffic on Interstate Highway 1-5 and result in vehicles stopping on tracks	Potential fatality, major/minor Injury, property damage, service disruption.	IB	1. Grade Crossing System Incorporated with "Fail-Safe" Design 2. Pavement Markings 3. Cross buck Signs 4. Mounted Flashing Light Signals 5. Automatic Gates for Roadway 6. Stop Lines (Roadway) 7. Audible Warning Devices – Warning Bells 8. Wayside Horns 9. Constant warning devices for train detection. 10. Traffic control police at crossing	1. Provide traffic signal system with pre-emption. 2. Design train detection circuits on fail-safe principle per MUTCD standard. 3. Provide appropriate signage (speed limits), and safety warning devices (Cross buck, track signs, etc.) 4. Provide appropriate lane barriers and active/passive warning devices. 5. Channelization and unmountable curbs 6. Ensure proper sight lines 7. Pavement marking clearly indicating fouling area. 8. Pullout lanes for each lane of traffic 9. Emergency Notification System (ENS) signs posted conspicuously 10. Arrange diagnostic team to review proposed grade crossing design. 11. Consider traffic control police at crossing for special situations	1. "Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection. 10. Signal Pre-emption and coordination with adjacent traffic signals (Commissioning and testing during System Integration) 11. Enforcement (Police/Security) 12. Crossing Illumination 13. Channelization 14. Public Outreach and Education 15. Queue cutter according to plans 16. Additional signals according to plans 17. Ramp Meter integration 18. JBLM & Camp Murray to Notify Railroad of unusual traffic situation 19. Emergency Notification System (ENS) signs posted conspicuously 20. Traffic control police at crossing for special situations	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases

**Point Defiance Bypass
Preliminary Hazard Analysis**

Revision 2
4/21/2015

PHA FOR POINT DEFIANCE EXTENSION OF SOUNDER-AMTRAK						IA, IB, IC, IIA, IIB, IIIA	UNACCEPTABLE				
						ID, IIC, IID, IIIB, IIIC	UNDESIRABLE				
						IE, IIE, IID, IIIE, IVA, IVE	ACCEPTABLE W/ REVIEW				
						IVC, IVD, IVE	ACCEPTABLE				
Hazard No.	Sub-system	Location/ Scenario	Hazard Description	Potential Cause	Effect/ Consequence	Initial Risk	Existing Mitigation Measures	Recommended Mitigation Measures	Suggested Resolution (Safety Verification)	Residual Risk	Remarks/Comments
SCR-PDB-131	Grade Crossing	Barksdale Crossing	Collision between train and roadway vehicle at grade crossing or in the alignment	Traffic queues backup could exceed storage length and result in vehicles stopping on tracks due to proximity to freeway ramp and frontage road at rush hour, high traffic volumes at Clark Rd entrance to military base, other traffic overflow situations	Potential fatality, major/minor Injury, property damage, service disruption.	IB	1. Grade Crossing System Incorporated with "Fail-Safe" Design 2. Pavement Markings 3. Cross buck Signs 4. Mounted Flashing Light Signals 5. Automatic Gates for Roadway 6. Stop Lines (Roadway) 7. Audible Warning Devices – Warning Bells 8. Wayside Horns 9. Constant warning devices for train detection. 10. Traffic control police at crossing	1. Provide traffic signal system with pre-emption. 2. Design train detection circuits on fail-safe principle per MUTCD standard. 3. Provide appropriate signage (speed limits), and safety warning devices (Cross buck, track signs, etc.) 4. Provide appropriate lane barriers and active/passive warning devices. 5. Channelization and unmountable curbs 6. Ensure proper sight lines 7. Pavement marking clearly indicating fouling area. 8. Pullout lanes for each lane of traffic 9. Emergency Notification System (ENS) signs posted conspicuously 10. Arrange diagnostic team to review proposed grade crossing design. 11. Consider traffic control police at crossing for special situations	1. "Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection. 10. Signal Pre-emption and coordination with adjacent traffic signals (Commissioning and testing during System Integration) 11. Enforcement (Police/Security) 12. Crossing Illumination 13. Channelization 14. Public Outreach and Education 15. Queue cutter according to plans 16. Additional signals according to plans 17. Ramp Meter integration 18. JBLM & Camp Murray to Notify Railroad of unusual traffic situation 19. Emergency Notification System (ENS) signs posted conspicuously 20. Traffic control police at crossing for special situations	ID	Requires Safety Certification verification during integrated testing, commissioning, and operational phases

Point Defiance Bypass CIL

Element	System	Item	CATEGORY	PDB
1	0	0	STATIONS (at-grade, underground, elevated)	x
1	13	1	Installation/Location	x
3	0	0	GUIDEWAY (at-grade, elevated and tunnel)	x
3	1	2	Alignments (Vertical and Horizontal)	x
3	1	4	ROW Clearance from Wayside Objects	x
3	2	0	Track work	x
3	2	6	Rail Welds	x
3	2	9	Rail Joints	x
3	2	11	Track Ballast	x
3	2	13	Special Trackwork	x
3	3	1	Roads & Paving	x
3	3	3	Fencing (to include security barriers)	x
3	4	4	Steel	x
3	4	4	Concrete	x
3	4	7	Track Structure	x
3	6	2	Atmospheric Corrosion Control	x
3	10	1	Grounding/insulation	x
3	15	1	Track Inspection & Maintenance	x
6	0	0	SIGNALING	x
6	1	3	Train Detection	x
6	1	7	Positive Train Control (PTC)	x
6	3	1	Signals	x
7	0	0	COMMUNICATIONS	x
7	5	2	Fiber Optic Network (FON)	x
9	0	0	TRAFFIC CONTROL	x
9	4	0	Control of Train Interface with Traffic	x
9	5	0	Sign Design	x
9	6	0	Pavement Marking Design	x
9	7	0	Traffic Signal Controller	x
9	10	0	Detection Equipment	x
9	11	0	Preemption Equipment	x
9	13	0	Height Clearances for Overhead Structures	x
9	14	0	Vehicle Barriers	x
10	0	0	FIRE/LIFE SAFETY	x
10	2	2	Means of Access	x
10	2	3	Emergency Response	x
13	0	0	SAFETY & SECURITY PLANS, PROCEDURES, & TRAINING	x
13	1	0	Standard Operating Procedure (SOPs)	x
13	1	1	Training and Certification	x
13	5	0	Operation Manuals	x



ELEMENT VERIFICATION SUMMARY

As a project progresses, tasks are executed throughout the life of the project to ensure that Safety and Security requirements are addressed.

A Preliminary Hazard Analysis (PHA) was prepared in coordination with Sound Transit and the Sounder Point Defiance Bypass Track & Signal Improvements Project Design Consultants. The PHA was performed to identify an initial risk index for hazard classification, proposed mitigations, and identified resolutions and residual risk rankings to form a basis for risk acceptance. All identified certifiable items were categorized by Element and recorded in the Safety/Security Information Management System (SSIMS).

The Design Consultants and the Construction Contractor were responsible for providing information to SSIMS that confirms compliance to the Safety and Security requirements for certifiable items within each Element. The Design Consultants and the Construction Contractor have also prepared letters confirming that the safety and security-related requirements listed in the *Sound Transit Design Criteria Manual, Rev 4, 2016* have been incorporated into the contract documents, and that the Contract Specifications have been incorporated into construction of the Sounder Point Defiance Bypass Project. These letters confirm that all the required work has been performed, inspected and approved.

The Contractor prepared and submitted contract specific commissioning, pre-revenue test plans and procedures for contractually required tests, and commissioning test results at the conclusion of test, including the pass/fail criteria, to the Construction Manager in compliance with the Safety and Security requirements.

Emergency Response Exercises were developed and coordinated by the ST Emergency Management group. All emergency response exercises are witnessed by SQA to verify that the operators and emergency responders are adequately prepared to address transit emergencies.

Safety plans to enforce a pro-active safety philosophy were implemented during the design, construction and continued into operations phases of the system. Sounder Commuter Rail's established Standard Operating Procedures (SOPs), Standard Maintenance Procedures (SMPs), Rulebook were reviewed and verified. Any Operating Procedures (SOPs) and/or Standard Maintenance Procedures (SMPs) developed for Point Defiance Bypass Project were identified.

System Readiness Training was conducted to address the inherent hazards of Sound Transit operations. Training courses were provided for individuals who operate or maintain significant safety related equipment, and to teach rail operating personnel the safe operation of the new segment.

Fire/Life Safety requirements are reviewed by the Fire Life Safety/Security Committee consisting of representatives from municipal Fire and Police, the Contractor design/construction team and Sound Transit Operations.

Certificates of Conformance for each safety certifiable element have been approved by Construction Management, Systems Engineering & Integration, Operations, Rail Activation, Security, and Safety & Quality Assurance. Backup documentation to support this certification is maintained by Safety & Quality Assurance (SQA) in the Safety & Security Information Management System (SSIMS) database.

The documents herein exhibit that the safety and security requirements have been implemented and any exceptions have been listed on the Element Certificates of Conformance.



SAFETY & QUALITY ASSURANCE

**SOUNDER POINT DEFIANCE BYPASS
TRACK & SIGNAL IMPROVEMENTS
SAFETY & SECURITY CERTIFICATION VERIFICATION REPORT**

Point Defiance Bypass Project Certifiable Elements

Safety Certifiable Element	Certificate Issued	Comments
Stations	7/7/17	
Guideway	9/15/17	
Signaling	9/15/17	
Communications	9/8/17	
Traffic Control	9/15/17	
Fire/Life Safety		Exceptions: PTEPP to be prepared by Amtrak. Final draft provided 9/15/17
Safety/Security Plans, Procedures, Training	7/7/17	

SOUND TRANSIT SOUNDER COMMUTER RAIL



AGENCY SAFETY AND SECURITY CERTIFICATION FOR PROJECT: POINT DEFIANCE BYPASS TRACK & SIGNAL IMPROVEMENTS

Element Certificate of Conformance

Completion of this Certificate verifies that the Certifiable Element listed herein complies with all applicable Safety, Fire/Life, Security and Systems Assurance requirements for the Point Defiance Bypass Project (PDB) Track & Signals Improvements Project. Element Certification Exceptions are listed below (if applicable).

Element: **Stations - Lakewood**

Exceptions:

None

[Redacted Signature]

6/27/17

Tom Dean
PDB Construction Manager
Sound Transit

Date

[Redacted Signature]

6/29/2017

Jodi Mitchell
PDB Rail Activation Lead
Sound Transit

Date

[Redacted Signature]

6-29-17

Andrew Rawls
Sr. Engineer, Systems Engineering & Integration
Sound Transit

Date

[Redacted Signature]

7/12/17

Branden Porter
Transit System Security Program
Sound Transit

Date

[Redacted Signature]

6-29-17

Weylin Doyle
Commuter Rail Operations Manager
Sound Transit

Date

[Redacted Signature]

7-7-17

Robert Taaffe
Sr. Construction & System Safety Manager
Sound Transit

Date

PDB Safety Certification
 Element 01 - Stations

Element	System	CI	ElementName	ItemSource	SystemName	CI Name	HazardDescription	PotentialCause	PotentialEffect	InitialRisk	ProposedMitigation	ResidualRisk	SafetyAndSecurityRequirements	DesignConformance	ConstructionConformance	OperationalConformance	Status
0001	0013	0001	Station	PDB-PHA	Signage and Graphics	Installation/Location	Collision between train and Lakewood Station patrons	Amtrak train passes by station without stopping	Potential fatality, major/minor Injury, service disruption.	1C	1. "LOOK" or "High Speed Trains Travel in Both Directions" signage; 2. Other signage according to MUTCD standards; 3. Adjacent Residence / Business Public Education for Rail Safety; 4 . Operating rules and procedures for use of horn and train speed; 5. Tactile warning tiles at edge of platform; 6. Stand Behind Yellow Line (pavement paint)	1D	1. "High speed train" signage at station; 2. Operating procedures and speed for passing a passenger station; 3. Warning procedures for train when passing a passenger station; 4. Public Outreach & Education	Signs at Lakewood Station would need to be added to contract as change order	Signage already exists at the Lakewood Station. see photo attached	Operating procedures and speed for passing a passenger station. Operating rules and procedures for use of horn and train speed; All of this is handled by the General Code of Operating Rules (managed by all of the operating railroads in North America) and the Lakewood Subdivision Timetable (managed by our Operating partner, BNSF).	Certified

SOUND TRANSIT SOUNDER COMMUTER RAIL



AGENCY SAFETY AND SECURITY CERTIFICATION FOR PROJECT: POINT DEFIANCE BYPASS TRACK & SIGNAL IMPROVEMENTS

Element Certificate of Conformance

Completion of this Certificate verifies that the Certifiable Element listed herein complies with all applicable Safety, Fire/Life, Security and Systems Assurance requirements for the Point Defiance Bypass Project (PDB) Track & Signals Improvements Project. Element Certification Exceptions are listed below (if applicable).

Element: **GUIDEWAY**

Exceptions:

Submittals for Track Geometry Report, Stage 6, 7, 8 Test Reports, Drainage As-Builts, and Fence As-Builts – Approved and uploaded to SSIMS

[Redacted Signature]
Tom Dean
PDB Construction Manager
Sound Transit

9/14/17
Date

[Redacted Signature]
Jodi Mitchell
PDB Rail Activation Lead
Sound Transit

9/15/17
Date

[Redacted Signature]
Andrew Lewis
Sr. Engineer, Systems Engineering & Integration
Sound Transit

9-15-17
Date

[Redacted Signature]
Branden Porter
Transit System Security Program
Sound Transit

9-15-17
Date

[Redacted Signature]
Weylin Doyle
Commuter Rail Operations Manager
Sound Transit

9/15/17
Date

[Redacted Signature]
Robert Taaffe
Sr. Construction & System Safety Manager
Sound Transit

9-15-17
Date

Point Defiance Bypass Project
Safety Certification Checklist - Element 3 - Guideway

ID	ElementNumber	SystemNumber	CI Number	ElementName	ItemSource	SystemName	CI Name	HazardDescription	PotentialCause	PotentialEffect	InitialRisk Index	ProposedMitigation	ResidualRisk Index	SafetyAndSecurityRequirements	SuggestedConstructionDocumentation	DesignConformance	ConstructionConformance	TestingConformance	OperationalConformance	Status
3	0003	0001	0002	Guideway	PDB-PHA	Track Alignment and Clearances	Alignment (Vertical and Horizontal)	Excessive track wear	Stopping train on curve with increased Superelevation	Potential derailment, equipment damage, major/minor injuries	1C	1. Engineering, Operation Rules; 2. Identify stopping locations for trains; 3. Ensure curves; elevation and speed limitations are designed according to 49 CFR 213.57; 4. Develop inspection and maintenance procedures according to 49 CFR 213.233 Track Inspection; 5. Future PTC.	1D	1. Restrictions on mainlines for stoppage or slow speeds of heavy freight on certain mainlines in specific areas; 2. Track inspection through MOW; 3. Tonnage per year on tracks is light and not excessive.	N/A	Not Applicable to Design	not applicable to CM - Operations measure		MOW Operating Rules uploaded to SSIMS PDB Verification Documents folder	Documentation Complete-Accepted
4	0003	0001	0004	Guideway	PDB-PHA	Track Alignment and Clearances	ROW Clearance from Wayside Objects	Collision between train and fixed structure	Business property encroachments	Potential fatality, derailment, major/minor Injury, property damage, service disruption.	1C	1. Develop procedures to ensure adequate clearance of tracks from existing and future fixed structures adjacent to tracks.; 2. Procedures for periodic inspection and maintenance to ensure no obstructions are in ROW; 3. Right of Entry requirements.	2D	1. Adequate ROW track clearance; 2. ROW inspection procedures; 3. Actively inspecting for business property encroachments; 4. Post orders for security and property staff; 5. Land use approval requirements; 6. Develop procedures to ensure adequate clearance of tracks from existing and future fixed structures adjacent to tracks; 7. Procedures for periodic inspection and maintenance to ensure no obstructions are in ROW; 8. Right of Entry requirements.	N/A	not applicable to design	not applicable to CM - Operations & Security measures		Uploaded ROW Maintenance Plan, 2014 to SSIMS PDB Verification Documents folder	Documentation Complete-Accepted
5	0003	0001	0004	Guideway	PDB-PHA	Track Alignment and Clearances	ROW Clearance from Wayside Objects	Collision between train and fixed structure	Interchange Bridge Columns within ROW	Potential fatality, derailment, major/minor Injury, property damage, service disruption.	1D	1. Enforce timetable speed restrictions along alignment (PTC); 2. Develop inspection and maintenance procedures to assure frequent debris clearance from all tracks; 3. Develop inspection and maintenance procedures to assure the structural integrity of the tracks; 4. Verify train speed vs. sight distances; 5. Verify ROW inspection procedures	1E	1. Enforce timetable speed restrictions along alignment (PTC); 2. Inspection and maintenance procedures to assure frequent debris clearance from all tracks; 3. Inspection and maintenance procedures to assure the structural integrity of the tracks; 4. All existing columns are built extra heavy (similar to crash walls)	photo	The Center Drive bridge columns were evaluated and heavy construction was verified where the new track is being added - WSDOT plans for Center Drive Interchange construction	The Center Drive bridge columns were evaluated and heavy construction was verified where the new track is being added - WSDOT plans for Center Drive Interchange construction		MOW Operating Rules found in PDB Verification Documents folder.	Documentation Complete-Accepted
6	0003	0001	4	Guideway	PDB-PHA	Track Alignment and Clearances	ROW Clearance from Wayside Objects	Collision between train and foreign object	Falling Trees; Trees adjacent to tracks (Heavily wooded both sides)	Potential fatality, derailment, major/minor Injury, property damage, service disruption.	1C	1. Enforce speed restrictions along alignment; 2. Develop inspection and maintenance procedures for underbrush/debris clearance on alignment according to 49 CFR 213.37 - Vegetation; 3. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations.	1D	1. Clearing and trimming/pruning Trees within the ROW; 2. Tree stumps left for Soil stabilization; 3. Tree survey		311100 - CLEARING AND GRUBBING, 3.02, Existing Conditions/Demolition Plans	Added IDR 0230 dated 2/6/17 with images obtained 4 months since Tree Trimming		Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations, and for speed observance	Documentation Complete-Accepted
7	0003	0001	4	Guideway	PDB-PHA	Track Alignment and Clearances	ROW Clearance from Wayside Objects	Collision between train and wayside object	Vehicles parked at business or residence adjacent to the ROW	Major/minor Injury, property damage, service disruption.		1. Design fencing and warning signs along alignment areas where intrusion is likely; 2. Implement public rail safety education programs; 3. Define property lines; 4. Enforcement of parking regulations.		1. Adequate ROW track clearance; 2. ROW inspection procedures through security, maintenance and property patrols; 3. Fencing according to plans	Fence As-Builts	01 57 24 -TEMPORARY SITE WATER DISCHARGE-1.04.A, Stormwater Pollution Prevention Plans (SWPPP); SWPPP Submitted with IFB Package 32 31 13 -CHAIN LINK FENCES AND GATES-1.03, Submittals	S34150-REC-00061 -Construction Stormwater Pollution Prevention Plan, S34150-REC-02190 SUB 017839-011.001 1.02A Fence As-Builts, WSDOT Outreach Plan, Amtrak/Cascades PDB Testing Flyer, Outreach_Folio PDB 2017 FINAL		Exception Documentation Completed-Accepted	
8	0003	0001	0004	Guideway	PDB-PHA	Track Alignment and Clearances	ROW Clearance from Wayside Objects	Foreign object(s) on alignment	Rock/mudslide	Potential track damage, potential derailment, potential major/minor injury, potential fatality, equipment damage, service disruption.		1. Design to provide clearance from trees and rockslide areas and fencing where appropriate; 2. Provide disaster warning system (wayside mudslide/rockslide warning system); 3. 49 CFR 213.233 - Track inspections; 4. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations.		1. Adequate ROW track clearance; 2. ROW inspection procedures; 3. Fencing placed according to plans; 4. Geotechnical surveys for rock/mudslide areas. Tree stumps left for soil stabilization		01 57 24 -TEMPORARY SITE WATER DISCHARGE-1.04.A, Stormwater Pollution Prevention Plans (SWPPP); SWPPP Submitted with IFB Package- 32 31 13 -CHAIN LINK FENCES AND GATES-1.03, Submittals. Permanent fencing is identified in the Track Plan and Profile (TA) series. Drawings and Geotechnical Memorandum (Section 8.0) for PDB provided, Geotechnical Memorandum S34150 Track Plan and Profile.pdf, SWPPP for PRD_Final Jan 2015.pdf, Point Defiance Bypass Geotechnical Report 09JAN2014 21-1-22026-002-R1.pdf	Track Inspection Reports - Feb -Oct 2016-S341 50-REC-01808, Track Inspection Reports - Oct -Dec 2016-S34150-REC-01809, Track Inspection Reports - Jan-Mar 2017-S34150-REC-02020, Fence As-Builts-S34150-REC-02190		Documentation Complete-Accepted	
9	0003	0002	0000	Guideway	PDB-PHA	Track work	Track work	No or improper rail cant. (Superelevation)	improper design.	Poor ride quality due to hunting; Possible derailment at high speeds; Injury. Operational impact.		1. Design track cross-level to meet or exceed AREMA or BNSF guidelines; 2. Ongoing track inspection and maintenance program		Certifications	Final Survey of Track Geometry	34 05 17-TRACK CONSTRUCTION, GENERAL REQUIREMENTS-1.04.A.1, A.11, SUBMITTALS	OTM Material and Buy America Certifications, REC-0298, Code 1-NET 1/20/16. 03-02-17 Added REC-01967 Rail Grind Report & REC-01968 Rail Flaw Report. Added S34150-REC-02223 SUB 340517-030.002 3.28C Geometry Car Report to Verification Documents folder.		Exception Documentation Completed-Accepted	
10	0003	0002	0000	Guideway	PDB-PHA	Track work	Track work	Excessive rail wear	Sharp curves.	Potential derailment. Injury. Operational Impact	3C	1. Design track cross-level to meet or exceed AREMA or BNSF guidelines; 2. Ongoing track inspection and maintenance program	3D	Qualifications of personnel who will perform rail end hardening	Qualifications of personnel who will perform rail end hardening	34 05 17-TRACK CONSTRUCTION, GENERAL REQUIREMENTS-1.04.A.4, SUBMITTALS	Email on 1/17/17 Matt Lumsden - Rail Hardening is not expected since all rail met specifications for hardness. REC 00153 stating Rail Hardness Acceptance At Factory-EAN 11/20/15, REC-00841 for 136H Head Hardened Rail Mill Certs-NET 4/19/16, and 1/7/16 Readiness Review Meeting Minutes. Rail hardening is not expected since all rail met specifications for hardness. REC00226 136 Standard Grade Rail Mill Certs. (see PDB Verification Documents folder)		Documentation Complete-Accepted	
11	0003	0002	0000	Guideway	PDB-PHA	Track work	Track work	Wide/Tight track gauge.	Improper design / installation.	Operational impact. Potential derailment. Injury.		1. AREMA Manual for Railway Engineering, Chapter 5 Track, and Chapter 30 Ties; 2a. Certified Test Results; 2b. Use of concrete ties to make changes in gauge less likely to occur; 3a. Certification of Manufacturer's Experience; 3b. Use of concrete ties to make changes in gauge less likely to occur; 4a. Tests - Certified test results as required in specs; 4b. Use of concrete ties to make changes in gauge less likely to occur		1. Certifications of track gauges, torque wrenches and bolt tightening machines; 2. Certified Test Results; 3. Certification of Manufacturer's Experience; 4. Tests - Certified test results as required in specs	Certifications of track gauges, torque wrenches and bolt tightening machines; Final Track Inspection Report&10;Certification of Manufacturer's Experience	1. 34 05 17-TRACK CONSTRUCTION, GENERAL REQUIREMENTS-1.04.A.11, A.12, SUBMITTALS; 2a. 34 11 31-CONCRETE CROSS TIES AND FASTENERS-1.03.B, SUBMITTALS; 2b. 34 05 17-TRACK CONSTRUCTION, GENERAL REQUIREMENTS-1.04.A.11, SUBMITTALS; 3a. 34 11 31-CONCRETE CROSS TIES AND FASTENERS-1.03.C, SUBMITTALS; 3b. 34 05 17-TRACK CONSTRUCTION, GENERAL REQUIREMENTS-1.04.A.11, SUBMITTALS; 4a. Wood Railroad Ties-34 11 40-1.03.B; 4.b. 34 05 17-TRACK CONSTRUCTION, GENERAL REQUIREMENTS-1.04.A.11, SUBMITTALS	Added Submittals for Wood Railroad Ties, and Concrete Cross Ties and Fasteners-1.31/17. Added submittals REC-01967 Rail Grind Report & REC-01968 Rail Flaw Report. Added REC-00003 for Manufacturers Experience and REC-00296 Torque Gauges/Wrenches.	Added S34150-REC-02223 SUB 340517-030.002 3.28C Geometry Car Report to Verification Documents folder		Exception Documentation Completed-Accepted
12	0003	0002	0000	Guideway	PDB-PHA	Track work	Track work	Increased risk of incorrect test results	Unqualified test personell	Increased risk of system failures, affecting safety systems	3C	Tester qualifications and automated testing	3E	Tester qualifications and automated testing	Tester qualifications and automated testing	34 05 17-TRACK CONSTRUCTION, GENERAL REQUIREMENTS-3.13	Added REC-01967 Rail Grind Report and REC-01968 Rail Flaw Report. See PDB Verification Documents Folder for S34150-REC-01264 Welding QC Plan		Documentation Complete-Accepted	
13	0003	0002	0000	Guideway	PDB-PHA	Track work	Track work	Uninformed Train Operator	Improper Railroad Signage Design/Installation	Operator misses important information, Penalty, Operational impact	3C	Railroad Signage	3E	Shop Drawing for Railroad Signage	Shop Drawing	34 05 17-TRACK CONSTRUCTION, GENERAL REQUIREMENTS-3.24.F	Added Submittal Railroad Sign Shop Drawing		Documentation Complete-Accepted	
14	0003	0002	0006	Guideway	PDB-PHA	Track work	Rail Welds	Broken rail.	Rail Defect or faulty weld.	Potential derailment. Injury. Operational impact	3C	Quality Control Plan	3D	Quality Control Plan	Quality Control Plan, Field Weld Reports, Rail inspection records	34 11 16-WELDED TRACK RAILS, SUBMITTALS-1.03.A; 34 11 13-TRACK RAILS-SUBMITTALS-1.03.E.4; 34 05 17-TRACK CONSTRUCTION, GENERAL REQUIREMENTS-3.12.A	Added Submittals for REC 01264 SUB 341116 006 004 1 03A Welding QC Plan, and REC-01852 MP and UT Weld Reports. ASee PDB Verification Documents folder for REC01967 Rail Grinding Report and 01968 Rail Inspection Report- Rail Flaw		Documentation Complete-Accepted	
15	0003	0002	0009	Guideway	PDB-PHA	Track work	Rail Joints	Broken rail joint.	Improper installation, e.g. loose bolts fracture rail at bolt holes, excessive end batter.	Potential derailment. Injury. Operational impact	3C	1. AREMA Manual for Railway Engineering, Chapter 4 Rail; 2. Sounder Right-of-Way Maintenance Plan. Sound transit MOW and/or the designated contractor will conduct track and rail inspections and associated documentation in accordance with 49 CFR Part 213 and the Sound Transit recommended practice for the Inspection	3D	Certifications	Certification for U	34 11 19-TRACK RAIL JOINTS-QUALITY ASSURANCE-1.04.A; 34 11 50-RAILROAD MAINTENANCE OF WAY-REGULATORY COMPLIANCE-1.07	Added Submittal for Track Rail Joints		MOW Inspection see MOW Operating Rules document in Verification Documents folder.	Documentation Complete-Accepted

Point Defiance Bypass Project
 Safety Certification Checklist - Element 3 - Guideway

ID	Element Number	System Number	CI Number	Element Name	Item Source	System Name	CI Name	Hazard Description	Potential Cause	Potential Effect	Initial Risk Index	Proposed Mitigation	Residual Risk Index	Safety and Security Requirements	Suggested Construction Documentation	Design Conformance	Construction Conformance	Testing Conformance	Operational Conformance	Status
16	0003	0002	0011	Guideway	PDB-PHA	Track work	Track Ballast	Poor horizontal track alignment	Sun kinks. Improper design / installation.	Potential derailment. Injury. Operational impact.	3C	1. Design ballast sections with 12 inches or more of high-quality ballast tamped to AREMA standards. 2. Ongoing track inspection and maintenance program	3D	In-Track test results	Test Report, Track Geometry (Car Results)	IFC Vol 2-9/4/15. Track Ballast-34 11 26.13.1.03.C. Track Construction, General Requirements-34 05 17, 3.03	REC-01967 Rail Grinding Report. REC-01968 Rail Inspection Report-Rail Flaw. REC-00663 In-Track test results, REC-02223 Geometry Car Report		See PDB Verification Documents folder for ST Commuter Rail Right of Way Maintenance Plan, 2014	Exception Documentation Completed-Accepted
17	0003	0002	0011	Guideway	PDB-PHA	Track work	Track Ballast	Loss of train detection	Mechanical or electrical problem with train detection equipment*. Loss of shunt (LOS).	Derailment causing damage to railcar or fixed facility. Injury or death to operator or passenger. Potential for collision. Potential for injury or death.		1. Test results of electrical resistance 2. Complete FRA in-service and monthly testing to assure proper operation*. 3. Utilize a Loss of Shunt (LOS) detection system.		Test results of electrical resistance	Test results of electrical resistance, Shunt sensitivity, Track Circuit Tests.	34 11 27-BALLASTED SPECIAL TRACKWORK CONSTRUCTION-SUBMITTALS-1.03.C; 34 42 10-CENTRALIZED TRAFFIC CONTROL SYSTEM-TRACK CIRCUITS, 2.19.B, SPECIFIC FIELD TESTS, 3.26.M & 3.26.O	REC-1330 Specific Field Tests and Inspections - Bungalows.pdf	Added test results for Stage 6, 7, & 8 and Matrix to Verification Documents folder. See Matrix tests #14, 15, 16, 46, 35, 36, 37 for Shunt sensitivity Track Circuit Tests Interlocking & Control Point Tests .		Exception Documentation Completed-Accepted
18	0003	0002	0013	Guideway	PDB-PHA	Track work	Special Track work	Improper frog guard rail check gauge.	Improper design / installation.	Potential derailment. Injury. Operational impact.		1. Design special track work to AREMA standards; 2. Ongoing track inspection and maintenance program		Rail inspection results	Rail inspection results	34 11 23-SPECIAL TRACKWORK-SUBMITTALS-1.03.4	IDR of Special Track work added to SSIMS			Documentation Complete-Accepted
19	0003	0003	0001	Guideway	PDB-PHA	Civil Work	Roads and Paving	Collision between train and roadway vehicle at grade crossing or in the alignment	Motorist misjudges turn and enters ROW; Roadway vehicle driver fails to or is unable to stop within safe braking distances; Roadway vehicle operator for any reason enters crossing when warning is activated	Potential fatality, major/minor injury, property damage, service disruption.		1. Design train detection circuits on fail-safe principle per MUTCD standard; 2. Provide appropriate signage according to MUTCD Standards (speed limits), and safety warning devices (Cross buck, track signs, etc.); 3. Provide appropriate lane barriers and active/passive warning devices; 4. Channelization; 5. Ensure proper sight lines; 6. Train operators to follow FRA regulations for grade crossings; 7. Emergency Notification System (ENS) signs posted conspicuously; 8. Arrange diagnostic team to review proposed grade crossing design.		1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signal Pre-emption; 11. Enforcement (Police/Security); 12. Crossing Illumination; 13. Channelization; 14. Bollards used for wider ROW at grade crossings; 15. Public Outreach and Education	Signaling Test Reports, IDR / photo for each intersection	RR Crossing Signals-34 42 15 1.05.D, 1.13; Concrete Curbs/Gutters-32 16 13 3.01; Sidewalks-32 16 23 3.01; Pavement Markings-32 17 23 3.01; Traffic Signals-34 41 13 2.01 & 2.02; Vehicle Barriers-34 71 13 2.01; Chain Link Fences & Gates-32 31 13-3.01; Grading and Drainage, Roadway Alignment, Roadway Details, Roadway Plan and Profile, Roadway Channelization, and Roadway Preemption, signal, and wiring diagram Plan Sheets	Added Submittals for RR Grade Crossing Signals (01525 & 01526), Traffic Signal Materials (00813, 00682, 01157, 00871, 01158, & 01790), and Vehicle Barriers (01559). REC-00737 Spare Controller Cabinets, Signal Heads and LED Blank-Out Signs	Added test results for Stage 6, 7, & 8 and Matrix to Verification Documents folder. See Matrix tests 6, 44, 50, 47 for Signal Testing of Equipment Grounding.		Exception Documentation Completed-Accepted
20	0003	0003	0002	Guideway	PDB-PHA	Civil Work	Drainage	Flood on alignment	Heavy Rain / Water main break	Potential track damage, derailment, potential major/minor injury, potential fatality, equipment damage, service disruption.	1C	1. Design for adequate drainage, water diversion, or raised track in flood prone alignment areas; 2. Inspection and maintenance procedures to assure all drainage water diversion systems are operational according to 49 CFR 213.33 - Drainage; 3. Standard operating procedures and Rulebook to require reduced speed during heavy rain with reduced visibility.	1D	1. Alignment meets design criteria; 2. ROW clearances from structures; 3. Track inspection; 4. Subgrade and ballast compaction, slopes, grade, & drainage; 5. Drainage basins located on both sides of track; 6. Water mains upgraded and reinforced; 7. Qualifications of System Designer; 8. Certifications	Qualifications of System Designer Certifications	31 23 19-DEWATERING-SUBMITTALS-1.03B; 33 40 00-STORM DRAINAGE UTILITIES-SUBMITTALS-1.03.C; 33 46 00-SUBDRAINAGE-SUBMITTALS-1.03.B; 34 80 23-SUBDRAINAGE SYSTEM FOR RAILROAD BRIDGES-SUBMITTALS-1.04.C; 34 11 26.13-TRACK BALLAST-INSTALLATION -3.01 (Installation); Tracks above 100-year flood, Contract Grading and Drainage Plans, Contract Specifications-	Added Submittals for Storm Drainage REC-00625 Culvert Pipe EAN-3/17/16, REC-00802 Culvert Pipe Banding and Gasket NET-4/13/16, and Sub Drainage for Rail Bridges REC-01335 Bridge 19.8L Deck Drain EANR-8/16/16, REC-00799 Subdrainage HDPE Perforated Pipe EAN-4/13/16, REC-00463 Subdrainage HDPE Perforated Pipe Fittings EAN-2/23/16, REC-00467 Subdrainage HDPE Perforated Pipe Sock NET-2/24/16, REC-02282 As Built Drainage, NET 7/21/17. No dewatering activities occurred on this project, therefore dewatering system designer qualifications are not applicable	See GCOR rule 6.21-Precautions Against Unusual Conditions and 6.21.2-Water Above the Rail, for operating procedures related to heavy rain or water above the rail. I&M Manual Section A.10.3, pg 1-24 shows track inspection procedures to assure all drainage water diversion systems are operational (refer to PDB Verification Documents folder).	Exception Documentation Completed-Accepted	
21	0003	0003	0003	Guideway	PDB-PHA	Civil Work	Fencing	Collision between train and pedestrian(s)	Elementary school near Bridgeport Way grade crossing	Potential fatality, major/minor injury, service disruption.		1. Adjacent Residence / Business Public Education for Rail Safety; 2. School Crossing Guards; 3. Install adequate fencing near crossings and areas where intrusion or trespass may be frequent or most likely; 4. Install adequate safety warning devices at crossings; 5. Install adequate signage near legal crossings and along track way.		1. Adjacent Residence / Business / Golf Course; Public Education & outreach for Rail Safety; 2. Fence maintenance agreement / permanent replacement of Elementary School Fence; 3. Install adequate fencing as indicated on plans; 4. Install adequate safety warning devices at crossings according to plans; 5. Install adequate signage near legal crossings as indicated on plans; 6. Product Data; 7. Shop Drawings	Product Data, Shop Drawings, Fence As-Builts, safety warning devices at crossings, evidence of signage near legal crossings and along track way	32 31 13-CHAIN LINK FENCES AND GATES-SUBMITTALS-1.03.A, 1.03.B	Added Submittals for Chain Link Fencing and Gates including Product Data (01097) & Shop Drawings (01782). Added Fencing As-Builts REC-01290, added IDR at crossings	Added WSDOT Outreach documents Outreach_Folio_PDB_2017_FINAL.pdf, AmtrakCascades_PDB_Testing_Flyer_122916_Final.pdf, WSDOT PDB Outreach plan.pdf	Exception Documentation Completed-Accepted	
22	0003	0004	0004	Guideway	PDB-PHA	Structural	Steel	Broken rail	Rail Defect or faulty weld.	Potential derailment. Injury. Operational impact		1. ST Construction Inspector; 2. Ongoing track inspection and maintenance program; 3. Manufactured Products Mill certifications; 4. Welding certification and processes		1. Shop Drawings Qualification of welders and procedures; 2. Manufactured Products Mill certifications; 3. Qualifications Welders, Weld inspectors, NDT testers; 4. Welder certification and WPS	Shop Drawings; Rail inspection records; Manufactured Products Mill certifications; Quality Control Plan; Qualifications Welders, Weld inspectors, NDT testers; Personnel certification;	03 21 00-REINFORCING STEEL FOR RAILROAD BRIDGES-SUBMITTALS-1.03.A.3; 34 05 17-TRACK CONSTRUCTION, GENERAL REQUIREMENTS-RAIL INSPECTION-3.12, AUTOMATED INSPECTION OF TRACK CONSTRUCTED WITH CONCRETE TIES-3.13; 34 11 16-WELDED TRACK RAILS-SUBMITTALS-1.03.A; 05 05 23-METAL FASTENINGS-SUBMITTALS-1.04.A; 34 80 21-PIILING FOR RAILROAD BRIDGES-SUBMITTALS-1.04.F; 34 80 52-METAL FABRICATION FOR RAILROAD BRIDGES-SUBMITTALS-1.04.B.2	Added Submittals for Reinforcing Steel for Railroad Bridges (00937 & 01119), Welded Track Rail (01264), Metal Fastening (00965 & 01560), Piling for Railroad Bridges (01676 & 01579), and Metal Fabrication for Railroad Bridges (00986). Added 534150-REC-02223 SUB 340517-030.002 3.28C Geometry Car Report		Documentation Complete-Accepted	
23	0003	0004	0004	Guideway	PDB-PHA	Structural	Steel	Bridge support structure fails	Improper installation.	Collapse of a portion or all of bridge. Loss of bridge. Injury or death to passengers. Injury or death to passers-by under structure.	1D	1. ST Construction Inspector; 2. Shop Drawings Product Technical data including mill certs; 3. Certifications; 4. Test Reports; 5. Qualification of testing agency and test plans for source testing; 6. Qualifications of fabricator, welder, PE for contractor design components; 7. Certifications - welders, welding procedures, load requirements	1E	1. Shop Drawings Product Technical data including mill certs; 2. Inspection and Test Reports; 3. Mill test reports of structural steel; 4. Certifications; 5. Qualification of testing agency and test plans for source testing; 6. Qualifications of fabricator, welder, PE for contractor design components; 7. Certifications - welders, welding procedures, load requirements	Inspection and Test Reports; Mill test reports of structural steel; Qualification of testing agency and test plans for source testing; Qualifications of fabricator, welder; Certifications - welders, welding procedures, load requirements	03 21 00 REINFORCING STEEL FOR RAILROAD BRIDGES-SUBMITTALS-1.03.A.2; 05 05 23 METAL FASTENINGS-SUBMITTALS-1.04.D; 05 12 00 STRUCTURAL STEEL FRAMING-SUBMITTALS-1.04.E; 34 80 51 STRUCTURAL STEEL FOR RAILROAD BRIDGES-SUBMITTALS-1.03.A.5-6, SOURCE QUALITY CONTROL-2.06; 34 80 52 METAL FABRICATION FOR RAILROAD BRIDGES-QUALITY ASSURANCE-1.05.A; 34 80 53 STEEL HANDRAILS FOR RAILROAD IFC BRIDGES-SUBMITTALS-1.04.B, (Misc. Submittals)	Added Submittals REC 01291-Shop Drawings for Precast for Bridge 19 8L, REC 01496-CWP Bridge 10 8L Install, REC 00876-CWP Bridge 19 8L Install Precast Wingwall Raising Blocks, REC 00780 -CWP Bridge 19 9L Wingwall Raise, REC 00799 - Subdrainage HDPE Perforated Pipe, REC 00463-Subdrainage HDPE Perforated Pipe Fittings, REC-00467-Subdrainage HDPE Perforated Pipe Sock, REC-01959-Wingwall Raise Concrete Strength Test Results.pdf, REC 00817-Sound Transit Bridge Safety Management Program, REC-01264-Welding QC Plan, REC-00050-Qualification of Independent Testing Lab, REC-01119-Bridge Rebar Certifications, REC-01289-CWP Bridge 16.9L Span Rehab , REC-01957-Precast Mfg Testing Facility Qualifications, REC-01241-Precast Mfg Testing Facility Qualifications, REC-01087-Structural Field Welding Procedures for Bridges, REC 01117-AWS 1.5 Welder Certs		Documentation Complete-Accepted	
24	0003	0004	0004	Guideway	PDB-PHA	Structural	Steel	Bridge support structure fails	Inferior Material that does not meet specifications	Collapse of a portion or all of bridge. Loss of bridge. Injury or death to passengers. Injury or death to passers-by under structure.	1D	1. ST Construction Inspector; 2. Prequalification Test Report; 3. Qualification Certifications; 4. Mill Certifications; 5. Welder Certification	1E	1. Prequalification Test Report&; 2. Qualification Certifications; 3. Mill Certifications; 4. Welder Certification	Prequalification Test Report; Qualification Certifications; Rebar Mill Certifications; Pile Welder Certification	03 05 15 PORTLAND CEMENT CONCRETE-SUBMITTALS-1.03.C, G; 03 15 20 ANCHORAGE TO CONCRETE-SUBMITTALS-1.04.C, 1.04.D	Submittals for Anchorage to Concrete Qualification of Supply & Lab (00050 & 01241), and Welder Certifications (01579). See PDB Verification Documents for REC-0119 Bridge Rebar Certifications, REC-01886-Concrete Mix Design for WSDOT Structures, REC-01781-Bridge 16.9L Anchor Rod Extensions and REC-01264 Welding QC Plan		Documentation Complete-Accepted	
25	0003	0004	0005	Guideway	PDB-PHA	Structural	Concrete	Bridge support structure fails	Inferior Material that does not meet specifications	Collapse of a portion or all of bridge. Loss of bridge. Injury or death to passengers. Injury or death to passers-by under structure.	1D	1. ST Construction Inspector; 2. Concrete Testing Agency Qualifications; 3. Source Quality Control test reports; 4. Manufacturer testing facility qualifications	1E	1. Concrete Testing Agency Qualifications; 2. Concrete Test Reports; 3. Source Quality Control test reports (Sample of test reports); 4. Manufacturer testing facility qualifications	Concrete Testing Agency Qualifications, Concrete Test Reports, Source Quality Control test reports, Manufacturer testing facility qualifications	03 31 00 STRUCTURAL CONCRETE FOR RAILROAD BRIDGES-QUALITY ASSURANCE-1.05.A, FIELD QUALITY CONTROL 3.04.B
34 80 43 PRECAST AND PRESTRESSED CONCRETE FOR RAILROAD BRIDGES-SUBMITTALS-1.03.A.5-6	Added Submittals for Structural Concrete For Bridges (00050), and Precast & Pre-stressed Concrete For Railroad Bridges including Source QC and Testing Facility Qualifications (01241), and Wingwall Raise Concrete Strength Test Results (01959)		Documentation Complete-Accepted	

Point Defiance Bypass Project
 Safety Certification Checklist - Element 3 - Guideway

ID	ElementNumber	SystemNumber	CI Number	ElementName	ItemSource	SystemName	CI Name	HazardDescription	PotentialCause	PotentialEffect	InitialRisk Index	ProposedMitigation	ResidualRisk Index	SafetyAndSecurityRequirements	SuggestedConstructionDocumentation	DesignConformance	ConstructionConformance	TestingConformance	OperationalConformance	Status
26	0003	0004	0007	Guideway	PDB-PHA	Structural	Track Structure	Broken rail.	Rail Defect or faulty weld.	Potential derailment. Injury. Operational impact.		1. Description of method and verification testing to achieve rail hardness 2. Ultrasonic Technician Qualifications 3. Rail test records 4. Mill Certificate		1. Ultrasonic Technician Qualifications 2. Rail test records 3. Mill Certificate 4. Weld Reports	Reports, Qualification, Certificate	34 11 13 TRACK RAILS-SUBMITTALS-1.03.E; 34 05 17 TRACK CONSTRUCTION, GENERAL REQUIREMENTS-CONSTRUCTION EQUIPMENT-3.01.A & 3.12	1. Ultrasonic Technician Qualifications, REC-00152, Code 1-11/23/15 2. Operating Procedure - Stacking Loading and Banding of Rails, REC-00168, EAN 12-2-15. 3. Rail Test Records, REC-00380, NET 2-8-16. 4. Rail Shipping Records, REC-00775, EAN 4-11-16. 5. Head Hardened Rail, REC-01967 - Track Grind Report, and REC-01968 - Track Flaw Report, REC-02323 Rail Distress Log & Field Reports, REC 2304 Rail Weld Inspection Reports	Added test results for Stage 6, 7, & 8 to Verification Documents folder.		Documentation Complete-Accepted
27	0003	0004	0007	Guideway	PDB-PHA	Structural	Track Structure	Excessive rail wear.	Improper Rail Profile	Potential derailment. Injury. Operational impact.	3C	Certificates of compliance, codes and regulations	3D	Certificates of compliance, codes and regulations	Certificates of compliance	34 11 30 RAIL REPROFILING GRINDING-SUBMITTALS-1.04.C, D, & E	Added Submittal for Rail Re-profiling Grinding (01682), Added REC-01967 Rail Grind Report and REC-01968 Rail Flaw Report		Documentation Complete-Accepted	
28	0003	0006	0002	Guideway	PDB-PHA	Corrosion Control	Atmospheric Corrosion Control	Bridge support structure fails.	Atmospheric corrosion	Collapse of a portion or all of bridge; Loss of bridge. * Injury or death to passengers. * Injury or death to passers-by under structure.	1D	Environmental control measures, application	1E	Environmental control measures, application	Environmental control measures, application - Work Plan	34 80 61 PAINTING AND PROTECTIVE IFC COATINGS FOR RAILROAD BRIDGES-SUBMITTALS-1.04.A.3.f-g	REC-00787 - Paint Plan, EAN 4/12/16,
IDRS - Hamilton 19.8 Bridge & Pendleton Bridge Work-On site monitoring of painting by Purcell Paintings and Coatings
534150 REC 00817 Sound Transit Bridge Safety Management Program		Documentation Complete-Accepted	
29	0003	0010	0001	Guideway	PDB-PHA	Electrical Systems	Grounding/Insulation	Railroad signals not operational	Electric surge / Lightning	Dark Signal, restricted speeds, operational impact Potential for derailment or collision*; Potential for injury or death.		1. Field test reports; 2. Design signal interlocking to industry standard		Field test reports	Field test reports	34 42 54 GROUNDING AND BONDING FOR RAILROAD SIGNALS-SUBMITTALS-1.03.C		Added test results for Stage 6, 7, & 8 and Matrix tests 6, 44, 50 for Grounding Tests		Exception Documentation Completed-Accepted
30	0003	0015	0001	Guideway	PDB-PHA	Inspection and Maintenance	Track Inspection and Maintenance	Poor visibility on restricted alignment	Plant growth blocks view of signal or crossing.	Potential collision, injury, equipment damage, service disruption.		1. Design to provide removal of trees, shrubs, and brush from signal and grade crossing sight lines; integration testing to verify adequate sight lines according to 49 CFR 213.37 - Vegetation. 2. Inspection and maintenance procedures to require vegetation control. 3. Standard operating procedures and Rulebook to require train operation at reduced speed when weather affects visibility and train braking performance or alignment configuration reduces forward sight distance.		1. Track inspection procedures 2. Track speed is appropriate for Superelevation 3. Trees directly on the grade crossing or ROW are cleared. 4. All vegetation within 250 ft. of the grade crossing is cleared 5. Fencing is shortened to 42" within 250ft of the crossing.	Fencing As-Builts
IDR with images at crossings	31 11 00 CLEARING AND GRUBBING-Part 3, EXECUTION 34 11 50 RAILROAD MAINTENANCE OF WAY-SUBMITTALS-1.04.B	IDR ML Haz. ID 30 04-28-17, REC-01290 Fence Asbuilts		The Maintenance of Way department would never issue a speed restriction based on limited visibility due to weather conditions. This would come from the BNSF Dispatcher based on reports from the Train Crews and/or weather reports. As for Track Inspections, the I&M Manual covers "Special Inspections" due to extreme weather, this also comes from direction from the BNSF Dispatcher. Added ST SCR Right of Way Maintenance Plan, 2014.	Documentation Complete-Accepted
31	0003	0015	0001	Guideway	PDB-PHA	Inspection and Maintenance	Track Inspection and Maintenance	Derailment	Business / Industry / Yard Train Turnout Failures	Potential fatality, major/minor injury, property damage, service disruption.	1D	1. Ensure monthly inspections according to 49 CFR 213.235 - Inspection of switches, track crossings, and lift rail assemblies or other transition devices on moveable bridges; 2. Future PTC project; 3. Develop procedures for maintenance and proper operation of switches; 4. SOP's for operations and communication with control; 5. Signal system detects train cars on tracks; 6. Signal system detects position of switches	1E	1. PTC point located at all switches and monitored; 2. All switches are maintained by MOW; 3. ST Security, MOW, and Property Patrol and Inspections; 3. Switch heaters provided at power switches; 4. Reports - CWR plans, track inspection, signal inspection, ROW safety plan	Reports - CWR plans, track inspection, signal inspection, ROW safety plan	34 11 50 RAILROAD MAINTENANCE OF WAY-SUBMITTALS-1.04.A.3; 34 42 10 CENTRALIZED TRAFFIC CONTROL SYSTEM- SUBMITTALS-1.04.D	Added Submittals for Railroad MOW (01809-Track Inspection Reports-Oct-Dec 2016 E, 00432-Track and Signals Maintenance Records - Jan 2016, & 00817-Adoption of Sound Transit Bridge Safety Management; REC 1808-Track Inspection Reports - Feb-Oct 2016, REC 1990-Maintenance of Way Summary Reports -Oct 2015 to March 2017. REC-02268, 344216.19-002.002 1.04D, REC 2268 Fiber Optic Test Results - Long Haul and Distribution, NET 7/10/17 (see PDB Verification Documents folder)	Refer to Verification Documents for Sounder Inspection & Maintenance (IM) Manual 7/15/2012; Property Patrol and Inspections	Exception Documentation Completed-Accepted	
32	0003	0015	0001	Guideway	PDB-PHA	Inspection and Maintenance	Track Inspection and Maintenance	Fire/smoke under bridge structure	Adjacent fire/smoke spreads; ignition of flammable materials & Vehicle accident under bridge structure	Potential loss of load bearing capacity, potential major/minor injury, potential fatality, derailment, equipment and property damage, service disruption.	1D	1. Design structures with non-combustible materials; 2. Design equipment and systems to eliminate flammable materials; 3. Develop inspection and maintenance procedures for underbrush/debris clearance from underpasses according to 49 CFR 213.37 - Vegetation; 4. Develop procedures for fire incidents; 5. Inspection and maintenance procedures according to 49 CFR 237 Bridge Safety Standards; 6. SOP; 7. ST Security/MOW/Property Patrols and inspections on current Sounder track	1E	1. Alignment meets design criteria; 2. ROW clearances from structures; 3. Track inspection; 4. Vegetation clearing; 5. MOW, Property and Security patrols; 6. Bridge Safety Management Program	Work Plan	34 11 50 RAILROAD MAINTENANCE OF WAY-1.04.A.4, SUBMITTALS, A. Reports,	Added Submittal for Railroad MOW Bridge Safety Mgmt Program (00817)		Added Right of Way Maintenance Plan to SSIMS PDB Verification Documents folder.	Documentation Complete-Accepted
33	0003	0015	0001	Guideway	PDB-PHA	Inspection and Maintenance	Track Inspection and Maintenance	Foreign object(s) on alignment	Fallen trees or power lines	Potential track damage, potential derailment, potential major/minor injury, potential fatality, equipment damage, service disruption.	1C	1. Inspection and maintenance procedures to verify structural integrity of structures above and adjacent to alignment according to 49 CFR 213.233 - Track inspections 2. Inspection and maintenance procedures according to 49 CFR 237 Bridge Safety Standards. 3. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations.	1D	1. Adequate ROW track clearance 2. ROW inspection procedures	N/A	IFC Volume 1 - Existing Conditions/Demolition Plans Sheets 108 - 163 Specifications 02 41 00, 3.03 31 11 00, 3.02D ;All trees and limbs within 25 ft of track centerline were to be removed per the demolition plans. There were specific areas delineated in the contract plans for tree removal		Track is inspected as per CFR Part 213- Maintenance contractor hi-rails ST mainline twice per week as per FRA requirement. Right of Way Maintenance Plan added to SSIMS PDB Verification Documents folder	Documentation Complete-Accepted	

SOUND TRANSIT SOUNDER COMMUTER RAIL



AGENCY SAFETY AND SECURITY CERTIFICATION FOR PROJECT: POINT DEFIANCE BYPASS TRACK & SIGNAL IMPROVEMENTS

Element Certificate of Conformance

Completion of this Certificate verifies that the Certifiable Element listed herein complies with all applicable Safety, Fire/Life, Security and Systems Assurance requirements for the Point Defiance Bypass Project (PDB) Track & Signals Improvements Project. Element Certification Exceptions are listed below (if applicable).

Element: **SIGNALING**

Exceptions:

Submittals for Stage 6, 7, 8 Test Reports and Fence As-Built – Approved and uploaded to SSIMS

[Redacted Signature]

Tom Dean
PDB Construction Manager
Sound Transit

9/14/17
Date

[Redacted Signature]

Jodi Mitchell
PDB Rail Activation Lead
Sound Transit

9/15/17
Date

[Redacted Signature]

Andrew Rawls
Sr. Engineer, Systems Engineering & Integration
Sound Transit

9-15-17
Date

[Redacted Signature]

Branden Porter
Transit System Security Program
Sound Transit

9-15-17
Date

[Redacted Signature]

Weylin Doyle
Commuter Rail Operations Manager
Sound Transit

9/15/17
Date

[Redacted Signature]

Robert Taaffe
Sr. Construction & System Safety Manager
Sound Transit

9.15.17
Date

Point Defiance Bypass Project
 Safety Certification Checklist - Element 6 - Signaling

ID	Element Number	System Number	CI Number	Element Name	Item Source	System Name	CI Name	Hazard Description	Potential Cause	Potential Effect	Initial Risk Index	Proposed Mitigation	Residual Risk Index	Safety and Security Requirements	Suggested Construction Documentation	Design Conformance	Construction Conformance	Testing Conformance	Operational Conformance	Status
34	0006	0001	0003	Signaling	PDB-PHA	Train Control	Train Detection	Collision between train and roadway vehicle at grade crossing or in the alignment	Insufficient train approach warning time related to train speed	Potential fatality, major/minor injury, property damage, service disruption.		1. Design to ensure grade crossing warning time is correlated with train speed; 2. System integration testing for grade crossings to ensure sufficient warning time; 3. Design train detection circuits on fail-safe principle per MUTCD standard; 4. Provide appropriate signage according to MUTCD standards (speed limits), and safety warning devices (Cross buck, track signs, etc.); 5. Provide appropriate lane barriers and active/passive warning devices; 6. Channelization; 7. Ensure proper sight lines; 8. Train operators to follow FRA regulations for grade crossing; 9. Emergency Notification System (ENS) signs posted conspicuously; 10. Future PTC		1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines (painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signal Pre-emption; 11. PTC regulated train speed; 12. Commissioning & testing during System Integration	Test Reports	34 42 15 RAILROAD GRADE CROSSING SIGNALS-SUBMITTALS-1.05.A.2		Added CRE-02512-Intersection Interconnect Signoff to SSIMS Verification Documents. Added test results for Stage 6, 7, & 8 and Matrix to Verification Documents folder. See Matrix items 38, 39, 43, 40, 31, 32, 47 (RR Grade Crossing Signals)	GCOR Operating Rules, Apr 7, 2010 added to SSIMS Verification Documents	Exception Documentation Completed-Accepted
35	0006	0001	0007	Signaling	PDB-PHA	Train Control	PTC	Derailment	Train speed not within specified limits at track curves	Potential derailment, equipment damage, major/minor injuries	1C	1. Ensure curves; elevation and speed limitations are designed according to 49 CFR 213.57; 2. Develop inspection and maintenance procedures according to 49 CFR 213.233 Track Inspection; 3. Future PTC; 4. Timetable	1D	1. PTC regulated speeds according to timetables. 2. SOP		This would be in the WSDOT PTC Contract added PTC Schedule Flow Chart, WSDOT-ST Collaboration Meeting #18 and WSDOT PDB PTC 10 week look-ahead 3-29-17, see PDB Verification Documents for PTC Phase II Scope of Work		Inspection and maintenance procedures according to 49 CFR 213.233 Track Inspection Reference ROW Maintenance Plan in SSIMS PDB Verification Documents	Documentation Complete-Accepted	
36	0006	0003	0001	Signaling	PDB-PHA	Grade Crossing Warning System	Signals	Crossing gate preview time is less than 20 seconds.	1. Train approach circuit not long enough for train speeds; 2. Coordination with traffic signals and or railway signal system does not provide timely advance warning.	Minimum 20 second preview time is nationally recognized and taught in all driver education classes. * Road vehicle enters crossing directly or drives around gate causing collision. * Potential for injury or death.	2B	1. Test Procedures (Part of CPM); 2. Design crossing starts and program crossing control system to accommodate new track and higher speed using industry standards. Complete FRA in-service and monthly testing to assure proper operation.	2D	1. Test Procedures (Part of CPM); 2. Off site testing notification	Work Plan; Test Report	34 42 15 RAILROAD GRADE CROSSING SIGNALS-SUBMITTALS-1.05.A.1-2	Submittals for Test Procedures include Stage 1 (01458), Stage 3 (01403), Stage 4 (01180 & 01418), Stage 5 (01358), and Stage 6 (01711, 01842). Test Results added to Verification Documents CP Rill (01516), Stage 4 (01779), Stage 5 (01841), Stage 1 (01709), Stage 3 (01710) .	Added REC-02300 Field Test Train Recorded data and Stage 6, 7, & 8 Testing Results and Matrix to SSIMS Verification Documents folder. See Matrix tests 38, 39, 43, 40, 31, 32 for Grade Crossing Signals. (Less than double the design warning times at all speeds.)	Exception Documentation Completed-Accepted	
37	0006	0003	0001	Signaling	PDB-PHA	Grade Crossing Warning System	Signals	Crossing gate preview time greater than 30 seconds.	Train approach circuit too long for train speeds.	* Driver becomes impatient*. Potential for injury or death.		1. Test Procedures (Part of CPM); 2. Design crossing starts and program crossing control system to accommodate new track and higher speed using industry standards. Complete FRA in-service and monthly testing to assure proper operation; 3. Motorist behavior issues would be addressed with outreach and education program.		Test Reports (Part of CPM)	Stage 6, 7, 8 Test Reports	34 42 15 RAILROAD GRADE CROSSING SIGNALS-SUBMITTALS-1.05.A.2	Added test results for Stage 6, 7, & 8 and Matrix to Verification Documents folder. See Matrix tests 38, 39, 43, 40, 31, 32 for Grade Crossing Signals. (Less than double the design warning times at all speeds.)	Outreach documents added	Exception Documentation Completed-Accepted	
38	0006	0003	0001	Signaling	PDB-PHA	Grade Crossing Warning System	Signals	Collision between train and grade crossing user(s)	Obstructed sight distances	Potential fatality, major/minor injury, property damage, service disruption.	1C	1. Clearing of vegetation to allow adequate sight distance; 2. Removal/relocation of objects obstructing sight distance; 3. Design roadways with clear lines of sight; 4. Emergency Notification System (ENS) signs posted conspicuously; 5. Pedestrian gates for high volume pedestrian traffic; 6. Arrange diagnostic team to review proposed grade crossing design.	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines (painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Clearing of vegetation to allow adequate sight distance; 11. Trespass fence height 42" for 250ft from the grade crossing; 12. Emergency Notification System (ENS) signs posted conspicuously; 13. On site testing notification	IDR / Photo each grade crossing	31 11 00 CLEARING AND GRUBBING-Part 3, EXECUTION; 34 11 50 RAILROAD MAINTENANCE OF WAY-SUBMITTALS-1.04.B	IDR ML Haz. ID 38 04-28-17		Documentation Complete-Accepted	
39	0006	0003	0001	Signaling	PDB-PHA	Grade Crossing Warning System	Signals	Collision between train and grade crossing user(s)	Driving or walking around gates	Potential fatality, major/minor injury, property damage, service disruption.	1C	1. Fencing along both sides of tracks around grade crossings (to enforce channelization); 2. Channelization; 3. No trespassing signage; 4. Public Education for Rail Safety; 5. Physical barriers to prevent vehicles from going around gates.	1D	1. Fail-Safe Crossing, 2. Pavement Markings, 3. Cross buck Signs, 4. Red Flashing Signals, 5. Automatic Gates, 6. Stop Lines (painted), 7. Audible Warning Bells, 8. Wayside Horns, 9. Constant warning train detection, 10. Public Outreach and Education, 11. Signal Pre-emption Coordination, 12. Enforcement (Police/Security), 13. Channelization according to Plans	IDR showing channelization and signage, Fence As-Builts	Fencing Track Plan and Profiles Volume 1, TAO0 - TA73; Roadway Plan and Profile - Volume 2, RD126-RD132; Roadway Sign and Channelization and Signal Plan Volume 2, RDS01 - RDCH10	IDR ML Haz. ID 39 04-28-17, S34150-REC-02190 SUB 017839-011.001 1.02A Fence As-Builts. See PDB Verification Documents for PDB Outreach June 2017, Outreach_Folio_PDB_2017_FINAL, AmtrakCascades_Outreach_PDB_Testing_Flyer_122 916_FINAL		Exception Documentation Completed-Accepted	

SOUND TRANSIT SOUNDER COMMUTER RAIL



AGENCY SAFETY AND SECURITY CERTIFICATION FOR PROJECT: POINT DEFIANCE BYPASS TRACK & SIGNAL IMPROVEMENTS

Element Certificate of Conformance

Completion of this Certificate verifies that the Certifiable Element listed herein complies with all applicable Safety, Fire/Life, Security and Systems Assurance requirements for the Point Defiance Bypass Project (PDB) Track & Signals Improvements Project. Element Certification Exceptions are listed below (if applicable).

Element: **COMMUNICATIONS**

Exceptions:

None

[Redacted Signature] *9/5/17*
Date
Tom Dean
PDB Construction Manager
Sound Transit

[Redacted Signature] *9/8/17*
Date
Jodi Mitchell
PDB Rail Activation Lead
Sound Transit

[Redacted Signature] *9-7-17*
Date
Andrew Rawls
Sr. Engineer, Systems Engineering & Integration
Sound Transit

[Redacted Signature] *08 SEP 17*
Date
Branden Porter
Transit System Security Program
Sound Transit

[Redacted Signature] *8-17*
Date
Weylin Doyle
Commuter Rail Operations Manager
Sound Transit

[Redacted Signature] *9-8-17*
Date
Robert Taaffe
Sr. Construction & System Safety Manager
Sound Transit

Point Defiance Bypass Project

Safety Certification Checklist - Element 7 - Communication

ID	ElementNumber	SystemNumber	CI Number	ElementName	ItemSource	SystemName	CI Name	HazardDescription	PotentialCause	PotentialEffect	InitialRiskIndex	ProposedMitigation	ResidualRiskIndex	SafetyAndSecurityRequirements	SuggestedConstructionDocumentation	DesignConformance	ConstructionConformance	TestingConformance	OperationalConformance	Status
40	0007	0005	0002	Communications	PDB-PHA	Communication Transmission System	Fiber Optic Network	Loss of monitoring capability at the Rail Control Center (RCC).	Fiber cable cut.	Potential for serious injuries.* Damage to equipment and facilities. Potential minor environmental hazard.	3C	1. Incorporate redundant fiber optic lines as part of project 2. Test Procedures. 3. As Built	3D	Test procedures, Test Reports, As built drawings	Work Plans, Test Reports, As-buits	34 42 16.13 FIBER OPTIC DISTRIBUTION SYSTEM-SUBMITTALS-1.05.C-E; 34 42 16.19 TESTING, IDENTIFICATION AND ADMINISTRATION OF FIBER INFRASTRUCTURE-SUBMITTALS-1.04.C-D, ADMINISTRATION-3.04.B	added REC-02209 Fiber Optic Ductbank As-Built and REC-02114 Fiber Optic Vaults As-Built	Test Procedures include Stage 1 (01458), Stage 3 (01403), Stage 4 (01180 & 01418), Stage 5 (01358) & Stage 6 (01711, 01842, 01913). Test Results Include CP Rill (01516), Stage 4 (01779), Stage 5 (01841), Stage 1 (01709), Stage 3 (01710)	N/A	Certified

SOUND TRANSIT SOUNDER COMMUTER RAIL



AGENCY SAFETY AND SECURITY CERTIFICATION FOR PROJECT: POINT DEFIANCE BYPASS TRACK & SIGNAL IMPROVEMENTS

Element Certificate of Conformance

Completion of this Certificate verifies that the Certifiable Element listed herein complies with all applicable Safety, Fire/Life, Security and Systems Assurance requirements for the Point Defiance Bypass Project (PDB) Track & Signals Improvements Project. Element Certification Exceptions are listed below (if applicable).

Element: **TRAFFIC CONTROL**

Exceptions:

Submittals for Stage 6, 7, 8 Test Reports – approved and uploaded to SSIMS

Tom Dean
PDB Construction Manager
Sound Transit

9/14/17
Date

Jodi Mitchell
PDB Rail Activation Lead
Sound Transit

9/15/17
Date

Andrew Rawls
Sr. Engineer, Systems Engineering & Integration
Sound Transit

9-15-17
Date

Branden Porter
Transit System Security Program
Sound Transit

4-15-17
Date

Weylin Doyle
Commuter Rail Operations Manager
Sound Transit

9/15/17
Date

Robert Taaffe
Sr. Construction & System Safety Manager
Sound Transit

9-15-17
Date

Point Defiance Bypass Project
 Safety Certification Checklist - Element 9 - Traffic Control

ID	Element Number	System Number	CI Number	Element Name	Item Source	System Name	CI Name	Hazard Description	Potential Cause	Potential Effect	Initial Risk Index	Proposed Mitigation	Residual Risk Index	Safety and Security Requirements	Suggested Construction Documentation	Design Conformance	Construction Conformance	Testing Conformance	Operational Conformance	Status
41	0009	0004	0000	Traffic Control	PDB-PHA	Control of Train Interface with Traffic	Control of Train Interface with Traffic	Crossing gate preview time is less than 20 seconds.	Coordination with traffic signals and or railway signal system does not provide timely advance warning.	Minimum 20 second preview time is nationally recognized and taught in all driver education classes. * Road vehicle enters crossing directly or drives around gate causing collision. * Potential for injury or death.	2B	1. Traffic signal testing and turn on; 2. Design crossing starts and program crossing control system to accommodate new track and higher speed using industry standards. Complete FRA in-service and monthly testing to assure proper operation.	2D	1. Traffic Signal testing and turn on; 2. Test Procedures (Part of CPM); 3. Test Reports (Part of CPM); 4. On site testing notification; 5. Off site testing notification; 6. Qualifications of Railroad Signal and Communications Engineer; 7. Test equipment and service manuals; 8. Joint Railroad/Roadway Authority Interconnection Inspection Forms	Test Report ;Work Plan ;Qualification of Railroad Signal Engineer,	34 41 13 TRAFFIC SIGNALS 2.02.A.7.a, TRAFFIC SIGNAL MATERIALS FOR STREETS, ROADWAYS, AND PARKING LOTS OWNED OR MAINTAINED BY JURISDICTIONS OTHER THAN SOUND TRANSIT; 3.02.A.8 TRAFFIC SIGNAL MATERIALS FOR STREETS, ROADWAYS, AND PARKING LOTS OWNED OR MAINTAINED BY JURISDICTIONS OTHER THAN SOUND TRANSIT; 34 42 15 Railroad Grade Crossing Signals-1.05.A.1-4, 2.11.F, 00 22 13 Supplemental Responsible Bidder Criteria-1.03	Submittals Controller Cabinets for WSDOT Intersections REC-00846, Spare Controller Cabinets, Signal Heads and LED B REC-00737, Joint Railroad/Roadway Interconnect Inspection Form for Barkdale Crossing, Joint Railroad/Roadway Interconnect Inspection Forms for 41st Division and North Thorne Lane, Monthly Progress Reports REC-02267 7/10/17, WSDOT and Comm System Training Sign In REC-02211. Test Reports for Stage 6-REC-2303, Stage 7-REC-2318, & Stage 8-REC-2312, REC-2302 CTC Warranty and OandMs, CRE-2365 CTC Training Program	Added test results for Fiber Optic Vault Grounding, Intersection Interconnect Sign off, and Traffic Signals Controller Cabinet. Added to SSIMS Verification Documents folder CRE-02512 Intersection Interconnect Sign Off, REC-02300-Field Test Train Recorded Data, Test Reports for Stage 6 (6-REC-2303), 7 (REC-2318), 8 (REC-2312) and Matrix. See Matrix items 38, 39, 43, 40, 31, 32 for crossing signals. (Less than double the design warning times at all speeds)	GCOR Apr 7, 2010, ST Track, Train Control & Communication Depts - I & M Manual July 15, 2012	Documentation Complete - Accepted
42	0009	0004	0000	Traffic Control	PDB-PHA	Control of Train Interface with Traffic	Control of Train Interface with Traffic	Collision between train and grade crossing user(s)	Complex intersection geometry resulting in motorists and pedestrian judgment errors	Potential fatality, major/minor Injury, property damage, service disruption.	1C	1. Ensure safe right-of-way design, appropriate signage, encroachment detection/warning devices, and public education; 2. Arrange diagnostic team to review proposed grade crossing design; 3. Continued review of pedestrian/motorists intersection design through final site inspection and test; 4. Pedestrian gates	1D	1. Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Public Outreach and Education; 11. Signal Pre-emption Coordination; 12. New traffic signals according to plans		Grading and Drainage, Roadway Alignment, Roadway Details, Roadway Plan and Profile, Roadway Channelization, and Roadway Preemption, signal, and wiring diagram Plan Sheets; 34 42 15 -Railroad Grade Crossing Signals; 32 16 23 -Concrete Curbs & Gutters; 32 16 23 -Sidewalks; 32 17 23 - Pavement Markings; 32 31 13; 34 41 13 - Traffic Signals; 34 17 13 - 2.01	Submittals for RR Grade Crossing Signals (01526 & 01525), Traffic Signal Materials (00813, 00682, 01157, 00871, 01158, & 01790), and Vehicle Barriers (01559). Add IDR showing finished work 04-28-19. See PDB Verification Documents folder for Outreach verification.	Added CRE-02512 Intersection Interconnect Signoff and Stage 6, 7, 8 Test Reports and Matrix to SSIMS Verification Documents folder. See Matrix items 6, 44, 50, 47 for Signal Testing of Equipment Grounding.		Exception Documentation Completed - Accepted
43	0009	0005	0000	Traffic Control	PDB-PHA	Sign Design	Sign Design	Collision between train and pedestrian(s)	Pedestrians unaware of double track or increase in frequency and speed of trains	Potential fatality, major/minor Injury, service disruption.	1C	1. "LOOK" or "High Speed Trains Travel in Both Directions" signage; 2. Other signage according to MUTCD standards; 3. Emergency Notification System (ENS) signs posted conspicuously; 4. Adjacent Residence / Business Public Education for Rail Safety; 5. Install adequate fencing near crossings and areas where intrusion or trespass may be frequent or most likely; 6. Install adequate safety warning devices at crossings 7. Install adequate signage near legal crossings and along track way.	1D	1. Public Outreach and Education; 2. Signage according to MUTCD standards as indicated in plans; 3. Emergency Notification System (ENS) signs posted conspicuously; 4. Adjacent Residence / Business Education for Rail Safety; 5. Install adequate fencing as indicated on plans. (Coordination of fencing between ST and WSDOT); 6. Install adequate safety warning devices at crossings; 7. Install adequate signage near legal crossings and along track way; 8. Product Data for permanent signs	Product Data; Fence As Builts; IDR / Photo at crossings	10 14 53 TRAFFIC SIGNAGE-SUBMITTALS-1.03.A	Submittal for Permanent Traffic Signage (01778), IDR ML Haz. ID 43 05-01-17, S34150-REC-02190 SUB 017839-011.001 1.02A Fence As-Builts	Added Safety Outreach documents to SSIMS PDB Verification Documents folder		Exception Documentation Completed - Accepted
44	0009	0005	0000	Traffic Control	PDB-PHA	Sign Design	Sign Design	Collision between train and grade crossing user(s)	Lack of advance warning signs	Potential fatality, major/minor Injury, property damage, service disruption.	1C	1. Design grade crossing according to MUTCD guidelines; 2. Channelization; 3. Clear sight distances of track from roadway; 4. Emergency Notification System (ENS) signs posted conspicuously; 5. Pedestrian gates for high volume pedestrian traffic; 6. Ensure safe right-of-way design, appropriate signage and public education; 7. Arrange diagnostic team to review proposed grade crossing design; 8. 20 second warning time	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signage according to plans; 11. Channelization; 12. Clear sight distances of track from roadway; 13. Emergency Notification System (ENS) signs posted conspicuously	IDR and Photo at each crossing	Grading and Drainage, Roadway Alignment, Roadway Details, Roadway Plan and Profile, Roadway Channelization, and Roadway Preemption, signal, and wiring diagram Plan Sheets; 321613, CONCRETE CURBS AND GUTTERS, 3.01; 321623, PAVEMENT MARKINGS, 3.01; 323113, 3.01; 344113, TRAFFIC SIGNALS, 2.01 & 2.02; 344215, RAILROAD GRADE CROSSING SIGNALS, 1.13; 341713, 2.01	Submittals; RR Grade Crossing Signals (01526 & 01525); Traffic Signal Materials (00813, 00682, 01157, 00871, 01158, & 01790), and Vehicle Barriers (01559); added REC-00737-Spare Controller Cabinets, Signal Heads and LED Blank-Out Signs; IDR ML Haz. ID 44 05-01-17.	Added test results for Stage 6, 7, & 8 and Matrix to Verification Documents folder. See Matrix items 6, 44, 50, 47 for Signal Testing of Equipment Grounding.		Exception Documentation Completed - Accepted
45	0009	0006	0000	Traffic Control	PDB-PHA	Pavement Marking Design	Pavement Marking Design	Collision between train and roadway vehicle at grade crossing or in the alignment	Highway vehicle fails to stop at stop bar and front end fouls tracks	Potential fatalities, major/minor Injuries, property damage, service disruption.	1C	1. Design grade crossing according to MUTCD guidelines; 2. Locate crossing gate sufficiently back to account for vehicles failing to stop at stop bar; 3. Organize diagnostic team to review grade crossing design; 5. Illuminate crossing; 6. Improve vehicle sight distance of crossing approach; 7. Coordinate traffic control device upgrades and design intersection interface with adjacent intersection traffic signals (Traffic Pre-emption); 8. Emergency Notification System (ENS) signs posted conspicuously; 9. Arrange diagnostic team to review proposed grade crossing design.	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signal Pre-emption; 11. Enforcement (Police/Security); 12. Crossing Illumination; 13. Channelization; 14. Public outreach and Education; 15. Product Data	Product Data, IDR and Photo at each crossing	32 17 23 PAVEMENT MARKINGS-SUBMITTALS-1.03.A	Submittals for Pavement Markings (01727 & 01848), IDR ML Haz. ID 45 05-01-17	Added Outreach documents to SSIMS PDB Verification Documents folder		Documentation Complete - Accepted
46	0009	0007	0000	Traffic Control	PDB-PHA	Traffic Signal Controller	Traffic Signal Controller	Collision between train and grade crossing user(s)	Crossing intersections improperly engineered (inadequate warning devices, incorrect timing, inadequate stopping distance, inadequate traffic control, etc.)	Potential fatality, major/minor Injury, property damage, service disruption.	1C	1. Ensure safe right-of-way design, appropriate signage and public education; 2. Arrange diagnostic team to review proposed grade crossing design; 3. Emergency Notification System (ENS) signs posted conspicuously; 4. Traffic Signal Pre-emption.	1D	1. Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Public Outreach and Education; 11. Signal Pre-emption Coordination; 12. New traffic signals according to plans	IDR and Photo at each crossing	Grading and Drainage, Roadway Alignment, Roadway Details, Roadway Plan and Profile, Roadway Channelization, and Roadway Preemption, signal, and wiring diagram Plan Sheets; 34 42 15, 105.D; 32 16 13, 3.01; 32 16 23, 3.01; 32 17 23, 3.01; 32 17 13, 3.01; 34 41 13, 2.01 & 2.02; 34 42 15, 1.13; 34 17 13, 2.01	Submittals; RR Grade Crossing Signals (01526 & 01525); Traffic Signal Materials (00813, 00682, 01157, 00871, 01158, & 01790); REC-00737 for Spare Controller Cabinets, Signal Heads and LED Blank-Out Signs, IDR ML Haz. ID 46 05-01-17	Added test results for Stage 6, 7, & 8 and Matrix to Verification Documents folder. See Matrix test 6, 44, 50, 47 for Signal testing of equipment grounding.	Added Outreach documents to SSIMS PDB Verification Documents folder	Exception Documentation Completed - Accepted
47	0009	0007	0000	Traffic Control	PDB-PHA	Traffic Signal Controller	Traffic Signal Controller	Collision between train and roadway vehicle at grade crossing or in the alignment	Truck or other long vehicle stops on tracks due to traffic backup from adjacent intersection controlled by traffic signals	Potential major/minor injury, potential fatality, derailment, equipment damage, service disruption.	1B	1. Design grade crossing according to MUTCD guidelines; 2. Locate crossing gate sufficiently back to account for vehicles failing to stop at stop bar; 3. Organize diagnostic team to review grade crossing design; 5. Illuminate crossing; 6. Improve vehicle sight distance of crossing approach; 7. Coordinate traffic control device upgrades and design intersection interface with adjacent intersection traffic signals (Traffic Pre-emption); 8. Emergency Notification System (ENS) signs posted conspicuously.	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signal Pre-emption and coordination with adjacent traffic signals (Commissioning and testing during System Integration); 11. Enforcement (Police/Security); 12. Crossing Illumination; 13. Channelization; 14. Public Outreach and Education; 15. Queue cutter according to plans; 16. Additional signals according to plans	IDR and Photo at each crossing	Grading and Drainage, Roadway Alignment, Roadway Details, Roadway Plan and Profile, Roadway Channelization, and Roadway Preemption, signal, and wiring diagram Plan Sheets; 34 42 15, 1.05.D; 32 16 13, 3.01; 32 17 23, 3.01; 32 17 13, 3.01; 34 41 13, 2.01 & 2.02; 34 42 15, 1.13; 34 17 13, 2.01	Submittals RR Grade Crossing Signals (01526-Factory Test Reports - MP 18.45 Remote Crossing, 01525-Factory Test Reports - MP 12.79 N, Thorne Lane), Traffic Signal Materials (00813-Traffic Signal Video Detectors, 00682-Backup Power Generator, 01157 & 00871-WSDOT Traffic Poles and Hardware for Thorne 41st and Barkdale, 01158-Detector Cards and Cabinet Base Riser , & 01790-7.5kVA Transformers at WSDOT Intersections) and Vehicle Barriers (01559-Beam Guardrail), 00737 for Traffic Signal Materials ST Owned, REC 00846-Controller Cabinets for WSDOT Intersections, REC 01248-Buy America Certificates for Econolite Products, REC 02029-Spare Traffic Controllers. added IDR ML Haz. ID 47 05-01-17	Queue Cutter Testing; CRE-002512-Intersection Interconnect Sign Off, Added test results for Stage 6, 7, & 8 and Matrix to Verification Documents folder. See Matrix test 6, 44, 50, 47 for Signal testing of equipment grounding.	Outreach documents added to SSIMS PDB Verification Documents folder.	Exception Documentation Completed - Accepted
48	0009	0010	0000	Traffic Control	PDB-PHA	Detection Equipment	Detection Equipment	Collision between train and roadway vehicle at grade crossing or in the alignment	Traffic queues backup at rush hour and exceed ramp storage length due to accident or heavy traffic on Interstate Highway I-5 and result in vehicles stopping on tracks	Potential fatality, major/minor Injury, property damage, service disruption.	1B	1. Provide traffic signal system with pre-emption; 2. Design train detection circuits on fail-safe principle per MUTCD standard; 3. Provide appropriate signage (speed limits), and safety warning devices (Cross buck, track signs, etc.); 4. Provide appropriate lane barriers and active/passive warning devices; 5. Channelization and unmountable curbs; 6. Ensure proper sight lines; 7. Pavement marking clearly indicating fouling area; 8. Pullout lanes for each lane of traffic; 9. Emergency Notification System (ENS) signs posted conspicuously; 10. Arrange diagnostic team to review proposed grade crossing design; 11. Consider traffic control police at crossing for special situations	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns ; 9. Constant warning train detection; 10. Signal Pre-emption and coordination with adjacent traffic signals (Commissioning and testing during System Integration); 11. Enforcement (Police/Security); 12. Crossing Illumination; 13. Channelization; 14. Public Outreach and Education; 15. Queue cutter according to plans; 16. Additional signals according to plans; 17. Ramp Meter integration; 18. JBLM & Camp Murray to Notify Railroad of unusual traffic situation; 19. Emergency Notification System (ENS) signs posted conspicuously; 20. Traffic control police at crossing for special situations	IDR and Photo at each crossing	Grading and Drainage, Roadway Alignment, Roadway Details, Roadway Plan and Profile, Roadway Channelization, and Roadway Preemption, signal, and wiring diagram Plan Sheets; 34 42 15, 1.05.D; 32 16 13, 3.01; 32 16 23, 3.01; 32 17 23, 3.01; 2 31 13, 3.01; 34 41 13, 2.01 & 2.02; 34 42 15, 1.13; 34 17 13, 2.01	Submittals RR Grade Crossing Signals (01526-Factory Test Reports - MP 18.45 Remote Crossing, 01525-Factory Test Reports - MP 12.79 N, Thorne Lane), Traffic Signal Materials (00813-Traffic Signal Video Detectors, 00682-Backup Power Generator, 01157 & 00871-WSDOT Traffic Poles and Hardware for Thorne 41st and Barkdale, 01158-Detector Cards and Cabinet Base Riser , & 01790-7.5kVA Transformers at WSDOT Intersections), and Vehicle Barriers (01559-Beam Guardrail), 00737 for Traffic Signal Materials ST Owned, REC 00846-Controller Cabinets for WSDOT Intersections, REC 01248-Buy America Certificates for Econolite Products, REC 02029-Traffic Controllers. added IDR ML Haz. ID 48 05-01-17	Queue Cutter Testing; REC 02512-Intersection Interconnect Sign Off. Added test results for Stage 6, 7, & 8 and Matrix to Verification Documents folder. See Matrix tests 6, 44, 50, 47 for Signal testing of equipment grounding	Added Outreach documents to SSIMS PDB Verification Documents folder. Requires JBLM Outreach (see 18. Safety/Security Requirements)	Exception Documentation Completed - Accepted

Point Defiance Bypass Project
 Safety Certification Checklist - Element 9 - Traffic Control

ID	Element Number	System Number	CI Number	Element Name	Item Source	System Name	CI Name	Hazard Description	Potential Cause	Potential Effect	Initial Risk Index	Proposed Mitigation	Residual Risk Index	Safety and Security Requirements	Suggested Construction Documentation	Design Conformance	Construction Conformance	Testing Conformance	Operational Conformance	Status
49	0009	0010	0000	Traffic Control	PDB-PHA	Detection Equipment	Detection Equipment	Collision between train and roadway vehicle at grade crossing or in the alignment	Traffic queues backup could exceed storage length and result in vehicles stopping on tracks due to proximity to freeway ramp and frontage road at Clark Rd entrance to military base, other traffic overflow situations	Potential fatality, major/minor injury, property damage, service disruption.	1B	1. Provide traffic signal system with pre-emption; 2. Design train detection circuits on fail-safe principle per MUTCD standard; 3. Provide appropriate signage (speed limits), and safety warning devices (Cross buck, track signs, etc.); 4. Provide appropriate lane barriers and active/passive warning devices; 5. Channelization and unmountable curbs; 6. Ensure proper sight lines; 7. Pavement marking clearly indicating fouling area; 8. Pullout lanes for each lane of traffic; 9. Emergency Notification System (ENS) signs posted conspicuously; 10. Arrange diagnostic team to review proposed grade crossing design; 11. Consider traffic control police at crossing for special situations	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signal Pre-emption and coordination with adjacent traffic signals (Commissioning and testing during System Integration); 11. Enforcement (Police/Security); 12. Crossing Illumination; 13. Channelization; 14. Public Outreach and Education; 15. Queue cutter according to plans; 16. Additional signals according to plans; 17. Ramp Meter Integration; 18. JBLM & Camp Murray to Notify Railroad of unusual traffic situation; 19. Emergency Notification System (ENS) signs posted conspicuously; 20. Traffic control police at crossing for special situations	IDR and Photo at each crossing	Grading and Drainage, Roadway Alignment, Roadway Details, Roadway Plan and Profile, Roadway Channelization, and Roadway Preemption, signal, and wiring diagram Plan Sheets; 34 42 15, 1.05.D; 32 16 13, 3.01; 32 16 23, 3.01; 32 17 23, 3.01; 32 31 13, 3.01; 34 41 13, 2.01 & 2.02; 34 42 15, 1.13; 34 17 13, 2.01	Submittals for RR Grade Crossing Signals (01526 & 01525), Traffic Signal Materials (00813, 00682, 01157, 00871, 01158, & 01790), and Traffic Barriers (01559). 00737 for Traffic Signal Materials ST Owned, 00846-Controller Cabinets for WSDOT Intersections, 01248-America Certificates for Econolite Products, 02029 Spare Traffic Controllers, added IDR ML Haz. ID 49 05-01-17	Queue Cutter Testing; REC-02512 Intersection Interconnect Sign Off, Added test results for Stage 6, 7, & 8 and Matrix to Verification Documents folder. See Matrix tests 38, 39, 43, 40, 31, 32, 47 for Signal Testing of Equipment Grounding.	Outreach documents added to SSIMS PDB Verification Documents folder. Requires Outreach coordination with JBLM	Final Documentation Completed Accepted
50	0009	0010	0000	Traffic Control	PDB-PHA	Detection Equipment	Detection Equipment	Collision between train and roadway vehicle at grade crossing or in the alignment	Traffic queues backup and stop on tracks due to High Security Level Inspection or Emergency Shutdown at Military Bases	Potential fatality, major/minor injury, property damage, service disruption.	1B	1. Provide traffic signal system with pre-emption. 2. Design train detection circuits on fail-safe principle per MUTCD standard. 3. Provide appropriate signage (speed limits), and safety warning devices (Cross buck, track signs, etc.) 4. Provide appropriate lane barriers and active/passive warning devices. 5. Channelization and un-mountable curbs 6. Ensure proper sight lines 7. Pavement marking clearly indicating fouling area. 8. Install DO NOT STOP ON TRACKS signage 9. Emergency Notification System (ENS) signs posted conspicuously 10. Public education on Rail Safety	1D	1. "Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection. 10. Signal Pre-emption and coordination with adjacent traffic signals (Commissioning and testing during System Integration) 11. Enforcement (Police/Security) 12. Crossing Illumination 13. Channelization 14. Public Outreach and Education 15. Queue cutter according to plans 16. Additional signals according to plans	IDR and Photo at each crossing, Traffic Signal Materials	IFC Vol 1 Item 3-Sheets 387 - 390, RDS01 - RDCH10 IFC Vol 2 Items 2,6,13-Sheets 141 - 147, RRS01-RRS04 Items 1,3-Sheets 086 - 119, RDAL123-RDDET119, RD126-RD132 Items 4,5,7,8,9,10,12,16-Sheets 152 - 178, RDSG01-RDSG27 IFC Vol 3 Items 1,4,5,7,8,9,10,12,16-Sheets 47 - 79, SGTYP01-SGTYP40 Specifications 34 42 15 RAILROAD GRADE CROSSING SIGNALS - 1.05 D, 1.13 (Items 1,4,5, 7,8,9, 10); 32 16 13 CONCRETE CURBS AND GUTTERS - 3.01 (Item 1.13); 32 17 23 PAVEMENT MARKINGS - 3.01 (Items 2,6,13); 32 31 13 CHAIN LINK FENCES AND GATES - 3.01 (Items 11); 34 41 13 TRAFFIC SIGNALS - 1.01.B, 2.01 & 2.02 (Items 15, 10,12); 34 17 13 - 2.01 (Items 11,13)	IDR ML Haz. ID 50 05-01-17, REC 00846-Controller Cabinets for WSDOT Intersections, REC 01248-Buy America Certificates for Econolite Products, REC 02029-Spare Traffic Controllers	Added to SSIMS Queue cutter Testing CRE-02512 Intersection Interconnect Sign Off, test results for Stage 6, 7, & 8 and Matrix to Verification Documents folder. See Matrix Items 6, 44, 50, 47 for Signal Testing of Equipment Grounding.	Outreach documents filed on SSIIIMS PDB Verification Documents folder.	Final Documentation Completed Accepted
51	0009	0011	0000	Traffic Control	PDB-PHA	Preemption Equipment	Preemption Equipment	Collision between train and roadway vehicle at grade crossing or in the alignment	Stopping on Tracks	Potential fatality, major/minor injury, property damage, service disruption.	1B	1. Coordinate traffic control device upgrades and design intersection interface with adjacent intersection traffic signals (Traffic Pre-emption); 2. Provide sufficient queuing for traffic between grade crossing and adjacent intersection; 3. Install DO NOT STOP ON TRACKS signage ; 4. Pavement markings clearly indicating fouling area; 5. Public education on Rail Safety; 6. Evaluate crossing for potential sight obstructions; 7. Emergency Notification System (ENS) signs posted conspicuously in compliance with CFR Part 49. .	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns ; 9. Constant warning train detection; 10. Signal Pre-emption ; 11. Enforcement (Police/Security); 12. Crossing Illumination; 13. Channelization; 14. Public Outreach and Education; 15. Queue cutter according to plans; 16. Additional signals according to plans	IDR / Photo for each intersection,	Grading and Drainage, Roadway Alignment, Roadway Details, Roadway Plan and Profile, Roadway Channelization, and Roadway Preemption, signal, and wiring diagram Plan Sheets; 34 41 13, 2.02.A.7.a; 34 42 15, 1.05.D; 32 16 13, 3.01; 32 17 23, 3.01; 32 31 13, 3.01; 34 42 15, 1.13; 34 17 13, 2.01	Submittals for RR grade Crossing Signals (01526-Factory Test Reports - MP 18.45 Remote Crossing, 01525-Factory Test Reports - MP 12.79 N. Thorne Lane), Traffic Signal Materials (00813-Traffic Signal Video Detectors, 00682-Backup Power Generator, 01157 & 00871-WSDOT Traffic Poles and Hardware for Thorne 41 st and Banksdale , 01158-Detector Cans and Cabinet Base Riser , 01790-7.5kVA Transformers at WSDOT Intersections), and Vehicle Barriers (01559-Beam Guardrail), REC-00737 for Traffic Signal Materials ST Owned. Added IDR ML Haz. ID 51 05-01-17	Added to SSIMS CRE-02512 Intersection Interconnect Sign Off for Queue cutter test, results for Stage 6, 7, & 8 and Matrix to Verification Documents folder. See Matrix tests 6, 44, 50, 47 for Signal Testing of Equipment Grounding.	Outreach documents added to SSIMS PDB Verification Documents folder.	Final Documentation Completed Accepted
52	0009	0013	0000	Traffic Control	PDB-PHA	Height Clearances	Height Clearances	Train overpass structure failure due to impact	Over height truckload/ military vehicle strikes overpass structure	Potential loss of load bearing capacity, potential major/minor injury, potential fatality, derailment, equipment and property damage, service disruption.	1C	1. Design structure in accordance with state vertical and horizontal clearance requirements; 2. Height clearance check bars on Northern side of Pendleton Ave; 3. Provide highly visible "Maximum Height" signage on Northern side of Pendleton Ave; 4. Remove any line of sight obstructions for height clearance signage; 5. Develop inspection and maintenance procedures to assure frequent inspection of bridges; 6. Coordinate with JBLM for education for Rail Safety; 7. Inspection and maintenance procedures according to 49 CFR 237 Bridge Safety Standards.; 8. Maximum height signage	1D	1. Alignment meets design criteria; 2. ROW clearances from structures; 3. Track inspection; 4. Pendleton Ave Bridge to be raised 9"; 5. Height check predictor to be placed on roadway	IDR - Check height above Pendleton and photo of JBLM low height clearance warning system, maximum height signage	Alignment Plans, Bridge 16.9L Plan sheets, Height Predictor is being coordinated separately with JBLM. Bridge inspection and load rating reports; 02 41 00, Demolition-1.06, DEMOLITION AND REMOVAL CONSTRUCTION WORK PLAN; 34 11 27, Ballasted Track Construction-3.07, SURFACING, ALIGNING, AND STABILIZING - GENERAL; 34 11 50, Railroad Maintenance of Way, 3.01 GENERAL, 3.02 SIGNALS, GRADE CROSSINGS, AND COMMUNICATIONS EQUIPMENT, 3.04 BRIDGES AND OTHER STRUCTURES; JBLM plans to install an advance low height clearance warning system as mitigation for the low clearance; 16.9L Plan Sheets (Pendleton Ave Bridge) Volume 2 - (S01-S08)	Added REC's REC 00381-CWP for Building Demolition, REC 00571-CWP Bridge 19.8L Balustrade Demo, & REC 00573-JHA Demo Balustrade and Raise Parapet. Added IDR Pendleton Bridge Height Inspection/Verification, Measured & Recorded 04-10-17	See PDB Verification Documents folder for Outreach with JBLM for education for Rail Safety. The Bridge Safety Management Program Plan is currently being updated (attached).	CM Documentation Complete Accepted	
53	0009	0004	0000	Traffic Control	PDB-PHA	Control Train Interface with Traffic	Control Train Interface with Traffic	Collision between train and vehicle on track	I-5 Vehicle <10,000 lb. loses control and drives onto track	Potential fatality, major/minor injury, property damage, service disruption.	2D	1. Barriers alongside all roadways or highways where elevation exceeds track grade and high risk areas	2D	1. Monitor I-5 collision data quarterly to detect accident trends or facts that indicate a need for reconsideration of placing of additional guardrails. 2. Ensure that local emergency dispatch centers have the telephone numbers and protocols to immediately contact BNSF dispatch when a vehicle is reported on the tracks.			WSDOT analysis Risk Posed by Trains Striking Errant Vehicles from I-5 on the PDB including Clear Zone Maps & Cross sections was reviewed and changes approved by SDDCC removed vehicle barriers as a requirement, reduced initial risk, added new hazard #63 for vehicle >10,000 lb.		CM Documentation Complete Accepted	
54	0009	0014	0000	Traffic Control	PDB-PHA	Vehicle Barriers	Vehicle Barriers	Collision between train and vehicle on track	Vehicle enters ROW from Bridgeport Way	Potential fatality, derailment, major/minor injury, property damage, service disruption.	1D	1. Provide roadway illumination at the crossing to better illuminate the railroad environment; 2. Design grade crossing according to MUTCD guidelines; 3. Coordinate roadway signage with local jurisdiction traffic department; 4. Bollards for wider ROW areas	1E	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Provide roadway illumination at the crossing to better illuminate the railroad environment; 11. Pre-emption signal & activation; 12. Public Outreach and Education	Signals Tests	Grading and Drainage, Roadway Alignment, Roadway Details, Roadway Plan and Profile, Roadway Channelization, and Roadway Preemption, signal, and wiring diagram Plan Sheets; 34 42 15, 1.05.D; 32 16 13, 3.01; 32 16 23, 3.01; 32 17 23, 3.01; 32 31 13, 3.01; 34 41 13, 2.01 & 2.02; 34 42 15, 1.13; 34 17 13, 2.01	Submittals;RR Grade Crossing Signals (01525 &01526), Traffic Signal Materials (00813, 00682, 01157, 00871, 01158, & 01790), Vehicle Barriers (01559). Spare Controller Cabinets, (00737). Added IDR showing finished work 04-28-17.	Added test results for Stage 6, 7, & 8 and Matrix to Verification Documents folder. See Matrix items 6, 44, 50, 47 for signal testing of equipment grounding	See PDB Verification Documents folder for Outreach documents.	Final Documentation Completed Accepted
63	0009	0004	0000	Traffic Control	Item Master	Control Train Interface with Traffic	Control Train Interface with Traffic	Collision between train and truck >10,000 lb. on track	I-5 Vehicle loses control and drives onto track	Potential fatality, derailment, major/minor injury, property damage, service disruption.	1D	1. Barriers alongside all roadways or highways where elevation exceeds track grade and high risk areas	1D	1. Monitor I-5 collision data quarterly to detect accident trends or facts that indicate a need for reconsideration of placing of additional guardrails. 2. Ensure that local emergency dispatch centers have the telephone numbers and protocols to immediately contact BNSF dispatch when a vehicle is reported on the tracks.		N/A	4/26/17 WSDOT analysis determined there is a probability of increasing collisions or the severity of collisions on I-5 by placing barriers in the clear zone. WSDOT analysis Risk Posed by Trains Striking Errant Vehicles from I-5 on the PDB, Clear Zone Maps & Cross sections was reviewed and changes approved by SDDCC removed vehicle barriers as a requirement, reduced initial risk, added new hazard for vehicle >10,000 lb.		CM Documentation Complete Accepted	

SOUND TRANSIT

SOUNDER COMMUTER RAIL



AGENCY SAFETY AND SECURITY CERTIFICATION FOR PROJECT:

POINT DEFIANCE BYPASS TRACK & SIGNAL IMPROVEMENTS

Element

Certificate of Conformance

Completion of this revised Certificate verifies that the Certifiable Element listed herein complies with all applicable Safety, Fire/Life, Security and Systems Assurance requirements for the Point Defiance Bypass Project (PDB) Track & Signals Improvements Project and that prior Element Certification Exceptions have been addressed.

Element: **FIRE LIFE SAFETY**

System	Item	Mitigation
Train way (Guideway) Right-of-Way	Means of Access, Emergency Response	1. Provide emergency response agencies with maps of the alignment. 2. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan (PTEPP)" 3. Identify appropriate Fire/Life Safety Jurisdictions along alignment and provide train schedule

Exceptions:

Emergency Response: Passenger Train Emergency Preparedness Plan (PTEPP): FRA determined Amtrak (a shared Right-of-way user) will be responsible for updating the plan and providing to emergency response agencies once the PTEPP is accepted by FRA. Final Draft was submitted 9/15/17.

Right-of-Way/ Subdivision Maps: Alignment maps are included in the PTEPP.

Distribution of Train Schedule: Schedules will be distributed to jurisdictions as part of the PTEPP.

SOUND TRANSIT SOUNDER COMMUTER RAIL



AGENCY SAFETY AND SECURITY CERTIFICATION FOR PROJECT: POINT DEFIANCE BYPASS TRACK & SIGNAL IMPROVEMENTS

Element Certificate of Conformance

Element: FIRE LIFE SAFETY

[Redacted Signature]

Tom Dean
PDB Construction Manager
Sound Transit

9/27/17

Date

[Redacted Signature]

Jodi Mitchell
PDB Rail Activation Lead
Sound Transit

9/27/2017

Date

[Redacted Signature]

Andrew Rawls
Sr. Engineer, Systems Engineering & Integration
Sound Transit

10-5-17

Date

[Redacted Signature]

Branden Porter
Transit System Security Program
Sound Transit

10/05/17

Date

[Redacted Signature]

Weylin Doyle
Commuter Rail Operations Manager
Sound Transit

9/27/17

Date

[Redacted Signature]

Robert Taaffe
Sr. Construction & System Safety Manager
Sound Transit

10-5-17

Date

PDB Safety Certification
 Element 10 - Fire Life Safety

ID	Element Number	System Number	CI Number	ElementName	ItemSource	SystemName	CI Name	HazardDescription	PotentialCause	PotentialEffect	InitialRisk Index	ProposedMitigation	ResidualRisk Index	SafetyAndSecurityRequirements	SuggestedConstructionDocumentation	DesignConformance	ConstructionConformance	TestingConformance	OperationalConformance	Status
55	0010	0002	0002	Fire Life Safety	PDB-PHA	Train way (Guideway)	Means of Access	Access/egress by emergency forces hazardous, difficult, and/or slow.	Train derailment blocks access to 66th	Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	1D	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercise 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan" 6. Identify appropriate Fire/Life Safety Jurisdictions along alignment and provide train schedule	1E	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercises 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan" 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.
	N/A	Not Applicable to Design	N/A	N/A	Emergency Response Passenger Train Emergency Preparedness Plan (PTEPP) FRA determined Amtrak is responsible for updating the plan and providing it to emergency response agencies once accepted by FRA. Final Draft submitted 9/15/17. Emergency Responder Familiarization Training Passenger Train Emergency Response Training Courses were presented by Amtrak in July. A briefing workshop was also held on 8/2/17. Training materials contain information from the PTEPP and about Amtrak trains. Right-of-Way / Subdivision Maps Alignment maps are included in the PTEPP. Uploaded Draft PTEPP, TT/PDB Workshop, TT/PDB Tabletop Exercise AAR, TT/PDB Emergency Responder List	Complete
56	0010	0002	0003	Fire Life Safety	PDB-PHA	Train way (Guideway)	Emergency Response	Access/egress by emergency forces hazardous, difficult, and/or slow.	First responder prioritization; Limited Emergency Access Points; Property Encroachments; ROW width varies; limits access; Corridor fence less than 15 ft. from tracks at Camp Murray	Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	1D	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercise 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan". 6. Identify appropriate Fire/Life Safety Jurisdictions along alignment and provide train schedule	1E	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercises 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan" 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.
	N/A	Not Applicable to Design	N/A	N/A	Emergency Response Passenger Train Emergency Preparedness Plan (PTEPP) FRA determined Amtrak is responsible for updating the plan and providing it to emergency response agencies once accepted by FRA. Final Draft submitted 9/15/17. Emergency Responder Familiarization Training Passenger Train Emergency Response Training Courses were presented by Amtrak in July. A briefing workshop was also held on 8/2/17. Training materials contain information from the PTEPP and about Amtrak trains. Right-of-Way / Subdivision Maps Alignment maps are included in the PTEPP.
Uploaded Draft PTEPP, TT/PDB Workshop, TT/PDB Tabletop Exercise AAR, TT/PDB Emergency Responder List	Complete
57	0010	0002	0003	Fire Life Safety	PDB-PHA	Train way (Guideway)	Emergency Response	Access/egress by employees or emergency forces hazardous, difficult and slow due to problems in access routes	Access routes hazardous in themselves (e.g. rough, dark, steep, slippery).	Hazards relating to path itself could produce falls and minor injuries. Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	1D	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercise 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan". 6. Identify appropriate Fire/Life Safety Jurisdictions along alignment and provide train schedule	1E	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets; 2. Provide emergency response agencies with maps of the alignment; 3. Tabletop Exercises
4. Emergency Drills
5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan"; 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	N/A	Not Applicable to Design	N/A	N/A	Emergency Response Passenger Train Emergency Preparedness Plan (PTEPP) FRA determined Amtrak is responsible for updating the plan and providing it to emergency response agencies once accepted by FRA. Final Draft submitted 9/15/17. Emergency Responder Familiarization Training Passenger Train Emergency Response Training Courses were presented by Amtrak in July. A briefing workshop was also held on 8/2/17. Training materials contain information from the PTEPP and about Amtrak trains. Right-of-Way / Subdivision Maps Alignment maps are included in the PTEPP. Tabletop Exercise The exercise took place 8/2/17. Distribution of Train Schedule Schedules will be distributed to jurisdictions as part of the PTEPP.
Uploaded Draft PTEPP, TT/PDB Workshop, TT/PDB Tabletop Exercise AAR, TT/PDB Emergency Responder List	Complete

Riley-Hite, Mari

From: Mitchell, Jodi
Sent: Tuesday, October 17, 2017 3:10 PM
To: Doyle, Weylin
Cc: Riley-Hite, Mari
Subject: RE: LRS Done

Awesome. I've copied Mari for her reference.

Thanks,
Jodi

From: Doyle, Weylin
Sent: Tuesday, October 17, 2017 3:08 PM
To: Mitchell, Jodi [REDACTED]
Subject: LRS Done

Jodi,

I'm not sure who all needs this information but WSDOT has finished the Linear Referencing System (LRS). I received it on an FTP site today. Chandra is going to copy it to a DVD and we can make it available to those who need it. She will get in touch with Lori to get a list of how many copies are needed for her to distribute to the Emergency Responders.

Thanks,
Weylin

*Commuter Rail Transportation Superintendent
Sound Transit*

[REDACTED]

SOUND TRANSIT SOUNDER COMMUTER RAIL



AGENCY SAFETY AND SECURITY CERTIFICATION FOR PROJECT: POINT DEFIANCE BYPASS TRACK & SIGNAL IMPROVEMENTS

Element Certificate of Conformance

Completion of this Certificate verifies that the Certifiable Element listed herein complies with all applicable Safety, Fire/Life, Security and Systems Assurance requirements for the Point Defiance Bypass Project (PDB) Track & Signals Improvements Project. Element Certification Exceptions are listed below (if applicable).

Element: **FIRE LIFE SAFETY**

System	Item	Mitigation
Train way (Guideway) Right-of-Way	Means of Access, Emergency Response	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercise 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan" 6. Identify appropriate Fire/Life Safety Jurisdictions along alignment and provide train schedule
PER		

Exceptions:

Emergency Response: Passenger Train Emergency Preparedness Plan (PTEPP): FRA determined Amtrak (a shared Right-of-way user) will be responsible for updating the plan and providing to emergency response agencies once the PTEPP is accepted by FRA.

Emergency Responder Familiarization Training: Passenger Train Emergency Response Training Courses will be presented by Amtrak in July. A briefing workshop is also being held on August 2, 2017. Training materials contain information from the Passenger Train Emergency Preparedness Plan and about Amtrak trains.

Right-of-Way/ Subdivision Maps: In progress-WSDOT is developing. This is a required element of the Passenger Train Emergency Preparedness Plan.

Tabletop Exercise: PTEPP and training lead up to and are used during Tabletop exercise. The exercise is scheduled for August 2, 2017 to accommodate completion of plans, training, and maps.

Distribution of Train Schedule: Schedules will be distributed to jurisdictions along the alignment once completed by Amtrak and Sound Transit Passenger Rail Operations.

SOUND TRANSIT SOUNDER COMMUTER RAIL



AGENCY SAFETY AND SECURITY CERTIFICATION FOR PROJECT: POINT DEFIANCE BYPASS TRACK & SIGNAL IMPROVEMENTS

Element Certificate of Conformance

[Redacted Signature]

Tom Dean
PDB Construction Manager
Sound Transit

7/18/17

Date

[Redacted Signature]

Jodi Mitchell
PDB Rail Activation Lead
Sound Transit

7/14/17

Date

[Redacted Signature]

Andrew Rawls
Sr. Engineer, Systems Engineering & Integration
Sound Transit

PER
7-7-17

Date

[Redacted Signature]

Branden Porter
Transit System Security Program
Sound Transit

7/17/17

Date

[Redacted Signature]

Weylin Doyle
Commuter Rail Operations Manager
Sound Transit

7/6/17

Date

[Redacted Signature]

Robert Taaffe
Sr. Construction & System Safety Manager
Sound Transit

7.24.17

Date

ID	Element System/Item	CI Number	Element Name	Item Source	System Name	CI Name	Hazard Description	Potential Cause	Potential Effect	Initial Risk	Proposed Mitigation	Residual Risk	Safety and Security Requirements	Suggested Control	Design Conformance	Construction Conformance	Testing Conformance	Operational Conformance	Status	Column 1	Column 2
55	0010	0002	0002	Fire Life Safety	PDB-PHA	Train way (Guideway)	Means of Access	Access/egress by emergency forces hazardous, difficult, and/or slow.	Train derailment blocks access to 66th	1D	Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	1E	1. Identify all Fire/Life Safety jurisdictions along Entire Alignment; 2. Tabletop drills and exercises for all agencies involved; 3. Predetermine default emergency staging areas along alignment; 4. Develop procedures to ensure that emergency access is unobstructed, adequately lighted; 5. Add maintenance service roads where possible; 6. Identify and practice emergency access routes.	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercises 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan" 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.
	N/A	Not Applicable to Design	N/A	Passenger Train Emergency Preparedness Plan: FRA determined Amtrak should be responsible for drafting the updated plan. It is in progress. Draft by May 31. Provided to emergency response agencies once accepted by FRA.
 Emergency Responder Familiarization Training: Training materials contain information from the Passenger Train Emergency Preparedness Plan and about Amtrak trains. Information regarding trains is pending release from Amtrak. Emergency Responder training scheduled to begin July 1
 Maps: In progress. Completed by June 30 (released as part of training for emergency response planning)
 Tabletop Exercise: PTEPP and training lead up to and are used during Tabletop exercise. The exercise date was changed from May to August or early September to accommodate completion of plans, training, and maps. Date will be determined as soon as a venue has been reserved.
	Final Documentation Assigned	Exception Open	
56	0010	0002	0003	Fire Life Safety	PDB-PHA	Train way (Guideway)	Emergency Response	Access/egress by emergency forces hazardous, difficult, and/or slow.	First responder prioritization, Limited Emergency Access Points, Property Encroachments; ROW width varies; limits access; Corridor fence less than 15 ft. from tracks at Camp Murray	1D	Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	1E	1. Identify all Fire/Life Safety jurisdictions along Entire Alignment; 2. Tabletop drills and exercises for all agencies involved; 3. Predetermine default emergency staging areas along alignment; 4. Develop procedures to ensure that emergency access is unobstructed, adequately lighted; 5. Add maintenance service roads where possible; 6. Identify and practice emergency access routes.	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercises 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan" 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.
	N/A	Not Applicable to Design	N/A	Passenger Train Emergency Preparedness Plan: FRA determined Amtrak should be responsible for drafting the updated plan. It is in progress. Draft by May 31. Provided to a emergency response agencies once accepted by FRA.
 Emergency Responder Familiarization Training: Training materials contain information from the Passenger Train Emergency Preparedness Plan and about Amtrak trains. Information regarding trains is pending release from Amtrak. Emergency Responder training scheduled to begin July 1
 Maps: In progress. Completed by June 30 (released as part of training for emergency response planning)
 Tabletop Exercise: PTEPP and training lead up to and are used during Tabletop exercise. The exercise date was changed from May to August or early September to accommodate completion of plans, training, and maps. Date will be determined as soon as a venue has been reserved.	Final Documentation Assigned	Exception Open	
57	0010	0002	0003	Fire Life Safety	PDB-PHA	Train way (Guideway)	Emergency Response	Access/egress by employees or emergency forces hazardous, difficult and slow due to problems in access routes	Access routes hazardous in themselves (e.g. rough, dark, steep, slippery).	1D	Hazards related to path itself could produce falls and other injuries. Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	1E	1. Identify all Fire/Life Safety jurisdictions along Entire Alignment
 2. Tabletop drills and exercises for all agencies involved
 3. Predetermine default emergency staging areas along alignment
 4. Develop procedures to ensure that emergency access is unobstructed, adequately lighted
 5. Add maintenance service roads where possible
 6. Identify and practice emergency access routes.	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets
 2. Provide emergency response agencies with maps of the alignment.
 3. Tabletop Exercises
 4. Emergency Drills
 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan"
 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	Not Applicable to Design	N/A	Emergency Response: Passenger Train Emergency Preparedness Plan: FRA determined Amtrak should be responsible for drafting the updated plan. It is in progress. Draft by May 31. Provided to emergency response agencies once accepted by FRA. Emergency Responder Familiarization Training: Training materials contain information from the Passenger Train Emergency Preparedness Plan and about Amtrak trains. Information regarding trains is pending release from Amtrak. Emergency Responder training scheduled to begin July 1, Maps: In progress. Completed by June 30 (released as part of training for emergency response planning). Tabletop Exercise: PTEPP and training lead up to and are used during Tabletop exercise. The exercise date was changed from May to August or early September to accommodate completion of plans, training, and maps. Date will be determined as soon as a venue has been reserved.	Final Documentation Assigned	Exception Open		

PER

SOUND TRANSIT SOUNDER COMMUTER RAIL



AGENCY SAFETY AND SECURITY CERTIFICATION FOR PROJECT: POINT DEFIANCE BYPASS TRACK & SIGNAL IMPROVEMENTS

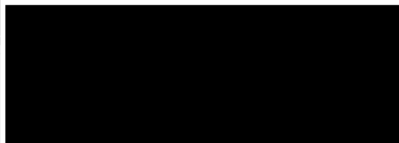
Element Certificate of Conformance

Completion of this Certificate verifies that the Certifiable Element listed herein complies with all applicable Safety, Fire/Life, Security and Systems Assurance requirements for the Point Defiance Bypass Project (PDB) Track & Signals Improvements Project. Element Certification Exceptions are listed below (if applicable).

Element: **SAFETY & SECURITY PLANS, PROCEDURES, & TRAINING**

Exceptions:

None



Tom Dean
PDB Construction Manager
Sound Transit

6/27/17

Date



Jodi Mitchell
PDB Rail Activation Lead
Sound Transit

6/29/2017

Date



Andrew Rawls
Sr. Engineer, Systems Engineering & Integration
Sound Transit

6-29-17

Date



Branden Porter
Transit System Security Program
Sound Transit

7/2/17

Date



Weylin Doyle
Commuter Rail Operations Manager
Sound Transit

6-29-17

Date



Robert Taaffe
Sr. Construction & System Safety Manager
Sound Transit

7-7-17

Date

Point Defiance Bypass Project
 Safety Certification Checklist - Element 0013, Safety Plans, Procedures Training


ID	Element	SystemNu	CI Num	ElementName	ItemSource	SystemName	CI Name	HazardDescription	PotentialCause	PotentialEffect	InitialRis	ProposedMitigation	DualRisk	SafetyAndSecurityRequirements	SuggestedConstruct	DesignConformance	ConstructionConformance	OperationalConformance	Status
58	0013	0001	0000	Safety Plans, Procedures & Training	PDB-PHA	Standard Operating Procedures (SOPs)	Standard Operating Procedures (SOPs)	Foreign object(s) on alignment	Vandalism / Criminal activity	Potential track damage, potential derailment, potential major/minor injury, potential fatality, equipment damage, service disruption.	1C	1. Inspection and maintenance procedures to verify structural integrity of structures above and adjacent to alignment; 2. Design fencing and warning signs where intrusion is likely; 3. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations	1D	1. Adequate ROW track clearance 2. ROW inspection procedures; 3. Fencing according to plans; 4. Security patrols; 5. Signage placed according to plans; 6. MOW and Property Management inspections and procedures	Fence As-Built Sign As-Built	Not Applicable to Design	REC-02229-Railroad Signage As-Built, REC-02190-Fence As-Built	See PDB Verification Documents Folder BNSF Maintenance of Way Operating Rules - Dec 2, 2009 (Rev. Apr 19, 2012) and ST I & M Manual (PRACTICE FOR THE INSPECTION, MAINTENANCE OF TRACK, TRAIN CONTROL AND COMMUNICATION)-July 15, 2012	Certified
59	0013	0001	0000	Safety Plans, Procedures & Training	PDB-PHA	Standard Operating Procedures (SOPs)	Standard Operating Procedures (SOPs)	Derailment	Track Superelevation not within designed limits at track curves	Potential derailment, equipment damage, major/minor injuries	1C	1. Ensure curves; elevation and speed limitations are designed according to 49 CFR 213.57; 2. Develop inspection and maintenance procedures according to 49 CFR 213.233 Track Inspection; 3. Timetable	1D	1. Restrictions on mainlines for stoppage or slow speeds of heavy freight on certain mainlines in specific areas; 2. Track inspection through MOW; 3. Track maintained through MOW		34 05 17-Track Construction, General Requirements, 3.03 - 3.04	N/A	Maintenance contractor performs annual geometry car inspections as per FRA requirement as well as hi-rail inspections twice weekly. The timetable has not been updated to reflect the newly constructed track south of Bridgeport but will be one prior to passenger service beginning. I & M Manual attached	Certified
60	0013	0001	0001	Safety Plans, Procedures & Training	PDB-PHA	Standard Operating Procedures (SOPs)	Standard Operating Procedures (SOPs)	Mishandling of equipment during maintenance/overhaul	Personnel not following proper procedures.	Mishandling during maintenance overhaul; Equipment not secured properly for maintenance Personal injury and/or equipment damage.	2D	1. Training and procedures. 2. Maintenance manuals and operation instructions to include the necessary safety instructions. 3. Ensure proper handling equipment and jigs are used	2E	1. Training Program plan Final 2. Instruction Material Final 3. Training reports 4. Operations and Maintenance (O&M) Manuals	Training Program plan, Final Instruction Material, Final Training reports, Operations and Maintenance (O&M) Manuals	TRAINING-01 79 00 -1.02.A.2, 1.02.B.2, 1.02.C, Fiber Optic Distribution System-34 42 16.13, 1.05.G, Electrical Basic Requirements-34 42 18, 1.05.G	S34150-REC-02087 SUB 017900-002.001 1.02C Signal Training Results and Attendance, WSDOT O and M Manuals provided in CRE-1284 saved in the PDB Verification Documents folder	added REC-02087 Signal Training Results and attendance. added CRE-02184 WSDOT Warranties and O&Ms to SSIMS PDB Verification Documents folder	Certified
61	0013	0005	0000	Safety Plans, Procedures & Training	PDB-PHA	Operation Manuals	Operation Manuals	Equipment degradation	Improper/inadequate maintenance resulting from maintainer carelessness, lack of proper training, poor working conditions, inadequate tools and test equipment, lack of spare parts.	Can vary from loss of performance to the generation of unsafe operating conditions. May also result in situations hazardous to maintainers.	2C	1. The system maintenance program, provisioning and personnel should be adequate for the purpose intended; 2. Provide training and certification for critical elements; 3. Regular performance reviews and support documentation revisions as necessary; 4. Maintenance in accordance with manufacturers recommendations.	2E	Test equipment and service manuals	N/A	Operations Issue	N/A	Training Program plan N/A. ST utilizes a MOW Contractor for all maintenance/inspection on the Lakewood Sub. The contractor uses its own equipment to perform this work and is responsible for maintenance and upkeep of their equipment. Only qualified personnel will be allowed to perform maintenance/inspection on ST owned equipment.	Certified
62	0013	0001	0000	Safety Plans, Procedures & Training	PDB-PHA	Standard Operating Procedures (SOPs)	Standard Operating Procedures (SOPs)	Collision between train and Lakewood Station patrons	Amtrak train passes by station without stopping	Potential fatality, major/minor injury, service disruption.	1C	1. "LOOK" or "High Speed Trains Travel in Both Directions" signage; 2. Other signage according to MUTCD standards; 3. Adjacent Residence / Business Public Education for Rail Safety; 4. Operating rules and procedures for use of horn and train speed; 5. Tactile warning tiles at edge of platform; 6. Stand Behind Yellow Line (pavement paint)	1D	1. "High speed train" signage at station; 2. Operating procedures and speed for passing a passenger station; 3. Warning procedures for train when passing a passenger station; 4. Public Outreach & Education		Signs at Lakewood Station would need to be added to contract as change order. IFC Vol 2, 9/4/15 01 79 00, 1.02.A.2, 1.02.B.2, 1.02.C	Signage is already in place at the Lakewood Station. Picture uploaded	N/A	Closed

MEMO



October 19, 2017

TO: Salah Al-Tamimi, ST Chief Safety Officer

FROM: Robert Taaffe, Sr. Construction and System Safety Manager 

SUBJECT: Point Defiance Bypass Track and Signal Improvements Project Safety & Security Certification – Follow up on Certificate Exceptions

With regard to the Safety/Security Certification Verification Report for Point Defiance Bypass Track and Signal Improvements Project, on September 15, 2017, Safety & Security Certification Elements; Guideway, Signals and Traffic Control were certified with exceptions for outstanding test reports for Stage 6, 7, and 8 Integrated Tests. The test reports have now been approved by ST, provided to SQA and verified for safety critical elements.

This memo is to update the status for Element Certificates of Conformance for Elements; Guideway, Signals and Traffic Control, dated September 15, 2017, to reflect that all safety and security certification requirements have been met.

Point Defiance Bypass Safety Certification Exceptions Log

Exception Descriptions:

Item ID	Description of Exception
17, 19, 29, 34, 36, 37, 42, 44, 46, 47, 48, 49, 50, 51, 54	<p>7/28/17: These items were closed with the following explanation of the exceptions listed on the face of the Safety/Security Certificate of Conformance: Requires Stage 6,7,8 Test Reports, including Shunt sensitivity, Track Circuit Tests, Interlocking & Control Point Tests, Signal Testing of Equipment, Grounding Reports, Queue Cutter Testing, RR Grade Crossing Signals, Traffic Signal Materials.</p> <p>9/26/17 Update: REC-02303 Stage 6 Test Results-Code 2, REC-02318 Stage 7 Test Results-Code 2, and REC-02312 Stage 8 Test Results-Code 1 were uploaded to SSIMS and SQA verified safety certifiable elements.</p>
55, 56, 57	<p>7/28/17: These items were closed with the following explanation of the exceptions listed on the face of the Safety/Security Certificate of Conformance:</p> <p><u>Emergency Response</u>: Passenger Train Emergency Preparedness Plan (PTEPP): FRA determined Amtrak (a shared Right-of-Way user) will be responsible for updating the plan and provide to emergency response agencies.</p> <p><u>Passenger Train Emergency Response Training</u>: will be presented by Amtrak in July. A briefing workshop is also being held on August 2, 2017.</p> <p><u>Right-of-Way/Subdivision Maps</u>: In progress, WSDOT is developing. This is a required element of the PTEPP</p> <p><u>Tabletop Exercise</u>: The exercise is scheduled for August 2, 2017</p> <p><u>Distribution of Train Schedule</u>: Schedules will be distributed to jurisdictions once completed by Amtrak and Sound Transit Passenger Rail Operations.</p> <p>9/26/17 Update: uploaded to SSIMS; Amtrak & BNSF Railway Joint PTEPP amended 7/14/17 (draft), Passenger Train Emergency Preparedness Coordination Workshop AAR 8/2/17, and PDB Stakeholder Emergency Responder List. It was also confirmed that WSDOT completed the Linear Referencing System (LRS) and ST Operations made available to the Emergency Responders, and the Operating Timetable is complete – it will go into effect 11/13/17.</p>

Point Defiance Bypass Safety Certification Exceptions Log

ID	Contract	Element	Title	Initial Risk	Res. Risk	Hazard Description	Potential Cause
17	PDB	Guideway	Track Ballast	2C	3D	Loss of train detection	Mechanical or electrical problem with train detection equipment. Loss of shunt (LOS).
19	PDB	Guideway	Roads and Paving	1D	1E	Collision between train and roadway vehicle at grade crossing or in the alignment	1. Motorist misjudges turn and enters ROW 2. Roadway vehicle driver fails to or is unable to stop within safe braking distances 3. Roadway vehicle operator for any reason enters crossing when warning is activated
29	PDB	Guideway	Grounding/Insulation	2C	3D	Railroad signals not operational	Electric surge / Lightning
34	PDB	Signaling	Train Detection	1C	1E	Collision between train and roadway vehicle at grade crossing or in the alignment	Insufficient train approach warning time related to train speed
36	PDB	Signaling	Signals	2B	2D	Crossing gate preview time is less than 20 seconds.	1. Train approach circuit not long enough for train speeds. 2. Coordination with traffic signals and or railway signal system does not provide timely advance warning.
37	PDB	Signaling		2B	2D	Crossing gate preview time is excessive (greater than 65 seconds.)	Train approach circuit too long for train speeds.
42	PDB	Traffic Control	Control of Train Interface with Traffic	1C	1D	Collision between train and grade crossing user(s)	Complex intersection geometry resulting in motorists and pedestrian judgment errors
44	PDB	Traffic Control	Sign Design	1C	1D	Collision between train and grade crossing user(s)	Lack of advance warning signs
46	PDB	Traffic Control	Traffic Signal Controller	1C	1D	Collision between train and grade crossing user(s)	Crossing intersections improperly engineered (inadequate warning devices, incorrect timing, inadequate stopping distance, inadequate traffic control, etc.)
47	PDB	Traffic Control	Traffic Signal Controller	1B	1D	Collision between train and roadway vehicle at grade crossing or in the alignment	Truck or other long vehicle stops on tracks due to traffic backup from adjacent intersection controlled by traffic signals
48	PDB	Traffic Control	Detection Equipment	1B	1D	Collision between train and roadway vehicle at grade crossing or in the alignment	Traffic queues backup at rush hour and exceed ramp storage length due to accident or heavy traffic on Interstate Highway I-5 and result in vehicles stopping on tracks

Point Defiance Bypass Safety Certification Exceptions Log

ID	Contract	Element	Title	Initial Risk	Res. Risk	Hazard Description	Potential Cause
49	PDB	Traffic Control	Detection Equipment	1B	1D	Collision between train and roadway vehicle at grade crossing or in the alignment	Traffic queues backup could exceed storage length and result in vehicles stopping on tracks due to proximity to freeway ramp and frontage road at rush hour, high traffic volumes at Clark Rd entrance to military base, other traffic overflow situations
50	PDB	Traffic Control	Detection Equipment	1B	1D	Collision between train and roadway vehicle at grade crossing or in the alignment	Traffic queues backup and stop on tracks due to High Security Level Inspection or Emergency Shutdown at Military Bases
51	PDB	Traffic Control	Preemption Equipment	1B	1D	Collision between train and roadway vehicle at grade crossing or in the alignment	Stopping on Tracks
54	PDB	Traffic Control	Vehicle Barriers	1D	1E	Collision between train and vehicle	Vehicle enters ROW from Bridgeport Way
55	PDB	Fire/Life Safety	Means of Access	1D	1E	Access/egress by emergency forces hazardous, difficult, and/or slow.	Train derailment blocks access to 66th
56	PDB	Fire/Life Safety	Emergency Response	1D	1E	Access/egress by emergency forces hazardous, difficult, and/or slow.	First responder prioritization, Limited Emergency Access Points Property Encroachments, ROW width varies; limits access, Corridor fence less than 15 ft. from tracks at Camp Murray
57	PDB	Fire/Life Safety	Emergency Response	1D	1E	Access/egress by employees or emergency forces hazardous, difficult and slow due to problems in access routes	Access routes hazardous in themselves (e.g. rough, dark, steep, slippery).



September 22, 2015

Ms. Jodi Mitchell
Sound Transit
401 Jackson Street
Seattle, WA 98104

Subject: Point Defiance Bypass – Track and Signal Design

Dear Ms. Mitchell,

As designers of record, we confirm that the standard of care for our professional engineering, consulting and related services performed under this Agreement were to the care and skill ordinarily used by members of the engineering profession practicing under the same or similar circumstances at the same time and in the same locality. We have designed the Point Defiance Bypass Track and Signal improvements project in accordance with the following Design Standards and Guidelines for Sound Transit:

- Final Geotechnical Report – Final Design, Point Defiance Bypass Project, 2009
- Geotechnical Report Supplement, Point Defiance Bypass, December 2014
- Point Defiance Bypass Track and Signal Environmental Assessment, 2013
- City of Lakewood Municipal Code, 2001
- City of Lakewood 2010 Stormwater Management Program
- City of Lakewood Standard Plans, March 2011
- City of DuPont Public Works Standards, 2011
- Washington State Department of Transportation Standard Specifications, 2014
- Washington State Department of Transportation Design Manual, 2013
- Washington State Department of Transportation Bridge Design Manual, 2014
- Washington State Department of Transportation Geotechnical Design Manual, 2014
- Washington State Department of Transportation Standard Plans, 2014
- Washington Utilities and Transportation Commission (WUTC) Regulations
- AASHTO Geometric Design of Highways and Streets, 2011
- BNSF/UPRR Guidelines for Railroad Grade Separated Projects, January 2007
- Sound Transit Engineering Standards, 2006
- Sound Transit Design Criteria for Structures Supporting Railroad Loading, November 2005

- American Railway Engineering and Maintenance-of-Way Association Manual for Railway Engineering, 2014 Edition

The signature below certifies only the components of the design completed by HDR for which their Washington State professional engineering seal and signature appears on the construction plans and specifications.



██████████ Inc.
Josh Metcalf, P.E.
Project Manager

Stacy and Witbeck

July 25, 2017

1481-LET-00346

Sound Transit
Union Station
401 South Jackson Street
Seattle, Washington 98104-2826

Attention: Shannon McNutt – Resident Engineer

**Subject: S34150-CRE-02433
Contract No. RTA/CN 0132-14
Point Defiance Bypass Track and Signals Improvements**

Re: Construction Conformance

Ms. McNutt:

As the General Contractor for Contract No. RTA/CN 0132-14, Point Defiance Bypass Track and Signals Improvements, to the best of our knowledge Stacy and Witbeck, Inc., with our subcontractors and suppliers constructed the project in accordance with contract plans and specifications as issued and dated September 2015, and as amended by contract change orders.

Sincerely,



David E Duke
Deputy Project Manager
Stacy and Witbeck, Inc.

Cc: Sound Transit
Contract File/SWI

5202 100th Street, Ste B
Lakewood, WA 98499
T: 971.302.0047

Point Defiance Bypass Track Signal Improvements Project
 Safety Certification Verification Matrix - Final 10/27/17

ID	Element Number	System Number	CI Number	Element Name	Item Source	System Name	CI Name	Hazard Description	Potential Cause	Potential Effect	Initial Risk Index	Proposed Mitigation	Residual Risk Index	Safety and Security Requirements	Suggested Construction Document	Design Conformance	Construction Conformance	Testing Conformance	Operational Conformance	Status
2	0001	0013	0001	Station	PDB-PHA	Signage and Graphics	Installation/Location	Collision between train and Lakewood Station patrons	Amtrak train passes by station without stopping	Potential fatality major/minor injury service disruption.	1C	1. "LOOK" or "High Speed Trains Travel in Both Directions" signage; 2. Other signage according to MUTCD standards; 3. Adjacent Residence / Business Public Education for Rail Safety; 4. Operating rules and procedures for use of horn and train speed; 5. Tactile warning tiles at edge of platform; 6. Stand Behind Yellow Line (pavement paint)	1D	1. "High speed train" signage at station; 2. Operating procedures and speed for passing a passenger station; 3. Warning procedures for train when passing a passenger station; 4. Public Outreach & Education	N/A	Signs at Lakewood Station would need to be added to contract as change order	Signage already exists at the Lakewood Station. see photo attached		Operating procedures and speed for passing a passenger station. Operating rules and procedures for use of horn and train speed; All of this is handled by the General Code of Operating Rules (managed by all of the operating railroads in North America) and the Lakewood Subdivision Timetable (managed by our Operating partner BNSF).	CM Documentation Complete Accepted
3	0003	0001	0002	Guideway	PDB-PHA	Track Alignment and Clearances	Alignment (Vertical and Horizontal)	Excessive track wear	Stopping train on curve with increased Superelevation	Potential derailment equipment damage major/minor injuries	1C	1. Engineering Operation Rules; 2. Identify stopping locations for trains; 3. Ensure curves; elevation and speed limitations are designed according to 49 CFR 213.57; 4. Develop inspection and maintenance procedures according to 49 CFR 213.233 Track Inspection; 5. Future PTC.	1D	1. Restrictions on mainlines for stoppage or slow speeds of heavy freight on certain mainlines in specific areas; 2. Track inspection through MOW; 3. Tonnage per year on tracks is light and not excessive.	N/A	Not Applicable to Design	not applicable to CM - Operations measure	MOW Operating Rules uploaded to SSIMS PDB Verification Documents folder	CM Documentation Complete Accepted	
4	0003	0001	0004	Guideway	PDB-PHA	Track Alignment and Clearances	ROW Clearance from Wayside Objects	Collision between train and fixed structure	Business property encroachments	Potential fatality derailment major/minor injury property damage service disruption.	1C	1. Develop procedures to ensure adequate clearance of tracks from existing and future fixed structures adjacent to tracks; 2. Procedures for periodic inspection and maintenance to ensure no obstructions are in ROW; 3. Right of Entry requirements.	2D	1. Adequate ROW track clearance; 2. ROW inspection procedures; 3. Actively inspecting for business property encroachments; 4. Post orders for security and property staff; 5. Land use approval requirements; 6. Develop procedures to ensure adequate clearance of tracks from existing and future fixed structures adjacent to tracks; 7. Procedures for periodic inspection and maintenance to ensure no obstructions are in ROW; 8. Right of Entry requirements.	N/A	not applicable to design	not applicable to CM - Operations & Security measures	Uploaded ROW Maintenance Plan 2014 to SSIMS PDB Verification Documents folder	CM Documentation Complete Accepted	
5	0003	0001	0004	Guideway	PDB-PHA	Track Alignment and Clearances	ROW Clearance from Wayside Objects	Collision between train and fixed structure	Interchange Bridge Columns within ROW	Potential fatality derailment major/minor injury property damage service disruption.	1D	1. Enforce timetable speed restrictions along alignment (PTC); 2. Develop inspection and maintenance procedures to assure frequent debris clearance from all tracks; 3. Develop inspection and maintenance procedures to assure the structural integrity of the tracks; 4. Verify train speed vs. sight distances; 5. Verify ROW inspection procedures	1E	1. Enforce timetable speed restrictions along alignment (PTC); 2. Inspection and maintenance procedures to assure frequent debris clearance from all tracks; 3. Inspection and maintenance procedures to assure the structural integrity of the tracks; 4. All existing columns are built extra heavy (similar to crash walls)	photo	The Center Drive bridge columns were evaluated and heavy construction was verified where the new track is being added - WSDOT plans for Center Drive Interchange construction	The Center Drive bridge columns were evaluated and heavy construction was verified where the new track is being added - WSDOT plans for Center Drive Interchange construction	MOW Operating Rules found in PDB Verification Documents folder.	CM Documentation Complete Accepted	
6	0003	0001	4	Guideway	PDB-PHA	Track Alignment and Clearances	ROW Clearance from Wayside Objects	Collision between train and foreign object	Falling Trees; Trees adjacent to tracks (Heavily wooded both sides)	Potential fatality derailment major/minor injury property damage service disruption.	1C	1. Enforce speed restrictions along alignment; 2. Develop inspection and maintenance procedures for underbrush/debris clearance on alignment according to 49 CFR 213.37 - Vegetation; 3. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations.	1D	1. Clearing and trimming/pruning Trees within the ROW; 2. Tree stumps left for Soil stabilization; 3. Tree survey	311100 - CLEARING AND GRUBBING 3.02 Existing Conditions/Demolition Plans	Added IDR 0230 dated 2/6/17 with images obtained 4 months since Tree Trimming	Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations and for speed observance	CM Documentation Complete Accepted		
7	0003	0001	4	Guideway	PDB-PHA	Track Alignment and Clearances	ROW Clearance from Wayside Objects	Collision between train and wayside object	Vehicles parked at business or residence adjacent to the ROW	Major/minor injury property damage service disruption.	2C	1. Design fencing and warning signs along alignment areas where intrusion is likely; 2. Implement public rail safety education programs; 3. Define property lines; 4. Enforcement of parking regulations.	2D	1. Adequate ROW track clearance; 2. ROW inspection procedures through security maintenance and property patrols; 3. Fencing according to plans	Fence As-Built	01 57 24 -TEMPORARY SITE WATER DISCHARGE- 1.04.A Stormwater Pollution Prevention Plans (SWPPP); SWPPP Submitted with IFB Package 32 31 13 -CHAIN LINK FENCES AND GATES-1.03 Submittals	S34150-REC-00061 -Construction Stormwater Pollution Prevention Plan S34150-REC-02190 SUB 01.7839-011.001 1.02A Fence As-Built; WSDOT Outreach Plan Amtrak/Cascades PDB Testing Flyer Outreach_Folio PDB 2017 FINAL		Final Documentation Completed Accepted	
8	0003	0001	0004	Guideway	PDB-PHA	Track Alignment and Clearances	ROW Clearance from Wayside Objects	Foreign object(s) on alignment	Rock/mudslide	Potential track damage potential derailment potential major/minor injury potential fatality equipment damage service disruption.	1C	1. Design to provide clearance from trees and rockslide areas and fencing where appropriate; 2. Provide disaster warning system (wayside mudslide/rockslide warning system); 3. 49 CFR 213.233 - Track inspections; 4. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations.	1D	1. Adequate ROW track clearance; 2. ROW inspection procedures; 3. Fencing placed according to plans; 4. Geotechnical surveys for rock/mudslide areas. Tree stumps left for soil stabilization	01 57 24 -TEMPORARY SITE WATER DISCHARGE- 1.04.A Stormwater Pollution Prevention Plans (SWPPP); SWPPP Submitted with IFB Package 32 31 13 -CHAIN LINK FENCES AND GATES-1.03 Submittals	Track Inspection Reports - Feb -Oct 2016-5341 50-REC-01808 Track Inspection Reports - Oct -Dec 2016-534150-REC-01809 Track Inspection Reports - Jan-Mar 2017-534150-REC-02020 Fence As-Built- 534150-REC-02190		CM Documentation Complete Accepted		
9	0003	0002	0000	Guideway	PDB-PHA	Track work	Track work	No or improper rail cant. (Superelevation)	Improper design.	Poor ride quality due to hunting; Possible derailment at high speeds; Injury. Operational impact.	3C	1. Design track cross-level to meet or exceed AREMA or BNSF guidelines; 2. Ongoing track inspection and maintenance program	3D	Certifications	Final Survey of Track Geometry	34 05 17-TRACK CONSTRUCTION GENERAL REQUIREMENTS-1.04.A.1 A.11 SUBMITTALS	OTM Material and Buy America Certifications REC-0298 Code 1-NET 1/20/16. 03-02-17 Added REC-01967 Rail Grind Report & REC-01968 Rail Flow Report. Added S34150-REC-02223 SUB 340517-030.002 3.28C Geometry Car Report to Verification Documents folder.		Final Documentation Completed Accepted	
10	0003	0002	0000	Guideway	PDB-PHA	Track work	Track work	Excessive rail wear	Sharp curves.	Potential derailment. Injury. Operational impact	3C	1. Design track cross-level to meet or exceed AREMA or BNSF guidelines; 2. Ongoing track inspection and maintenance program	3D	Qualifications of personnel who will perform rail end hardening	Qualifications of personnel who will perform rail end hardening	34 05 17-TRACK CONSTRUCTION GENERAL REQUIREMENTS-1.04.A.4 SUBMITTALS	Email on 1/17/17 Matt Lumsden - Rail Hardening is not expected since all rail met specifications for hardness. REC 00153 stating Rail Hardness Acceptance At Factory-EAN 11/20/15 REC-00841 for 136# Head Hardened Rail Mill Certs-NET 4/19/16 and 1/7/16 Readiness Review Meeting Minutes. Rail hardening is not expected since all rail met specifications for hardness. REC00226 136 Standard Grade Rail Mill Certs. (see PDB Verification Documents folder)		CM Documentation Complete Accepted	
11	0003	0002	0000	Guideway	PDB-PHA	Track work	Track work	Wide/Tight track gauge.	Improper design / installation.	Operational impact. Potential derailment. Injury.	3C	1. AREMA Manual for Railway Engineering Chapter 5 Track and Chapter 30 Ties; 2a. Certified Test Results; 2b. Use of concrete ties to make changes in gauge less likely to occur; 3a. Certification of Manufacturer's Experience; 3b. Use of concrete ties to make changes in gauge less likely to occur; 4a. Tests - Certified test results as required in specs; 4b. Use of concrete ties to make changes in gauge less likely to occur	3D	1. Certifications of track gauges torque wrenches and bolt tightening machines; 2. Certified Test Results; 3. Certification of Manufacturer's Experience; 4. Tests - Certified test results as required in specs	Certifications of track gauges torque wrenches and bolt tightening machines; Final Track Inspection Report&ID;Certification of Manufacturer's Experience	1. 34 05 17-TRACK CONSTRUCTION GENERAL REQUIREMENTS-1.04.A.11 A.12 SUBMITTALS; 2a. 34 11 31-CONCRETE CROSS TIES AND FASTENERS-1.03.B SUBMITTALS; 2b. 34 05 17-TRACK CONSTRUCTION GENERAL REQUIREMENTS-1.04.A.11 SUBMITTALS; 3a. 34 11 31-CONCRETE CROSS TIES AND FASTENERS-1.03.C SUBMITTALS; 3b. 34 05 17-TRACK CONSTRUCTION GENERAL REQUIREMENTS-1.04.A.11 SUBMITTALS; 4. Wood Railroad Ties-34 11 40-1.03.B; 4.b. 34 05 17-TRACK CONSTRUCTION GENERAL REQUIREMENTS-1.04.A.11 SUBMITTALS	Added Submittals for Wood Railroad Ties and Concrete Cross Ties and Fasteners-1.31/17. Added submittals REC-01967 Rail Grind Report & REC-01968 Rail Flow Report. Added REC-00003 for Manufacturer's Experience and REC-00296 Torque Gauges/Wrenches. Added S34150-REC-02223 SUB 340517-030.002 3.28C Geometry Car Report to Verification Documents folder	Certified Test Results as required in specs	Final Documentation Completed Accepted	
12	0003	0002	0000	Guideway	PDB-PHA	Track work	Track work	Increased risk of incorrect test results	Unqualified test personell	Increased risk of system failures affecting safety systems	3C	Tester qualifications and automated testing	3E	Tester qualifications and automated testing	Tester qualifications and automated testing	34 05 17-TRACK CONSTRUCTION GENERAL REQUIREMENTS-3.13	Added REC-01967 Rail Grind Report and REC-01968 Rail Flow Report. See PDB Verification Documents Folder for S34150-REC-01264 Welding QC Plan		CM Documentation Complete Accepted	
13	0003	0002	0000	Guideway	PDB-PHA	Track work	Track work	Uninformed Train Operator	Improper Railroad Signage Design/Installation	Operator misses important information Penalty Operational impact	3C	Railroad Signage	3E	Shop Drawing for Railroad Signage	Shop Drawing	34 05 17-TRACK CONSTRUCTION GENERAL REQUIREMENTS-3.24.F	Added Submittal Railroad Sign Shop Drawing		CM Documentation Complete Accepted	
14	0003	0002	0006	Guideway	PDB-PHA	Track work	Rail Welds	Broken rail.	Rail Defect or faulty weld.	Potential derailment. Injury. Operational impact	3C	Quality Control Plan	3D	Quality Control Plan	Quality Control Plan Field Weld Reports Rail inspection records	34 11 16-WELDED TRACK RAILS SUBMITTALS-1.03.A; 34 11 13-TRACK RAILS-SUBMITTALS-1.03.E.4; 34 05 17-TRACK CONSTRUCTION GENERAL REQUIREMENTS-3.12.A	Added Submittals for REC 01264 SUB 341116 006 004 1 03A Welding QC Plan and REC-01852 MP and UT Weld Reports. ASee PDB Verification Documents folder for REC01967 Rail Grinding Report and 01968 Rail Inspection Report- Rail Flow records		CM Documentation Complete Accepted	
15	0003	0002	0009	Guideway	PDB-PHA	Track work	Rail Joints	Broken rail joint.	Improper installation e.g. loose bolts fracture rail at bolt holes excessive end batter.	Potential derailment. Injury. Operational impact	3C	1. AREMA Manual for Railway Engineering Chapter 4 Rail; 2. Sounder Right-of-Way Maintenance Plan. Sound transit MOW and/or the designated contractor will conduct track and rail inspections and associated documentation in accordance with 49 CFR Part 213 and the Sound Transit recommended practice for the Inspection	3D	Certifications	Certification for U	34 11 19-TRACK RAIL JOINTS-QUALITY ASSURANCE-1.04.A; 34 11 50-RAILROAD MAINTENANCE OF WAY- REGULATORY COMPLIANCE-1.07	Added Submittal for Track Rail Joints	MOW Inspection see MOW Operating Rules document in Verification Documents folder.	CM Documentation Complete Accepted	
16	0003	0002	0011	Guideway	PDB-PHA	Track work	Track Ballast	Poor horizontal track alignment	Sun kinks. Improper design / installation.	Potential derailment. Injury. Operational impact.	3C	1. Design ballast sections with 12 inches or more of high quality ballast tamped to AREMA standards. 2. Ongoing track inspection and maintenance program	3D	In-Track test results	Test Report Track Geometry (Car Results)	IFC Vol 2-9/4/15. Track Ballast-34 11 26.13 1.03.C Track Construction General Requirements-34 05 17 3.03	REC-01967 Rail Grinding Report REC-01968 Rail Inspection Report-Rail Flow REC-00663 In-Track test results REC-02223 Geometry Car Report	See PDB Verification Documents folder for ST Commuter Rail Right of Way Maintenance Plan 2014	Final Documentation Completed Accepted	
17	0003	0002	0011	Guideway	PDB-PHA	Track work	Track Ballast	Loss of train detection	Mechanical or electrical problem with train detection equipment*. Loss of shunt (LOS).	Derailment causing damage to railcar or fixed facility. Injury or death to operator or passenger. Potential for collision. Potential for injury or death.	2C	1. Test results of electrical resistance 2. Complete FRA in-service and monthly testing to assure proper operation*. 3. Utilize a Loss of Shunt (LOS) detection system.	3D	Test results of electrical resistance	Test results of electrical resistance Shunt sensitivity Track Circuit Tests.	34 11 27-BALLASTED SPECIAL TRACKWORK CONSTRUCTION-SUBMITTALS-1.03.C; 34 42 10-CENTRALIZED TRAFFIC CONTROL SYSTEM-TRACK CIRCUITS 2.19.B SPECIFIC FIELD TESTS 3.26.M & 3.26.O	REC-1330 Specific Field Tests and Inspections - Bungalows.pdf	Requires Stage 6 7 8 Test Rpts Shunt sensitivity Track Circuit Tests Interlocking & Control Point Tests Added test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix items #14 15 16 46 35 36 37 for Circuit Tests.	Final Documentation Completed Accepted	
18	0003	0002	0013	Guideway	PDB-PHA	Track work	Special Track work	Improper frog guard rail check gauge.	Improper design / installation.	Potential derailment. Injury; Operational impact.	3C	1. Design special track work to AREMA standards; 2. Ongoing track inspection and maintenance program	3D	Rail inspection results	Rail inspection results	34 11 23-SPECIAL TRACKWORK-SUBMITTALS-1.03.4	IDR of Special Track work added to SSIMS		CM Documentation Complete Accepted	

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19	0003	0003	0001	Guideway	PDB-PHA	Civil Work	Roads and Paving	Collision between train and roadway vehicle at grade crossing or in the alignment	Motorist misjudges turn and enters ROW; Roadway vehicle driver fails to or is unable to stop within safe braking distances; Roadway vehicle operator for any reason enters crossing when warning is activated	Potential fatality major/minor Injury property damage service disruption.	1D	1. Design train detection circuits on fail-safe principle per MUTCD standard; 2. Provide appropriate signage according to MUTCD Standards (speed limits) and safety warning devices (Cross buck track signs etc.); 3. Provide appropriate lane barriers and active/passive warning devices; 4. Channelization; 5. Ensure proper sight lines; 6. Train operators to follow FRA regulations for grade crossings; 7. Emergency Notification System (ENS) signs posted conspicuously; 8. Arrange diagnostic team to review proposed grade crossing design.	1E	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signal Pre-emption; 11. Enforcement (Police/Security); 12. Crossing Illumination; 13. Channelization; 14. Bollards used for wider ROW at grade crossings; 15. Public Outreach and Education	Signaling Test Reports IDR / photo for each intersection	RR Crossing Signals-34 42 15 1.05.D 1.13; Concrete Curbs/Gutters-32 16 13 3.01; Sidewalks-32 16 23 3.01; Pavement Markings-32 17 23 3.01; Traffic Signals-34 41 13 1.01 & 2.02; Vehicle Barriers-34 71 13 2.01; Chain Link Fences & Gates-32 31 13 3.01; Grading and Drainage Roadway Alignment Roadway Details Roadway Plan and Profile Roadway Channelization and Roadway Preemption signal and wiring diagram Plan Sheets	Added Submittals for RR Grade Crossing Signals (01525 8/01526) Traffic Signal Materials (00811 00682 01157 00871 01158 &01790) and Vehicle Barriers (01559). REC-00737 Spare Controller Cabinets Signal Heads and LED Blank Out Signs	Requires Stage 6 7 8 Test Rpts Signaling Testing of Equipment Grounding. Added test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix Items 6 44 50 47	Final Documentation Completed Accepted
20	0003	0003	0002	Guideway	PDB-PHA	Civil Work	Drainage	Flood on alignment	Heavy Rain / Water main break	Potential track damage derailment potential major/minor injury equipment damage service disruption.	1C	1. Design for adequate drainage water diversion or raised track in flood prone alignment areas; 2. Inspection and maintenance procedures to assure all drainage water diversion systems are operational according to 49 CFR 213.33 - Drainage; 3. Standard operating procedures and Rulebook to require reduced speed during heavy rain with reduced visibility.	1D	1. Alignment meets design criteria; 2. ROW clearances from structures; 3. Track inspection; 4. Subgrade and ballast compaction slopes grade & drainage; 5. Drainage basins located on both sides of track; 6. Water mains upgraded and reinforced; 7. Qualifications of System Designer; 8. Certifications	Qualifications of System Designer Certifications	31 23 19-DEWATERING-SUBMITTALS-1.03B; 33 40 00-STORM DRAINAGE UTILITIES-SUBMITTALS-1.03.C 33 46 00-SUBDRAINAGE-SUBMITTALS-1.03.B; 34 80 01335 BRIDGE 19 8L Deck Drain E&R-8/16/16 REC-00799 SUBMITTALS-1.04.C; 34 11 26.13-TRACK BALLAST-INSTALLATION-.301 (Installation); Tracks above 100 year flood Contract Grading and Drainage Plans Contract Specifications-	Added Submittals for Storm Drainage: REC-00625 Culvert Pipe E&R-3/17/16 REC-00802 Culvert Pipe Banding and Gasket NET-4/13/16 and Sub Drainage for Rail Bridges: REC-01335 Bridge 19 8L Deck Drain E&R-8/16/16 REC-00799 Subdrainage HDPE Perforated Pipe E&R-4/13/16 REC-00463 Subdrainage HDPE Perforated Pipe Fittings E&R-2/23/16 REC-00467 Subdrainage HDPE Perforated Pipe Sock NET-2/24/16 REC-02282 As Built Drainage NET 7/21/17. No dewatering activities occurred on this project therefore dewatering system designer qualifications are not applicable	See GCOR rule 6.21-Precautions Against Unusual Conditions and 6.21.2-Water Above the Rail for operating procedures related to heavy rain or water above the rail. I&M Manual Section A.10.3 pg 1-24 shows track inspection procedures to assure all drainage water diversion systems are operational (refer to PDB Verification Documents folder).	Final Documentation Completed Accepted
21	0003	0003	0003	Guideway	PDB-PHA	Civil Work	Fencing	Collision between train and pedestrian(s)	Elementary school near Bridgeport Way grade crossing	Potential fatality major/minor Injury service disruption.	1C	1. Adjacent Residence / Business Public Education for Rail Safety; 2. School Crossing Guards; 3. Install adequate fencing near crossings and areas where intrusion or trespass may be frequent or most likely; 4. Install adequate safety warning devices at crossings; 5. Install adequate signage near legal crossings and along track way.	1D	1. Adjacent Residence / Business / Golf Course; Public Education & outreach for Rail Safety; 2. Fence maintenance agreement / permanent replacement of Elementary School Fence; 3. Install adequate fencing as indicated on plans; 4. Install adequate safety warning devices at crossings according to plans; 5. Install adequate signage near legal crossings as indicated on plans; 6. Product Data; 7. Shop Drawings	Product Data Shop Drawings Fence As-Built safety warning devices at crossings evidence of signage near legal crossings and along track way	32 31 13 -CHAIN LINK FENCES AND GATES- SUBMITTALS-1.03.A 1.03.B	Added Submittals for Chain Link Fencing and Gates including Product Data (01097) & Shop Drawings (01782). Added Fencing As-Built REC-01290 added IDR at crossings	Added WSDOT Outreach documents: Outreach_Fo io_PDB_2017_FINAL.pdf AmtrakCascades_PDB_Testing_Flyer_122916_Final.pdf WSDOT PDB Outreach plan.pdf	Final Documentation Completed Accepted
22	0003	0004	0004	Guideway	PDB-PHA	Structural	Steel	Broken rail	Rail Defect or faulty weld.	Potential derailment. Injury. Operational impact	3C	1. ST Construction Inspection; 2. Ongoing track inspection and maintenance program; 3. Manufactured Products: Mill certifications; 4. Welding certification and processes	3D	1. Shop Drawings: Qualification of welders and procedures; 2. Manufactured Products: Mill certifications; 3. Qualifications: Welders Weld Inspectors NDT testers; 4. Welder certification and WPS	Shop Drawings; Rail inspection records; Manufactured Products: Mill certifications; Quality Control Plan; Qualifications: Welders Weld inspectors NDT testers; Personnel certification;	03 21 00-REINFORCING STEEL FOR RAILROAD BRIDGES-SUBMITTALS-1.03.A.3; 34 05 17-TRACK CONSTRUCTION GENERAL REQUIREMENTS-RAIL INSPECTION-3.12 AUTOMATED INSPECTION OF TRACK CONSTRUCTED WITH CONCRETE TIES-3.13; 34 11 16-WELDED TRACK RAILS-SUBMITTALS-1.03.A; 05 05 23-METAL FASTENINGS-SUBMITTALS-1.04.A; 34 80 21-PILING FOR RAILROAD BRIDGES-SUBMITTALS-1.04.F; 34 80 52-METAL FABRICATION FOR RAILROAD BRIDGES-SUBMITTALS-1.04.B.2	Added Submittals for Reinforcing Steel for Railroad Bridges (00937 & 01119) Welded Track Rail (01264) Metal Fastening (00965 & 01560) Piling for Railroad Bridges (01676 & 01579) and Metal Fabrication for Railroad Bridges (00986). Added S34150-REC-02223 SUB 340517-030.002 3.28C Geometry Car Report	Rail Weld Test Results	CM Documentation Complete Accepted
23	0003	0004	0004	Guideway	PDB-PHA	Structural	Steel	Bridge support structure fails	Improper installation.	Loss of bridge. Injury or death to passengers. Injury or death to passers-by under structure.	1D	1. ST Construction Inspection; 2. Shop Drawings: Product Technical data including mill certs; 3. Test Reports; 5. Qualification of testing agency and test plans for source testing; 6. Qualifications of fabricator welder PE for contractor design components; 7. Certifications - welders welding procedures load requirements	1E	1. Shop Drawings: Product Technical data including mill certs; 2. Inspection and Test Reports; 3. Mill test reports of structural steel; 4. Certifications; 5. Qualification of testing agency and test plans for source testing; 6. Qualifications of fabricator welder PE for contractor design components; 7. Certifications - welders welding procedures load requirements	Inspection and Test Reports; Mill test reports of structural steel; Qualification of testing agency and test plans for source testing; Qualifications of fabricator welder; Certifications - welders welding procedures load requirements	03 21 00-REINFORCING STEEL FOR RAILROAD BRIDGES-SUBMITTALS-1.03.A.2; 05 05 23 METAL FASTENINGS-SUBMITTALS-1.04.D; 05 12 00 STRUCTURAL STEEL FRAMING-SUBMITTALS-1.04.E; 34 80 51-STRUCTURAL STEEL FOR RAILROAD BRIDGES-SUBMITTALS-1.03.A.5-8 SOURCE QUALITY CONTROL-2.06; 34 80 52-METAL FABRICATION FOR RAILROAD BRIDGES-QUALITY ASSURANCE-1.05.A; 34 80 53 STEEL HANDRAILS FOR RAILROAD IFC BRIDGES-SUBMITTALS-1.04.B (Misc. Submittals)	Added Submittals: REC 01291-Shop Drawings for Precast for Bridge 19 8L REC 01496-CWP Bridge 10 8L Install REC 00876 CWP Bridge 19 8L Install Precast Wingwall Raising Blocks REC 00780 -CWP Bridge 19 8L Wingwall Raise REC 00799 - Subdrainage HDPE Perforated Pipe REC 00463-Subdrainage HDPE Perforated Pipe Fittings REC 00467-Subdrainage HDPE Perforated Pipe Sock REC-01959-Wingwall Raise Concrete Strength Test Results.pdf REC 00817-Sound Transit Bridge Safety Management Program REC-01264-Welding QC Plan REC-00050-Qualification of Independent Testing Lab REC-01119-Bridge Rebar Certifications REC-01289-CWP Bridge 16.9L Span Rehab REC-01957-Precast Mfg Testing Facility Qualifications REC-01241-Precast Mfg Testing Facility Qualifications REC-01087-Structural Field Welding Procedures for Bridges REC 01117-AWS 1.5 Welder Certs	CM Documentation Complete Accepted	
24	0003	0004	0004	Guideway	PDB-PHA	Structural	Steel	Bridge support structure fails	Inferior Material that does not meet specifications	Loss of bridge. Injury or death to passengers. Injury or death to passers-by under structure.	1D	1. ST Construction Inspection; 2. Prequalification Test Report; 3. Qualification Certifications; 4. Mill Certifications; 5. Welder Certification	1E	1. Prequalification Test Report; 2. Qualification Certifications; 3. Mill Certifications; 4. Welder Certification	Prequalification Test Report; Qualification Certifications; Rebar Mill Certifications; File Certification; File Welder Certification	03 05 15 PORTLAND CEMENT CONCRETE-SUBMITTALS-1.03.C G; 03 15 20 ANCHORAGE TO CONCRETE-SUBMITTALS-1.04.C 1.04.D	Submittals for Anchorage to Concrete Qualification of Supply & Lab (00050 & 01241) and Welder Certifications (01579) See PDB Verification Documents for REC-0119 Bridge Rebar Certifications REC-01886-Concrete Mix Design for WSDOT Structures REC-01781-Bridge 16.9L Anchor Rod Extensions and REC-01264 Welding QC Plan	CM Documentation Complete Accepted	
25	0003	0004	0005	Guideway	PDB-PHA	Structural	Concrete	Bridge support structure fails	Inferior Material that does not meet specifications	Loss of bridge. Injury or death to passengers. Injury or death to passers-by under structure.	1D	1. ST Construction Inspection; 2. Concrete Testing Agency Qualifications; 3. Source Quality Control test reports; 4. Manufacturer testing facility qualifications	1E	1. Concrete Testing Agency Qualifications; 2. Concrete Test Reports; 3. Source Quality Control test reports (sample of test reports); 4. Manufacturer testing facility qualifications	Concrete Testing Agency Qualifications Concrete Test Reports Source Quality Control test reports Manufacturer testing facility qualifications	03 31 00 STRUCTURAL CONCRETE FOR RAILROAD BRIDGES-QUALITY ASSURANCE-1.05.A FIELD QUALITY CONTROL-3.04.B&10.34 80 43 PRECAST AND PRESTRESSED CONCRETE FOR RAILROAD BRIDGES-SUBMITTALS-1.03.A.5-6	Added Submittals for Structural Concrete For Bridges (00050) and Precast & Pre-stressed Concrete For Railroad Bridges including Source QC and Testing Facility Qualifications (01241) and Wingwall Raise Concrete Strength Test Results (01959)	CM Documentation Complete Accepted	
26	0003	0004	0007	Guideway	PDB-PHA	Structural	Track Structure	Broken rail.	Rail Defect or faulty weld.	Potential derailment. Injury. Operational impact.	3C	1. Description of method and verification testing to achieve rail hardness 2. Ultrasonic Technician Qualifications 3. Rail test records 4. Mill Certificate	3D	1. Ultrasonic Technician Qualifications 2. Rail test records; 3. Mill Certificate 4. Weld Reports	Reports Qualification Certificate	34 11 13 TRACK RAILS-SUBMITTALS-1.03.E; 34 05 17 TRACK CONSTRUCTION GENERAL REQUIREMENTS-CONSTRUCTION EQUIPMENT-3.01.A & 3.12	1. Ultrasonic Technician Qualifications REC-00152 Code 1-11/23/15 2. Operating Procedure - Stacking Loading and Banding of Rails REC-00168 EAN 12-2-15. 3. Rail Test Records REC-00380 NET 2-8-16. 4. Rail Shipping Records REC-00775 EAN 4-11-16. 5. REC-00153 - Rail Hardness REC-00841 - 136 LB. Head Hardened Rail REC-01967 - Track Grind Report and REC-01968 - Track Flaw Report REC-02323 Rail Distress Log & Field Reports REC 2304 Rail Weld Inspection Reports	Added test results for Stage 6 7 & 8 to Verification Documents folder.	CM Documentation Complete Accepted
27	0003	0004	0007	Guideway	PDB-PHA	Structural	Track Structure	Excessive rail wear.	Improper Rail Profile	Potential derailment. Injury. Operational impact.	3C	Certificates of compliance codes and regulations	3D	Certificates of compliance codes and regulations	Certificates of compliance	34 11 30 RAIL REPROFILING GRINDING-SUBMITTALS-1.04.C D & E	Added Submittal for Rail Re-profiling Grinding (01682) Added REC-01967 Rail Grind Report and REC-01968 Rail Flaw Report	CM Documentation Complete Accepted	
28	0003	0006	0002	Guideway	PDB-PHA	Corrosion Control	Atmospheric Corrosion Control	Bridge support structure fails.	Atmospheric corrosion	Loss of bridge. Injury or death to passengers. Injury or death to passers-by under structure.	1D	Environmental control measures application	1E	Environmental control measures application	Environmental control measures application - Work Plan	34 80 61 PAINTING AND PROTECTIVE IFC COATINGS FOR RAILROAD BRIDGES-SUBMITTALS-1.04.A.3.f-g	REC-00787 - Paint Plan EAN 4/12/16
IDRs - Hamilton 19.8 Bridge & Pendleton Bridge work On site monitoring of painting by Purcell Paintings and Coatings
S34150 REC 00817 Sound Transit Bridge Safety Management Program	CM Documentation Complete Accepted	
29	0003	0010	0001	Guideway	PDB-PHA	Electrical Systems	Grounding/Insulation	Railroad signals not operational	Electric surge / Lightning	Dark Signal restricted speeds operational impact Potential for derailment or collision*; Potential for injury or death.	2C	1. Field test reports; 2. Design signal interlocking to industry standard	3D	Field test reports	Field test reports	34 42 54 GROUNDING AND BONDING FOR RAILROAD SIGNALS-SUBMITTALS-1.03.C	stage 6 7 8 Test Rpts - grounding test reports. Added test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix Items 6 44 50	Final Documentation Completed Accepted	
30	0003	0015	0001	Guideway	PDB-PHA	Inspection and Maintenance	Track Inspection and Maintenance	Poor visibility on restricted alignment	Plant growth blocks view of signal or crossing.	Potential collision injury equipment damage service disruption.	2C	1. Design to provide removal of trees shrubs and brush from signal and grade crossing sight lines; integration testing to verify adequate sight lines according to 49 CFR 213.37 - Vegetation; 2. Inspection and maintenance procedures to require vegetation control. 3. Standard operating procedures and Rulebook to require train operation at reduced speed when weather affects visibility and train braking performance or alignment configuration reduces forward sight distance.	2D	1. Track inspection procedures 2. Track speed is appropriate for Superelevation 3. Trees directly on the grade crossing or ROW are cleared. 4. A 1 vegetation within 250 ft. of the grade crossing is cleared 5. Fencing is shortened to 42" within 250ft of the crossing.	Fencing As-Built
IDR with images at crossings	31 11 00 CLEARING AND GRUBBING-Part 3 EXECUTION 34 11 50 RAILROAD MAINTENANCE OF WAY-SUBMITTALS-1.04.B	IDR ML Haz. ID 30 04-28-17 REC-01290 Fence AsbuIts	The Maintenance of Way department would never issue a speed restriction based on limited visibility due to weather conditions. This would come from the BNSF Dispatcher based on reports from the Train Crews and/or weather reports. As for Track Inspectors the I&M Manual covers "Special Inspections" due to extreme weather this also comes from direction from the BNSF Dispatcher. Added ST SCR Right of Way Maintenance Plan 2014.	CM Documentation Complete Accepted

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31	0003	0015	0001	Guideway	PDB-PHA	Inspection and Maintenance	Track Inspection and Maintenance	Derailment	Business / Industry / Yard Train Turnout Failures	Potential fatality major/minor injury property damage service disruption.	1D	1. Ensure monthly inspections according to 49 CFR 213.235 - Inspection of switches track crossings and lift rail assemblies or other transition devices on moveable bridges; 2. Future PTC project; 3. Develop procedures for maintenance and proper operation of switches; 4. SOP's for operations and communication with control; 5. Signal system detects train cars on tracks; 6. Signal system detects position of switches	1E	1. PTC point located at all switches and monitored; 2. All switches are maintained by MOW; 3. ST Security MOW and Property Patrol and Inspections; 3. Switch heaters provided at power switches; 4. Reports - CWR plans track inspection signal inspection ROW safety plan	Reports - CWR plans track inspection signal inspection ROW safety plan	34 11 50 RAILROAD MAINTENANCE OF WAY- SUBMITTALS-1.04.A.3; 34 42 10 CENTRALIZED TRAFFIC CONTROL SYSTEM- SUBMITTALS-1.04.D	Added Submittals for Railroad MOW (01809-Track Inspection Reports-Oct-Dec 2016 E 00432-Track and Signals Maintenance Records- Jan 2016 & 00817-Adoption of Sound Transit Bridge Safety Management; REC 1808-Track Inspection Reports - Feb-Oct 2016 REC 1990-Maintenance of Way Summary Reports -Oct 2015 to March 2017. REC-02268 344216.19-002.002.1.04D REC 2268 Fiber Optic Test Results Long Haul and Distribution NET 7/10/17 (see PDB Verification Documents folder)	Refer to Verification Documents for Sounder Inspection & Maintenance (IM) Manual 7/15/2012; Property Patrol and Inspections	Final Documentation Completed Accepted	
32	0003	0015	0001	Guideway	PDB-PHA	Inspection and Maintenance	Track Inspection and Maintenance	Fire/smoke under bridge structure	Adjacent fire/smoke spreads; ignition of flammable materials & Vehicle accident under bridge structure	Potential loss of load bearing capacity potential major/minor injury potential fatality derailment potential major/minor injury property damage service disruption.	1D	1. Design structures with non-combustible materials; 2. Design equipment and systems to eliminate flammable materials; 3. Develop inspection and maintenance procedures for underbrush/debris clearance from underpasses according to 49 CFR 213.37 - Vegetation; 4. Develop procedures for fire incidents; 5. Inspection and maintenance procedures according to 49 CFR 237 Bridge Safety Standards; 6. SOP; 7. ST Security/MOW/Property Patrols and inspections on current Sounder track	1E	1. Alignment meets design criteria; 2. ROW clearances from structures; 3. Track inspection; 4. Vegetation clearing; 5. MOW Property and Security patrols; 6. Bridge Safety Management Program	Work Plan	34 11 50 RAILROAD MAINTENANCE OF WAY-1.04.A.4 SUBMITTALS A. Reports	Added Submittal for Ra ilroad MOW Bridge Safety Mgmt Program (00817)	Added Right of Way Maintenance Plan to SSIMS PDB Verification Documents folder.	CM Documentation Complete Accepted	
33	0003	0015	0001	Guideway	PDB-PHA	Inspection and Maintenance	Track Inspection and Maintenance	Foreign object(s) on alignment	Fallen trees or power lines	Potential track damage potential derailment potential major/minor injury potential fatality equipment damage service disruption.	1C	1. Inspection and maintenance procedures to verify structural integrity of structures above and adjacent to alignment according to 49 CFR 213.233 - Track inspections 2. Inspection and maintenance procedures according to 49 CFR 237 Bridge Safety Standards. 3. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations.	1D	1. Adequate ROW track clearance 2. ROW inspection procedures	N/A	IFC Volume 1 - Existing Conditions/Demolition Plans Sheets 108 - 163 Specifications: 02 41 00 3.03 31 11 00 3.02D A1 trees and limbs within 25 ft of track centerline were to be removed per the demolition plans. There were specific areas delineated in the contract plans for tree removal	Track is inspected as per CFR Part 213-Maintenance contractor hi-rails ST mainline twice per week as per FRA requirement. Right of Way Maintenance Plan added to SSIMS PDB Verification Documents folder	CM Documentation Complete Accepted		
34	0006	0001	0003	Signaling	PDB-PHA	Train Control	Train Detection	Collision between train and roadway vehicle at grade crossing or in the alignment	Insufficient train approach warning time related to train speed	Potential fatality major/minor injury property damage service disruption.	1C	1. Design to ensure grade crossing warning time is correlated with train speed; 2. System integration testing for grade crossings to ensure sufficient warning time; 3. Design train detection circuits on fail-safe principle per MUTCD standard; 4. Provide appropriate signage according to MUTCD standards (speed limits) and safety warning devices (Cross buck track signs etc.); 5. Provide appropriate lane barriers and active/passive warning devices; 6. Channelization; 7. Ensure proper sight lines; 8. Train operators to follow FRA regulations for grade crossing; 9. Emergency Notification System (ENS) signs posted conspicuously; 10. Future PTC	1E	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signal Pre-emption; 11. PTC regulated train speed; 12. Commissioning & testing during System Integration	Test Reports	34 42 15 RAILROAD GRADE CROSSING SIGNALS- SUBMITTALS-1.05.A.2	Added CRE-02512-Intersection Interconnect Signoff to SSIMS Verification Documents. Added test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix items 38 39 43 40 31 32 47 (RR Grade Crossing Signals)	Final Documentation Completed Accepted		
35	0006	0001	0007	Signaling	PDB-PHA	Train Control	PTC	Derailment	Train speed not within specified limits at track curves	Potential derailment equipment damage major/minor injuries	1C	1. Ensure curves; elevation and speed limitations are designed according to 49 CFR 213.57; 2. Develop inspection and maintenance procedures according to 49 CFR 213.233 Track Inspection; 3. Future PTC; 4. Timetable	1D	1. PTC regulated speeds according to timetables. 2. SOP	This would be in the WSDOT PTC Contract: added PTC Schedule Flow Chart WSDOT-ST Collaboration Meeting #18 and WSDOT PDB PTC 10 week look-ahead 3-29-17 see PDB Verification Documents for PTC Phase II Scope of Work	Inspection and maintenance procedures according to 49 CFR 213.233 Track Inspection Reference ROW Maintenance Plan in SSIMS PDB Verification Documents	CM Documentation Complete Accepted			
36	0006	0003	0001	Signaling	PDB-PHA	Grade Crossing Warning System	Signals	Crossing gate preview time is less than 20 seconds.	1. Train approach circuit not long enough for train speeds; 2. Coordination with traffic signals and or railway signal system does not provide timely advance warning.	Minimum 20 second preview time is nationally recognized and taught in all driver education classes. * Road vehicle enters crossing directly or drives around gate causing collision. * Potential for injury or death.	2B	1. Test Procedures (Part of CPM); 2. Design crossing starts and program crossing control system to accommodate new track and higher speed using industry standards. Complete FRA in-service and monthly testing to assure proper operation.	2D	1. Test Procedures (Part of CPM); 2. Off site testing notification	Work Plan; Test Report	34 42 15 RAILROAD GRADE CROSSING SIGNALS- SUBMITTALS-1.05.A.1-2	Submittals for Test Procedures include: Stage 1 (01458) Stage 3 (01403) Stage 4 (01180 & 01418) Stage 5 (01358) and Stage 6 (01711 01842). Test Results added to Verification Documents: CP Roll (01516) Stage 4 (01779) Stage 5 (01841) Stage 1 (01709) Stage 3 (01710).	Added REC-02300 Field Test Train Recorded data and Stage 6 7 & 8 Testing Results and Matrix to SSIMS Verification Documents folder. See Matrix tests 38 39 43 40 31 32 for Grade Crossing Signals. (Less than double the design warning times at all speeds.)	Final Documentation Completed Accepted	
37	0006	0003	0001	Signaling	PDB-PHA	Grade Crossing Warning System	Signals	Crossing gate preview time greater than 30 seconds.	Train approach circuit too long for train speeds.	* Driver becomes impatient*. Potential for injury or death.	2B	1. Test Procedures (Part of CPM); 2. Design crossing starts and program crossing control system to accommodate new track and higher speed using industry standards. Complete FRA in-service and monthly testing to assure proper operation; 3. Motorist behavior issues would be addressed with outreach and education program.	2D	Test Reports (Part of CPM)	Stage 6 7 8 Test Reports	34 42 15 RAILROAD GRADE CROSSING SIGNALS- SUBMITTALS-1.05.A.2	Added test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix tests 38 39 43 40 31 32 for Grade Crossing Signals. Less than double the design warning times at all speeds.	Outreach documents added	Final Documentation Completed Accepted	
38	0006	0003	0001	Signaling	PDB-PHA	Grade Crossing Warning System	Signals	Collision between train and grade crossing user(s)	Obstructed sight distances	Potential fatality major/minor injury property damage service disruption.	1C	1. Clearing of vegetation to a low adequate sight distance; 2. Removal/relocation of objects obstructing sight distance; 3. Design roadways with clear lines of sight; 4. Emergency Notification System (ENS) signs posted conspicuously; 5. Pedestrian gates for high volume pedestrian traffic; 6. Arrange diagnostic team to review proposed grade crossing design.	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Clearing of vegetation to allow adequate sight distance; 11. Trespass fence height 42" for 250R from the grade crossing; 12. Emergency Notification System (ENS) signs posted conspicuously; 13. On site testing notification	IDR / Photo each grade crossing	31 11 00 CLEARING AND GRUBBING-Part 3 EXECUTION; 34 11 50 RAILROAD MAINTENANCE OF WAY-SUBMITTALS-1.04.B	IDR ML Haz. ID 38 04-28-17 Change order #97 for ENS- documentation added to PDB Verification Documents folder	Final Documentation Complete Accepted		
39	0006	0003	0001	Signaling	PDB-PHA	Grade Crossing Warning System	Signals	Collision between train and grade crossing user(s)	Driving or walking around gates	Potential fatality major/minor injury property damage service disruption.	1C	1. Fencing along both sides of tracks around grade crossings (to enforce channelization); 2. Channelization; 3. No trespassing signage; 4. Public Education for Rail Safety; 5. Physical barriers to prevent vehicles from going around gates.	1D	1. Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection 10. Public Outreach and Education 11. Signal Pre-emption Coordination 12. Enforcement (Police/Security) 13. Channelization according to Plans	IDR showing channelization and signage Fence As-Built	Fencing:Track Plan and Profiles Volume 1 TA00 - TA73; Roadway Plan and Profile - Volume 2 RD126 RD132; Roadway Sign and Channelization and Signal Plan: Volume 2 RDS01 - RDCH10	IDR ML Haz. ID 39 04-28-17 S34150-REC-02190 SUB 017839-011.001.1.02A Fence As-Built. See PDB Verification Documents for: PDB Outreach June 2017 Outreach_Folio_PDB_2017_FINAL AmtrakCascades_Outreach_PDB_Testing_Flyer_122916_FIN AL	Security Enforcement (See Safety/Security Reqmts #12)	Final Documentation Completed Accepted	
40	0007	0005	0002	Communications	PDB-PHA	Communication Transmission System	Fiber Optic Network	Loss of monitoring capability at the Rail Control Center (RCC).	Fiber cable cut.	Potential for serious injuries.* Damage to equipment and facilities. Potential minor environmental hazard.	3C	1. Incorporate redundant fiber optic lines as part of project 2. Test Procedures. 3. As Built	3D	Test procedures Test Reports As built drawings	Work Plans Test Reports As-builts	34 42 16.13 FIBER OPTIC DISTRIBUTION SYSTEM- SUBMITTALS-1.05.C-E; 34 42 16.19 TESTING IDENTIFICATION AND ADMINISTRATION OF FIBER INFRASTRUCTURE-SUBMITTALS-1.04.C-D ADMINISTRATION-3.04.B	added REC-02209 Fiber Optic Ductbank As-Built and REC-02114 Fiber Optic Vaults As-Built	Test Procedures include: Stage 1 (01458) Stage 3 (01403) Stage 4 (01180 & 01418) Stage 5 (01358) & Stage 6 (01711 01842 01913). Test Results Include: CP Roll (01516) Stage 4 (01779) Stage 5 (01841) Stage 1 (01709) Stage 3 (01710)	Final Documentation Completed Accepted	
41	0009	0004	0000	Traffic Control	PDB-PHA	Control of Train Interface with Traffic	Control of Train Interface with Traffic	Crossing gate preview time is less than 20 seconds.	Coordination with traffic signals and or railway signal system does not provide timely advance warning.	Minimum 20 second preview time is nationally recognized and taught in all driver education classes. * Road vehicle enters crossing directly or drives around gate causing collision. * Potential for injury or death.	2B	1. Traffic signal testing and turn on; 2. Design crossing starts and program crossing control system to accommodate new track and higher speed using industry standards. Complete FRA in-service and monthly testing to assure proper operation.	2D	1. Traffic Signal testing and turn on; 2. Test Procedures (Part of CPM); 3. Test Reports (Part of CPM); 4. On site testing notification; 5. Off site testing notification; 6. Qualifications of Railroad Signal and Communications Engineer; 7. Test equipment and service manuals; 8. Joint Railroad/Roadway Authority Interconnection Inspection Forms	Test Report ,Work Plan ,Qualification of Railroad Signal Engineer	34 41 13 TRAFFIC SIGNALS: 2.02.A.7.a TRAFFIC SIGNAL MATERIALS FOR STREETS ROADWAYS AND PARKING LOTS OWNED OR MAINTAINED BY JURISDICTIONS OTHER THAN SOUND TRANSIT; 3.02.A.8 TRAFFIC SIGNAL MATERIALS FOR STREETS ROADWAYS AND PARKING LOTS OWNED OR MAINTAINED BY JURISDICTIONS OTHER THAN SOUND TRANSIT; 34 42 15 Railroad Grade Crossing Signals-1.05.A.1-4 2.11.F; 00 22 13 Supplemental Responsible Bidder Criteria-1.03	Submittals: Controller Cabinets for WSDOT Intersections REC 00846 Spare Controller Cabinets Signal Heads and LED BI REC-00737 Joint Railroad/Roadway Interconnect Inspection Form for Barkdale Crossing Joint Railroad/Roadway Interconnect Inspection Forms for 41st Division and North Thorne Line Monthly Progress Reports REC-02267 7/10/17 WSDOT and Comm System Training Sign In REC-02211. Test Reports for Stage 6-REC-2303. Stage 7-REC-2318 & Stage 8-REC-2312 REC-02365 CTC Training Program REC-02302 CTC Warranty and OandMs	Test Procedures (Part of CPM); #10;Joint Railroad/Roadway Authority Interconnection Inspection Forms (see Andrew Rawls re: WUTC)
and training records for Traffic Signals Controller Cabinet

 Test Reports for Stage 6-REC-2303. Stage 7-REC-2318 & Stage 8-REC-2312	Test equipment and service manuals;	Final Documentation Complete Accepted
42	0009	0004	0000	Traffic Control	PDB-PHA	Control of Train Interface with Traffic	Control of Train Interface with Traffic	Collision between train and grade crossing user(s)	Complex intersection geometry resulting in motorists and pedestrian judgment errors	Potential fatality major/minor injury property damage service disruption.	1C	1. Ensure safe right-of-way design appropriate signage encroachment detection/warning devices and public education; 2. Arrange diagnostic team to review proposed grade crossing design; 3. Continued review of pedestrian/motorists intersection design through final site inspection and test; 4. Pedestrian gates	1D	1. Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Public Outreach and Education; 11. Signal Pre-emption Coordination; 12. New traffic signals according to plans	Grading and Drainage Roadway Alignment Roadway Details Roadway Plan and Profile Roadway Channelization and Roadway Preemption signal and wiring diagram Plan Sheets; 34 42 15 -Railroad Grade Crossing Signals; 32 16 13 - Concrete Curbs & Gutters; 32 16 23 -Sidewalks; 32 17 23 - Pavement Markings; 32 31 13; 34 41 13 - Traffic Signals; 34 17 13 - 2.01	Submittals for RR Grade Crossing Signals (01526 & 01525) Traffic Signal Materials (00813 00682 01157 00871 01158 & 01790) and Vehicle Barriers (01559). Add IDR showing finished work 04-28-19. See PDB Verification Documents folder for Outreach verification.	Added CRE-02512 Intersection Interconnect Signoff and Stage 6 7 8 Test Reports and Matrix to SSIMS Verification Documents folder. See Matrix items 6 44 50 47 for Signal Testing of Equipment Grounding.	Final Documentation Completed Accepted		
43	0009	0005	0000	Traffic Control	PDB-PHA	Sign Design	Sign Design	Collision between train and pedestrian(s)	Pedestrians unaware of double track or increase in frequency and speed of trains	Potential fatality major/minor injury service disruption.	1C	1. "LOOK" or "High Speed Trains Travel in Both Directions" signage; 2. Other signage according to MUTCD standards; 3. Emergency Notification System (ENS) signs posted conspicuously; 4. (ENS) signs posted conspicuously; 4. Adjacent Residence / Business Public Education for Rail Safety; 5. Install adequate fencing near crossings and areas where intrusion or trespass may be frequent or most likely; 6. Install adequate safety warning devices at crossings; 7. Install adequate signage near legal crossings and along track way.	1D	1. Pub ic Outreach and Education; 2. Signage according to MUTCD standards as indicated in plans; 3. Emergency Notification System (ENS) signs posted conspicuously; 4. Adjacent Residence / Business Education for Rail Safety; 5. Install adequate fencing near crossings and areas where intrusion or trespass may be frequent or most likely; 6. Install adequate safety warning devices at crossings; 7. Install adequate signage near legal crossings and along track way; 8. Product Data for permanent signs	Product Data; Fence As Built; IDR / Photo at crossings	10 14 53 TRAFFIC SIGNAGE-SUBMITTALS-1.03.A	Submittal for Permanent Traffic Signage (01778) IDR ML Haz. ID 43 05-01-17 S34150-REC-02190 SUB 017839-011.001.1.02A Fence As-Built. Change order #97 for ENS- documentation added to PDB Verification Documents folder	Added Safety Outreach documents to SSIMS PDB Verification Documents folder	Final Documentation Complete Accepted	

Point Defiance Bypass Track Signal Improvements Project
Safety Certification Verification Matrix - Final 10/27/17

44	0009	0005	0000	Traffic Control	PDB-PHA	Sign Design	Sign Design	Collision between train and grade crossing user(s)	Lack of advance warning signs	Potential fatality major/minor injury property damage service disruption.	1C	1. Design grade crossing according to MUTCD guidelines; 2. Channelization; 3. Clear sight distances of track from roadway; 4. Emergency Notification System (ENS) signs posted conspicuously; 5. Pedestrian gates for high volume pedestrian traffic; 6. Ensure safe right-of-way design appropriate signage and public education; 7. Arrange diagnostic team to review proposed grade crossing design; 8. 20 second warning time	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signage according to plans; 11. Channelization; 12. Clear sight distances of track from roadway; 13. Emergency Notification System (ENS) signs posted conspicuously	IDR and Photo at each crossing	Grading and Drainage Roadway Alignment Roadway Details Roadway Plan and Profile Roadway Channelization and Roadway Preemption signal and wiring diagram Plan Sheets; 221613 CONCRETE CURBS AND GUTTERS 3.01; 321623 SIDEWALKS 3.01; 321723 PAVEMENT MARKINGS 3.01; 323113 3.01; 344113 TRAFFIC SIGNALS 2.01 & 2.02; 344215 RAILROAD GRADE CROSSING SIGNALS 1.13; 341713 2.01	Submittals; RR Grade Crossing Signals (01526 & 01525); Traffic Signal Materials (00813 00682 01157 00871 01158 & 01790) and Vehicle Barriers (01559); added REC-00737-Spare Controller Cabinets Signal Heads and LED Blank-Out Signs; IDR ML Haz. ID 44 05-01-17. Change order #97 for ENS-documentation added to PDB Verification Documents folder	Added test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix Items 6 44 50 47 for Signal Testing of Equipment Grounding.		Final Documentation Complete Accepted
45	0009	0006	0000	Traffic Control	PDB-PHA	Pavement Marking Design	Pavement Marking Design	Collision between train and roadway vehicle at grade crossing or in the alignment	Highway vehicle fails to stop at stop bar and front end fouls tracks	Potential fatalities major/minor injuries property damage service disruption.	1C	1. Design grade crossing according to MUTCD guidelines; 2. Locate crossing gate sufficiently back to account for vehicles failing to stop at stop bar; 3. Organize diagnostic team to review grade crossing design; 5. Illuminate crossing; 6. Improve vehicle sight distance of crossing approach; 7. Coordinate traffic control device upgrades and design intersection interface with adjacent intersection traffic signals (Traffic Pre-emption); 8. Emergency Notification System (ENS) signs posted conspicuously; 9. Arrange diagnostic team to review proposed grade crossing design.	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signal Pre-emption; 11. Enforcement (Police/Security); 12. Crossing Illumination; 13. Channelization; 14. Public Outreach and Education; 15. Product Data	Product Data IDR and Photo at each crossing	32 17 23 PAVEMENT MARKINGS-SUBMITTALS-1.03A	Submittals for Pavement Markings (01727 & 01848) IDR ML Haz. ID 45 05-01-17	Added Outreach documents to SSIMS PDB Verification Documents folder		CM Documentation Complete Accepted
46	0009	0007	0000	Traffic Control	PDB-PHA	Traffic Signal Controller	Traffic Signal Controller	Collision between train and grade crossing user(s)	Crossing intersections improperly engineered (inadequate warning devices incorrect timing inadequate stopping distance inadequate traffic control etc.)	Potential fatality major/minor injury property damage service disruption.	1C	1. Ensure safe right-of-way design appropriate signage and public education; 2. Arrange diagnostic team to review proposed grade crossing design; 3. Emergency Notification System (ENS) signs posted conspicuously; 4. Traffic Signal Pre-emption.	1D	1. Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Public Outreach and Education; 11. Signal Pre-emption Coordination; 12. New traffic signals according to plans	IDR and Photo at each crossing	Grading and Drainage Roadway Alignment Roadway Details Roadway Plan and Profile Roadway Channelization and Roadway Preemption signal and wiring diagram Plan Sheets; 34 42 15 1.05.D; 32 16 13 3.01; 32 16 23 3.01; 32 17 23 3.01; 32 31 13 3.01; 34 41 13 2.01 & 2.02; 34 42 15 1.13; 34 17 13 2.01	Submittals; RR Grade Crossing Signals (01526 & 01525); Traffic Signal Materials (00813 00682 01157 00871 01158 & 01790); REC-00737 for Spare Controller Cabinets Signal Heads and LED Blank-Out Signs IDR ML Haz. ID 46 05-01-17	Added test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix test 6 44 50 47 for Signal testing of equipment grounding.	Added Outreach documents to SSIMS PDB Verification Documents folder	Final Documentation Completed Accepted
47	0009	0007	0000	Traffic Control	PDB-PHA	Traffic Signal Controller	Traffic Signal Controller	Collision between train and roadway vehicle at grade crossing or in the alignment	Truck or other long vehicle stops on tracks due to traffic backup from adjacent intersection controlled by traffic signals	Potential major/minor injury potential fatality derailment equipment damage service disruption.	1B	1. Design grade crossing according to MUTCD guidelines; 2. Locate crossing gate sufficiently back to account for vehicles failing to stop at stop bar; 3. Organize diagnostic team to review grade crossing design; 5. Illuminate crossing; 6. Improve vehicle sight distance of crossing approach; 7. Coordinate traffic control device upgrades and design intersection interface with adjacent intersection traffic signals (Traffic Pre-emption); 8. Emergency Notification System (ENS) signs posted conspicuously.	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signal Pre-emption and coordination with adjacent traffic signals (Commissioning and testing during System Integration); 11. Enforcement (Police/Security); 12. Crossing Illumination; 13. Channelization; 14. Public Outreach and Education; 15. Queue cutter according to plans; 16. Additional signals according to plans	IDR and Photo at each crossing	Grading and Drainage Roadway Alignment Roadway Details Roadway Plan and Profile Roadway Channelization and Roadway Preemption signal and wiring diagram Plan Sheets; 34 42 15 1.05.D; 32 16 13 3.01; 32 17 23 3.01; 32 31 13 3.01; 34 41 13 2.01 & 2.02; 34 42 15 1.13; 34 17 13 2.01	Submittals; RR Grade Crossing Signals (01526-Factor Test Reports - MP 18.45 Remote Crossing 01525-Factor Test Reports - MP 12.79 N. Thorne Lane); Traffic Signal Materials (00813-Traffic Signal Video Detectors 00682-Backup Power Generator 01157 & 00871-WSDOT Traffic Poles and Hardware for Thorne 41 st and Barksdale 01158-Detector Cards and Cabinet Base Riser & 01790-7.5kVA Transformers at WSDOT Intersections); and Vehicle Barriers (01559-Beam Guardra I); 00737 for Traffic Signal Materials ST Owned REC 00846-Controller Cabinets for WSDOT Intersections REC 01248-Buy America Certificates for Econolite Products REC 02029-Spare Traffic Controllers. added IDR ML Haz. ID 47 05-01-17	Queue Cutter Testing; CRE-002512-Intersection Interconnect Sign Off Added test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix test 6 44 50 47 for Signal testing of equipment grounding.	Outreach documents added to SSIMS PDB Verification Documents folder.	Final Documentation Completed Accepted
48	0009	0010	0000	Traffic Control	PDB-PHA	Detection Equipment	Detection Equipment	Collision between train and roadway vehicle at grade crossing or in the alignment	Traffic queues backup at rush hour and exceed ramp storage length due to accident or heavy traffic on Interstate Highway I-5 and result in vehicles stopping on tracks	Potential fatality major/minor injury property damage service disruption.	1B	1. Provide traffic signal system with pre-emption; 2. Design train detection circuits on fail-safe principle per MUTCD standard; 3. Provide appropriate signage (speed limits) and safety warning devices (Cross buck track signs etc.); 4. Provide appropriate lane barriers and active/passive warning devices; 5. Channelization and unmountable curbs; 6. Ensure proper sight lines; 7. Pavement marking clearly indicating fouling area; 8. Pullout lanes for each lane of traffic; 9. Emergency Notification System (ENS) signs posted conspicuously; 10. Arrange diagnostic team to review proposed grade crossing design; 11. Consider traffic control police at crossing for special situations	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signal Pre-emption and coordination with adjacent traffic signals (Commissioning and testing during System Integration); 11. Enforcement (Police/Security); 12. Crossing Illumination; 13. Channelization; 14. Public Outreach and Education; 15. Queue cutter according to plans; 16. Additional signals according to plans; 17. Ramp Meter integration; 18. JBLM & Camp Murray to Notify Railroad of unusual traffic situation; 19. Emergency Notification System (ENS) signs posted conspicuously; 20. Traffic control police at crossing for special situations	IDR and Photo at each crossing	Grading and Drainage Roadway Alignment Roadway Details Roadway Plan and Profile Roadway Channelization and Roadway Preemption signal and wiring diagram Plan Sheets; 34 42 15 1.05.D; 32 16 13 3.01; 32 16 23 3.01; 32 17 23 3.01; 2 31 13 3.01; 34 41 13 2.01 & 2.02; 34 42 15 1.13; 34 17 13 2.01	Submittals; RR Grade Crossing Signals (01526-Factor Test Reports - MP 18.45 Remote Crossing 01525-Factor Test Reports - MP 12.79 N. Thorne Lane) Traffic Signal Materials (00813-Traffic Signal Video Detectors 00682-Backup Power Generator 01157 & 00871-WSDOT Traffic Poles and Hardware for Thorne 41 st and Barksdale 01158-Detector Cards and Cabinet Base Riser & 01790-7.5kVA Transformers at WSDOT Intersections) and Vehicle Barriers (01559-Beam Guardra I); 00737 for Traffic Signal Materials ST Owned REC 00846-Controller Cabinets for WSDOT Intersections REC 01248-Buy America Certificates for Econolite Products REC 02029-Traffic Controllers. added IDR ML Haz. ID 48 05-01-17. Change order #97 for ENS-documentation added to PDB Verification Documents folder	Queue Cutter Testing; REC-002512-Intersection Interconnect Sign Off. Added test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix tests 6 44 50 47 for Signal testing of equipment grounding	Added Outreach documents to SSIMS PDB Verification Documents folder. Requires JBLM Outreach (see 18. Safety/Security Requirements)	Final Documentation Complete Accepted
49	0009	0010	0000	Traffic Control	PDB-PHA	Detection Equipment	Detection Equipment	Collision between train and roadway vehicle at grade crossing or in the alignment	Traffic queues backup could exceed storage length and result in vehicles stopping on tracks due to proximity to freeway ramp and frontage road at rush hour high traffic volumes at Clark Rd entrance to military base other traffic overflow situations	Potential fatality major/minor injury property damage service disruption.	1B	1. Provide traffic signal system with pre-emption; 2. Design train detection circuits on fail-safe principle per MUTCD standard; 3. Provide appropriate signage (speed limits) and safety warning devices (Cross buck track signs etc.); 4. Provide appropriate lane barriers and active/passive warning devices; 5. Channelization and unmountable curbs; 6. Ensure proper sight lines; 7. Pavement marking clearly indicating fouling area; 8. Pullout lanes for each lane of traffic; 9. Emergency Notification System (ENS) signs posted conspicuously; 10. Arrange diagnostic team to review proposed grade crossing design; 11. Consider traffic control police at crossing for special situations	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signal Pre-emption and coordination with adjacent traffic signals (Commissioning and testing during System Integration); 11. Enforcement (Police/Security); 12. Crossing Illumination; 13. Channelization; 14. Public Outreach and Education; 15. Queue cutter according to plans; 16. Additional signals according to plans; 17. Ramp Meter integration; 18. JBLM & Camp Murray to Notify Railroad of unusual traffic situation; 19. Emergency Notification System (ENS) signs posted conspicuously; 20. Traffic control police at crossing for special situations	IDR and Photo at each crossing	Grading and Drainage Roadway Alignment Roadway Details Roadway Plan and Profile Roadway Channelization and Roadway Preemption signal and wiring diagram Plan Sheets; 34 42 15 1.05.D; 32 16 13 3.01; 32 16 23 3.01; 32 17 23 3.01; 32 31 13 3.01; 34 41 13 2.01 & 2.02; 34 42 15 1.13; 34 17 13 2.01	Submittals for RR Grade Crossing Signals (01526 & 01525) Traffic Signal Materials (00813 00682 01157 00871 01158 & 01790) and Traffic Barriers (01559); 00737 for Traffic Signal Materials ST Owned 00846-Controller Cabinets for WSDOT Intersections 01248-America Certificates for Econolite Products 02029-Spare Traffic Controllers added IDR ML Haz. ID 49 05-01-17. Change order #97 for ENS-documentation added to PDB Verification Documents folder	Queue Cutter Testing; REC-002512 Intersection Interconnect Sign Off Added test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix tests 38 39 43 40 31 32 47 for Signals Testing of Equipment Grounding.	Outreach documents added to SSIMS PDB Verification Documents folder. Requires Outreach coordination with JBLM	Final Documentation Complete Accepted
50	0009	0010	0000	Traffic Control	PDB-PHA	Detection Equipment	Detection Equipment	Collision between train and roadway vehicle at grade crossing or in the alignment	Traffic queues backup and stop on tracks due to High Security Level Inspection or Emergency Shutdown at Military Bases	Potential fatality major/minor injury property damage service disruption.	1B	1. Provide traffic signal system with pre-emption; 2. Design train detection circuits on fail-safe principle per MUTCD standard; 3. Provide appropriate signage (speed limits) and safety warning devices (Cross buck track signs etc.); 4. Provide appropriate lane barriers and active/passive warning devices; 5. Channelization and unmountable curbs; 6. Ensure proper sight lines; 7. Pavement marking clearly indicating fouling area; 8. Install DO NOT STOP ON TRACKS signage; 9. Emergency Notification System (ENS) signs posted conspicuously; 10. Public education on Rail Safety	1D	1. "Fail-Safe Crossing 2. Pavement Markings 3. Cross buck Signs 4. Red Flashing Signals 5. Automatic Gates 6. Stop Lines(painted) 7. Audible Warning Bells 8. Wayside Horns 9. Constant warning train detection. 10. Signal Pre-emption and coordination with adjacent traffic signals (Commissioning and testing during System Integration) 11. Enforcement (Police/Security) 12. Crossing Illumination 13. Channelization 14. Public Outreach and Education 15. Queue cutter according to plans 16. Additional signals according to plans	IDR and Photo at each crossing Traffic Signal Materials	IFC Vol 1: Item 3-Sheets 387 - 390 RDS01 - RDCH10; IFC Vol 2: Items 2 6 13-Sheets 141 - 147 RRS01-RRS04: Items 1 3-Sheets 086 - 119 RDAL123-RDDET119 RD126-RD132: Items 4 5 7 8 9 10 12 16-Sheets 152 - 178 RDSG01-RDSG27; IFC Vol 3: Items 1 4 5 7 8 9 10 12 16-Sheets 47 - 79 SGTYP01-SGTYP40 Specifications: 34 42 15 RAILROAD GRADE CROSSING SIGNALS - 1.05.D 1.13 (Items 1 4 5 7 8 9 10); 32 16 13 CONCRETE CURBS AND GUTTERS - 3.01 (Item 1 13); 32 17 23 PAVEMENT MARKINGS - 3.01 (Items 2 6 13); 32 31 13 CHAIN LINK FENCES AND GATES - 3.01 (Items 11); 34 41 13 TRAFFIC SIGNALS - 1.01.B 2.01 & 2.02 (Items 15 10 12); 34 17 13 - 2.01 (Items 11 13)	IDR ML Haz. ID 50 05-01-17 REC 00846-Controller Cabinets for WSDOT Intersections REC 01248-Buy America Certificates for Econolite Products REC 02029-Spare Traffic Controllers	Added to SSIMS: Queue cutter Testing; CRE-002512 Intersection Interconnect Sign Off test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix items 6 44 50 47 for Signal Testing of Equipment Grounding.	Outreach documents filed on SSIMS PDB Verification Documents folder.	Final Documentation Completed Accepted
51	0009	0011	0000	Traffic Control	PDB-PHA	Preemption Equipment	Preemption Equipment	Collision between train and roadway vehicle at grade crossing or in the alignment	Stopping on Tracks	Potential fatality major/minor injury property damage service disruption.	1B	1. Coordinate traffic control device upgrades and design intersection interface with adjacent intersection traffic signals (Traffic Pre-emption); 2. Provide sufficient queuing for traffic between grade crossing and adjacent intersection; 3. Install DO NOT STOP ON TRACKS signage; 4. Pavement markings clearly indicating fouling area; 5. Public education on Rail Safety; 6. Evaluate crossing for potential sight obstructions; 7. Emergency Notification System (ENS) signs posted conspicuously in compliance with CFR Part 49.	1D	1. "Fail-Safe Crossing; 2. Pavement Markings; 3. Cross buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop Lines(painted); 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Signal Pre-emption; 11. Enforcement (Police/Security); 12. Crossing Illumination; 13. Channelization; 14. Public Outreach and Education; 15. Queue cutter according to plans; 16. Additional signals according to plans	IDR / Photo for each intersection	Grading and Drainage Roadway Alignment Roadway Details Roadway Plan and Profile Roadway Channelization and Roadway Preemption signal and wiring diagram Plan Sheets; 34 41 13 2.02.A.7.2 34 42 15 1.05.D; 32 16 13 3.01; 32 17 23 3.01; 32 31 13 3.01; 34 42 15 1.13; 34 17 13 2.01	Submittals for RR grade Crossing Signals (01526-Factor Test Reports - MP 18.45 Remote Crossing 01525-Factor Test Reports - MP 12.79 N. Thorne Lane) Traffic Signal Materials (00813-Traffic Signal Video Detectors 00682-Backup Power Generator 01157 & 00871-WSDOT Traffic Poles and Hardware for Thorne 41 st and Barksdale 01158-Detector Cards and Cabinet Base Riser & 01790-7.5kVA Transformers at WSDOT Intersections) and Vehicle Barriers (01559-Beam Guardra I); REC-00737 for Traffic Signal Materials ST Owned. Added IDR ML Haz. ID 51 05-01-17	Added to SSIMS: CRE-002512 Intersection Interconnect Sign Off for Queue cutter test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix tests 6 44 50 47 for Signal Testing of Equipment Grounding.	Outreach documents added to SSIMS PDB Verification Documents folder.	Final Documentation Completed Accepted
52	0009	0013	0000	Traffic Control	PDB-PHA	Height Clearances	Height Clearances	Train overpass structure failure due to impact	Over height truckload/ military vehicle strikes overpass structure	Potential loss of load bearing capacity potential major/minor injury potential fatality derailment equipment and property damage service disruption.	1C	1. Design structure in accordance with state vertical and horizontal clearance requirements; 2. Height clearance check bars on Northern side of Pendleton Ave; 3. Provide highly visible "Maximum Height" signage on Northern side of Pendleton Ave; 4. Remove any line of sight obstructions for height clearance signage; 5. Develop inspection and maintenance procedures to assure frequent inspection of bridges; 6. Coordinate with JBLM for education for Rail Safety; 7. Inspection and maintenance procedures according to 49 CFR 237 Bridge Safety Standards.; 8. Maximum height signage	1D	1. Alignment meets design criteria; 2. ROW clearances from structures; 3. Track inspection; 4. Pendleton Ave Bridge to be raised 9"; 5. Height check predictor to be placed on roadway	IDR - Check height above Pendleton and photo of JBLM low height clearance warning system maximum height signage	Alignment Plans Bridge 16.9L Plan sheets Height Predictor is being coordinated separately with JBLM Bridge inspection and load rating reports; 02 41 00 Demolition-1.06 DEMOLITION AND REMOVAL CONSTRUCTION WORK PLAN; 34 11 27 Ballasted Track Construction-3.07 SURFACING ALIGNING AND STABILIZING - GENERAL 34 11 50 Railroad Maintenance of Way 3.01 GENERAL 3.02 SIGNALS GRADE CROSSINGS AND COMMUNICATIONS EQUIPMENT 3.04 BRIDGES AND OTHER STRUCTURES; JBLM plans to install an advance low height clearance warning system as mitigation for the low clearance.; 16.9L Plan Sheets (Pendleton Ave Bridge) Volume 2 - (501-508)	Added REC's REC 00381-CWP for Building Demolition REC 00571-CWP Bridge 19.8L Balustrade Demo & REC 00573-JHA Demo Balustrade and Raise Parapet. Added IDR Pendleton Bridge Height Inspection/Verification Measured & Recorded 04-10-17	See PDB Verification Documents folder for Outreach with JBLM for education for Rail Safety. The Bridge Safety Management Program Plan is currently being updated (attached).	CM Documentation Complete Accepted	

Point Defiance Bypass Track Signal Improvements Project
 Safety Certification Verification Matrix - Final 10/27/17

53	0009	0004	0000	Traffic Control	PDB-PHA	Control Train Interface with Traffic	Control Train Interface with Traffic	Collision between train and vehicle on track	I-5 Vehicle <10 000 lb. loses control and drives onto track	Potential fatality major/minor Injury property damage service disruption.	2D	1. Barriers alongside all roadways or highways where elevation exceeds track grade and high risk areas	2D	1. Monitor I-5 collision data quarterly to detect accident trends or facts that indicate a need for reconsideration of placing of additional guardrails. 2. Ensure that local emergency dispatch centers have the telephone numbers and protocols to immediately contact BNSF dispatch when a vehicle is reported on the tracks.			WSDOT analysis: Risk of Vehicle/Train Collisions on the PDB away from crossings. Clear Zone Maps & Cross sections. Including Attachments: I-5 Hazard Research I-5 vehicle-train collisions was reviewed and changes approved by SDDCC removed vehicle barriers as a requirement reduced initial risk added new hazard #63 for vehicle >10 000 lb.		CM Documentation Complete Accepted	
54	0009	0014	0000	Traffic Control	PDB-PHA	Vehicle Barriers	Vehicle Barriers	Collision between train and vehicle on track	Vehicle enters ROW from Bridgeport Way	Potential fatality derailment major/minor Injury property damage service disruption.	1D	1. Provide roadway illumination at the crossing to better illuminate the railroad environment; 2. Design grade crossing according to MUTCD guidelines; 3. Coordinate roadway signage with local jurisdiction traffic department; 4. Bollards for wider ROW areas	1E	1. "Fail-Safe Crossing"; 2. Pavement Markings; 3. Cross Buck Signs; 4. Red Flashing Signals; 5. Automatic Gates; 6. Stop grade crossing according to MUTCD guidelines; 7. Audible Warning Bells; 8. Wayside Horns; 9. Constant warning train detection; 10. Provide roadway illumination at the crossing to better illuminate the railroad environment; 11. Pre-emption signal & activation; 12. Public Outreach and Education	Signals Tests	Grading and Drainage Roadway Alignment Roadway Details Roadway Plan and Profile Roadway Channelization and Roadway Preemption signal and wiring diagram Plan Sheets; 34 42 15 1.05.D. 32 16.13 3.01; 32 16.23 3.01; 32 17.23 3.01; 32 31.13 3.01; 34 41 13 2.01 & 2.02; 34 42 15 1.13; 34 17 13 2.01	Submittals;RR Grade Crossing Signals (01525 &01526);Traffic Signal Materials (00813 00682 01157 00871 01158 & 01790) Vehicle Barriers (01559). Spare Controller Cabinets (00737). Added IDR showing finished work 04-28-17.	Added test results for Stage 6 7 & 8 and Matrix to Verification Documents folder. See Matrix items 6 44 50 47 for signal testing of equipment grounding	See PDB Verification Documents folder for Outreach documents.	Final Documentation Completed Accepted
55	0010	0002	0002	Fire Life Safety	PDB-PHA	Train way (Guideway)	Means of Access	Access/egress by emergency forces hazardous difficult and/or slow.	Train derailment blocks access to 66th	Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	1D	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercise 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan". 6. Identify appropriate Fire/Life Safety Jurisdictions along alignment and provide train schedule	1E	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercises 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan". 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	N/A	Not Applicable to Design	N/A	Emergency Response: Passenger Train Emergency Preparedness Plan (PTEPP); FRA determined Amtrak is responsible for updating the plan and providing it to emergency response agencies once accepted by FRA. Final Draft submitted 9/15/17. Emergency Responder Familiarization Training: Passenger Train Emergency Response Training Courses were presented by Amtrak in July. A briefing workshop was also held on 8/2/17. Training materials contain information from the PTEPP and about Amtrak trains. Right-of-Way / Subdivision Maps: Alignment maps are included in the PTEPP. Uploaded Draft PTEPP TT/PDB Workshop TT/PDB Tabletop Exercise AAR TT/PDB Emergency Responder List	Final Documentation Completed Accepted	
56	0010	0002	0003	Fire Life Safety	PDB-PHA	Train way (Guideway)	Emergency Response	Access/egress by emergency forces hazardous difficult and/or slow.	First responder prioritization; Limited Emergency Access Points; Property Encroachments; ROW width varies; limits access; Corridor fence less than 15 ft. from tracks at Camp Murray	Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	1D	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercise 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan". 6. Identify appropriate Fire/Life Safety Jurisdictions along alignment and provide train schedule	1E	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercises 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan". 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	N/A	Not Applicable to Design	N/A	Emergency Response: Passenger Train Emergency Preparedness Plan (PTEPP); FRA determined Amtrak is responsible for updating the plan and providing it to emergency response agencies once accepted by FRA. Final Draft submitted 9/15/17. Emergency Responder Familiarization Training: Passenger Train Emergency Response Training Courses were presented by Amtrak in July. A briefing workshop was also held on 8/2/17. Training materials contain information from the PTEPP and about Amtrak trains. Right-of-Way / Subdivision Maps: Alignment maps are included in the PTEPP. Uploaded Draft PTEPP TT/PDB Workshop TT/PDB Tabletop Exercise AAR TT/PDB Emergency Responder List	Final Documentation Completed Accepted	
57	0010	0002	0003	Fire Life Safety	PDB-PHA	Train way (Guideway)	Emergency Response	Access/egress by employees or emergency forces hazardous difficult and slow due to problems in access routes	Access routes hazardous in themselves (e.g. rough dark steep slippery).	Hazards relating to path itself could produce falls and minor injuries. Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	1D	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercise 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan". 6. Identify appropriate Fire/Life Safety Jurisdictions along alignment and provide train schedule	1E	1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercises 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan". 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	N/A	Not Applicable to Design	N/A	Emergency Response: Passenger Train Emergency Preparedness Plan (PTEPP); FRA determined Amtrak is responsible for updating the plan and providing it to emergency response agencies once accepted by FRA. Final Draft submitted 9/15/17. Emergency Responder Familiarization Training: Passenger Train Emergency Response Training Courses were presented by Amtrak in July. A briefing workshop was also held on 8/2/17. Training materials contain information from the PTEPP and about Amtrak trains. Right-of-Way / Subdivision Maps: Alignment maps are included in the PTEPP. Tabletop Exercise: The exercise took place 8/2/17. Distribution of Train Schedule: Schedules will be distributed to jurisdictions as part of the PTEPP. Uploaded Draft PTEPP TT/PDB Workshop TT/PDB Tabletop Exercise AAR TT/PDB Emergency Responder List	Final Documentation Completed Accepted	
58	0013	0001	0000	Safety Plans Procedures & Training	PDB-PHA	Standard Operating Procedures (SOPs)	Standard Operating Procedures (SOPs)	Foreign object(s) on alignment	Vandalism / Criminal activity	Potential track damage potential derailment potential major/minor injury potential fatality equipment damage service disruption.	1C	1. Inspection and maintenance procedures to verify structural integrity of structures above and adjacent to alignment; 2. Design fencing and warning signs where intrusion is likely; 3. Rulebook to require train operators to continuously observe alignment and report observation to Sounder Operations	1D	1. Adequate ROW track clearance 2. ROW inspection procedures; 3. Fencing according to plans; 4. Security patrols; 5. Signage placed according to plans; 6. MOW and Property Management inspections and procedures	ROW Track Clearance Fence As-Built Sign As-Built	Not Applicable to Design	REC-02229-Railroad Signage As-Built REC-02190-Fence As-Built	N/A	See PDB Verification Documents Folder: BNSF Maintenance of Way Operating Rules - Dec 2 2009 (Rev. Apr 19 2012) and ST I & M Manual (PRACTICE FOR THE INSPECTION MAINTENANCE OF TRACK TRAIN CONTROL AND COMMUNICATION)-July 15 2012	CM Documentation Complete Accepted
59	0013	0001	0000	Safety Plans Procedures & Training	PDB-PHA	Standard Operating Procedures (SOPs)	Standard Operating Procedures (SOPs)	Derailment	Track Superelevation not within designed limits at track curves	Potential derailment equipment damage major/minor injuries	1C	1. Ensure curves, elevation and speed limitations are designed according to 49 CFR 213.57; 2. Develop inspection and maintenance procedures according to 49 CFR 213.233 Track Inspection; 3. Timetable	1D	1. Restrictions on mainlines for stoppage or slow speeds of heavy freight on certain mainlines in specific areas; 2. Track inspection through MOW; 3. Track maintained through MOW		34 05 17-Track Construction General Requirements 3.03 - 3.04		Maintenance contractor performs annual geometry car inspections as per FRA requirement as well as hi-rail inspections twice weekly. The timetable has not been updated to reflect the newly constructed track south of Bridgeport but will be one prior to passenger service beginning. I & M Manual attached	CM Documentation Complete Accepted	
60	0013	0001	0001	Safety Plans Procedures & Training	PDB-PHA	Standard Operating Procedures (SOPs)	Standard Operating Procedures (SOPs)	Mishandling of equipment during maintenance/overhaul	Personnel not following proper procedures.	Mishandling during maintenance overhaul; Equipment not secured properly for maintenance Personal injury and/or equipment damage.	2D	1. Training and procedures. 2. Maintenance manuals and operation instructions to include the necessary safety instructions. 3. Ensure proper handling equipment and jigs are used	2E	1. Training Program plan: Final 2. Instruction Material: Final 3. Training reports 4. Operations and Maintenance (O&M) Manuals	Training Program plan: Final Instruction Material: Final Training reports; Operations and Maintenance (O&M) Manuals	TRAINING-01 79 00 -1.02.A.2 1.02.B.2 1.02.C Fiber Optic Distribution System-34 42 16.13 1.05.G Electrical Basic Requirements-34 42 18 1.05.G	S34150-REC-02087 SUB 017900-002.001 1.02C Signal Training Results and Attendance	CRE-02184 WSDOT Warranties and O&Ms & REC-2315 Communications System Training Program to SSIMS PDB Verification Documents folder	CM Documentation Complete Accepted	
61	0013	0005	0000	Safety Plans Procedures & Training	PDB-PHA	Operation Manuals	Operation Manuals	Equipment degradation	Improper/inadequate maintenance resulting from maintainer carelessness lack of proper training poor working conditions inadequate tools and test equipment lack of spare parts.	Can vary from loss of performance to the generation of unsafe operating conditions. May also result in situations hazardous to maintainers.	2C	1. The system maintenance program provisioning and personnel should be adequate for the purpose intended; 2. Provide training and certification for critical elements; 3. Regular performance reviews and support documentation revisions as necessary; 4. Maintenance in accordance with manufacturers recommendations.	2E	Test equipment and service manuals	N/A	Operations Issue	N/A	Training Program plan: N/A. ST utilizes a MOW Contractor for all maintenance/inspection on the Lakewood Sub. The contractor uses its own equipment to perform this work and is responsible for maintenance and upkeep of their equipment. Only qualified personnel will be allowed to perform maintenance/inspection on ST owned equipment.	CM Documentation Complete Accepted	
62	0013	0001	0000	Safety Plans Procedures & Training	PDB-PHA	Standard Operating Procedures (SOPs)	Standard Operating Procedures (SOPs)	Collision between train and Lakewood Station patrons	Amtrak train passes by station without stopping	Potential fatality major/minor Injury service disruption.	1C	1. "LOOK" or "High Speed Trains Travel in Both Directions" signage; 2. Other signage according to MUTCD standards; 3. Adjacent Residence / Business Public Education for Rail Safety; 4. Operating rules and procedures for use of horn and train speed; 5. Tactile warning tiles at edge of platform; 6. Stand Behind Yellow Line (pavement paint)	1D	1. "High speed train" signage at station; 2. Operating procedures and speed for passing a passenger station; 3. Warning procedures for train when passing a passenger station; 4. Public Outreach & Education		Signs at Lakewood Station would need to be added to contract as change order. IFC Vol 2 9/4/15: 01 79 00 1.02.A.2 1.02.B.2 1.02.C	Signage is already in place at the Lakewood Station. Picture uploaded		Closed	
63	0009	0004	0000	Traffic Control	Item Master	Control Train Interface with Traffic	Control Train Interface with Traffic	Collision between train and truck >10 000 lb. on track	I-5 Vehicle loses control and drives onto track	Potential fatality derailment major/minor Injury property damage service disruption.	1D	1. Barriers alongside all roadways or highways where elevation exceeds track grade and high risk areas	1D	1. Monitor I-5 collision data quarterly to detect accident trends or facts that indicate a need for reconsideration of placing of additional guardrails. 2. Ensure that local emergency dispatch centers have the telephone numbers and protocols to immediately contact BNSF dispatch when a vehicle is reported on the tracks.	N/A		2/13/17 WSDOT analysis determined there is a probability of increasing collisions or the severity of collisions on I-5 by placing barriers in the clear zone. WSDOT analysis: Risk of Vehicle/Train Collisions on the PDB away from crossings. Clear Zone Maps & Cross sections was reviewed and changes approved by SDDCC: removed vehicle barriers as a requirement reduced initial risk added new hazard for vehicle >10 000 lb.	CM Documentation Complete Accepted		

MEMO



March 7, 2016

TO: Salah Al Tamimi, Director of SQA
FROM: Jodi Mitchell, Project Manager [REDACTED]
SUBJECT: Point Defiance Bypass – Safety and Security Management Plan

Salah,

The Point Defiance Bypass Project is funded by the American Recovery and Reinvestment Act (ARRA) high speed rail grant administered by the Federal Railroad Administration.

Pursuant to the Agency Safety and Security Certification Policy, the Sound Transit Safety and Quality Assurance Division (SQA), in coordination with the appropriate project staff, will evaluate and determine the level of certification for each project.

We hereby request that the certification of the Point Defiance Bypass Project follow the Agency Safety and Security Management Plan (SSMP) and the Agency Safety and Security Certification Plan (SSCP). The project has been following the procedures outlined within the aforementioned documents. We have conducted a Preliminary Hazard Analysis (PHA), compiled a Certifiable Items List (CIL), and are in the process of verifying design and construction conformance for the identified items.

Regards,

Jodi Mitchel

Attachment: None.

MEMO



March 7, 2016

TO: Jodi Mitchell, Project Manager
FROM: Salah Al-Tamimi, Director of SQA
SUBJECT: Point Defiance Bypass – Safety and Security Management Plan

Jodi,

In reference to your memo dated March 7th, 2016 regarding the Safety and Security Management Plan of the Point Defiance Bypass Project, I hereby authorize the use of the Agency Safety and Security Management Plan (SSMP) as well as the Agency Safety and Security Certification Plan (SSCP) for the project.

Regards,

Salah Al-Tamimi



Attachment: None.



MEMO OF CONCURRENCE

April 14, 2017

TO: Mari Riley-Hite, System Safety Assurance Specialist
FROM: Robert Taaffe, Senior Construction & System Safety Assurance Manager [REDACTED]
CC: Gary Aviles, Esrenee Chambers, Craig DeLalla, Branden Porter, John Weston
SUBJECT: **SSDCC Vote: Point Defiance Bypass (PDB) CIL #55, 56, 57**

Mari,

The Safety and Security Design Construction Committee (SSDCC) has reviewed the Point Defiance Bypass (PDB) Certifiable Items List (CIL) numbers #55, 56, and 57 and hereby agrees and accepts the changes. This item is closed with the SSDCC and no further action required.

Enclosures: PDB CIL #55, 56, 57
Proposed changes to PDB CIL Document
SSDCC Vote email

Prepared by: Teresa Graziani, Safety Project Coordinator, SQA Division [REDACTED]
SSDCC Administrator

SSDCC Issue Notification Form



INSTRUCTIONS

Use this form to notify the Safety, Security and Design Construction Committee (SSDCC) of any hazard issues associated with planning, design, and/or on-going construction of Capitol Projects, and/or safety and security issues that require SSDCC risk acceptance.

- 1) Fill out one form for each hazard issue unless the SSDCC is reviewing a Preliminary Hazard Analysis (PHA), Verification Matrix (VM) or Threat and Vulnerability Analysis (TVA).
- 2) Fill out each section marked with red.
- 3) Attach supporting documents (i.e. "PHA, VM, TVA, DCM Chapter, Drawing or Spec. No., Photo's").
- 4) Submit this form along with reference documentation to the SSDCC Administrator **10 business days before a meeting.**
- 5) For questions, contact Teresa Graziani, SSDCC Administrator at 206-370-5518 or teresa.graziani@soundtransit.org

Requested By

Date of Request

04/07/2017

First and Last Name

Mari Riley-Hite

Department/Title

SQA/System Safety & Assurance Specialist

E-mail

mari.riley-hite@soundtransit.org

Project/Contract Name/Contract No. or Location of Hazard Issue

Point Defiance Bypass (PDB)

Project Director

Mark Johnson

Project Manager

Jodi Mitchell

Description of Hazard Issue

(Explain why the issue is Safety/Security Critical)

Changes to the PDB CIL Items 55, 56, 57 are required because some of the safety/security requirements listed were not in the purview of ST Safety and Security.

Potential Cause

n/a

Effect/Consequence

(i.e. "limited visibility")

n/a

Recommended Control Measures

(What action must be taken to correct or lower the risk to an acceptable level)

The SSDCC to review and approve the changes to the PDB CIL items 55, 56, 57.

Was this item reviewed by a lower-level committee (i.e. ELE SSCRS, LLE SSCRS, NGL SSCRS) and require SSDCC concurrence?

Yes No

Date reviewed by the Safety Security Certification Review Subcommittee (SSCRS)

Reference Documentation (List and attach to form)

Spreadsheet - PDB CIL (filtered with items 55, 56, 57)
Word Document - Proposed changes to PDB CIL

Is Reference Documentation Enclosed with this form?

Yes No

TO BE FILLED OUT BY THE SSDCC ADMINISTRATOR

Frequency of Occurrence

Hazard Severity

Initial Hazard Risk

Residual Hazard Risk

Acceptance Criteria

SSDCC Recommendation

Budget Assessment

SSDCC Vote

Closed?

Approve

Yes

Disapprove

No

SSDCC Comments

Vote email was sent to SSDCC members 04/10/17 requesting acceptance of the changes to the PDB CIL (#55, 56, 57). The deadline to vote was 04/14/17. If no responses received by deadline the PDB CIL #55, 56, 57 was considered approved without comment. Vote approved. Memo of Concurrence sent to Mari Riley-Hite and the SSDCC 04/18/2017.

Approval signature of the requestor

[Redacted signature box]

Approval signature of the SSDCC Chair or Co-chair

[Redacted signature box]

Date Reviewed by the SSDCC

Date item will be reviewed by SOAP

04/14/2017

[Redacted date box]

SSDCC Contact Information

Robert Taaffe
SSDCC Chair

Ameed Shaban
SSDCC Co-chair

[Redacted contact information]

Teresa Graziani
SSDCC Administrator
(206) 370-5510

[Redacted contact information]

[Redacted signature box]

Graziani, Teresa

To: Riley-Hite, Mari (mari.riley-hite@soundtransit.org); Baldwin, Arleen; Mitchell, Jodi; Miller, Sarah; Doyle, Weylin; Agan, Bryon; Cummins, Kenneth; Dean, Thomas; Rowswell, Mike; Klute, Elizabeth; Shaban, Ameen; Singh, Inderjit; Ellingson, Brian; Gregg, Allison; Gatliff, Brandon; Hartley, Tony; Adams, Corrie; Saxe, Melissa Flores; 'MatkinJ@consultant.wsdot.wa.gov'; Wageman, Steve; Rawls, Andrew; Cheatham, Joshua; Gildner, Joseph; Dunster, Chris; Wright, Amanda; Moczygemba, Jennifer; Colzani, Greg; Johnson, Matthew; Matkin, Janet (Consultant); Johnson, Mark

Cc: Aviles, Gary; Chambers, Esrenee; DeLalla, Craig; Porter, Branden; Weston, John; Bisping, Lori (lori.bisping@soundtransit.org); Taaffe, Robert (robert.taaffe@soundtransit.org)

Subject: SSDCC Memo of Concurrence: PDB CIL #55, 56, 57

Attachments: PDB CIL Hazards 55-56-57.xlsx; Proposed changes to Point Defiance Bypass Certifiable Items List.docx; SSDCC Vote_ PDB CIL #55, 56 & 57.pdf

Please find attached the Safety and Security Design Construction Committee (SSDCC) Memo of Concurrence for Point Defiance Bypass (PDB) Certifiable Items List (CIL) for hazards; **#55, #56 and #57.**

Enclosures: SSDCC Memo of Concurrence PDB CIL #55, 56, 57
PDB CIL #55, 56, 57
Proposed changes to PDB CIL Document
SSDCC Vote email

Teresa Graziani
SSDCC Administrator

[SSDCC SharePoint Site](#)

From: Graziani, Teresa
To: [Aviles, Gary](#); [Chambers, Esrenee](#); [DeLalla, Craig](#); [Porter, Branden](#); [Weston, John](#)
Cc: "[Taaffe, Robert \(robert.taaffe@soundtransit.org\)](#)"; [Shaban, Ameer](#); "[Riley-Hite, Mari \(mari.riley-hite@soundtransit.org\)](#)"; "[Bisping, Lori \(lori.bisping@soundtransit.org\)](#)"
Subject: "CORRECTION to PDB CIL #55, 56, 57"
Date: Tuesday, April 11, 2017 2:49:00 PM
Attachments: [Copy of PDB CIL 555657.xlsx](#)
[Proposed changes to Point Defiance Bypass Certifiable Items List.docx](#)
Importance: High

SSDCC Voting Members,

Yesterday, a vote email went out with the wrong PDB CIL Spreadsheet. The "correct" PDB CIL is attached to this email with the changes (noted below). Please review the "*Safety/Security Requirements*" to see the proposed changes to hazards # 55, 56, & 57. Also attached is a word document with the changes. If you have any questions please contact me. Sorry for the confusion.
The deadline to vote is April 14, 2017, COB.

ORIGINAL VOTE EMAIL SENT 04.10.17

SSDCC Voting Members,

You are being presented for review and acceptance of the Point Defiance Bypass (PDB) Certifiable Items #55, 56, and 57 (attached).

The following changes to the PDB CIL Items 55, 56, 57 (see attachment) are required because some of the safety/security requirements listed were not in the purview of ST Safety and Security. Please review and approve by using the voting buttons (above) before end of day Friday, April 14, 2017.

Responses not received by close of business on Friday, April 14, 2017 will be considered approved without comment. If you have any questions on the voting instructions please contact me.

Questions regarding the PDB CIL changes can be directed to Lori Bisping at extension 7482.

The deadline to vote - April 14, 2017.

Teresa Graziani
SSDCC Administrator



From: [DeLalla, Craig](#)
To: [Graziani, Teresa](#); [Riley-Hite, Mari](#)
Subject: Approve: "CORRECTION to PDB CIL #55, 56, 57
Date: Friday, April 14, 2017 4:17:26 PM

From: [Porter, Branden](#)
To: [Graziani, Teresa](#); [Riley-Hite, Mari](#)
Subject: Approve: "CORRECTION to PDB CIL #55, 56, 57
Date: Wednesday, April 12, 2017 7:50:44 AM

From: [Weston, John](#)
To: [Graziani, Teresa](#); [Riley-Hite, Mari](#)
Subject: Approve: "CORRECTION to PDB CIL #55, 56, 57
Date: Tuesday, April 11, 2017 3:34:30 PM

From: Graziani, Teresa
To: [Aviles, Gary](#); [Chambers, Esrenee](#); [DeLalla, Craig](#); [Porter, Branden](#); [Weston, John](#)
Cc: [Taaffe, Robert \(robert.taaffe@soundtransit.org\)](#); [Shaban, Ameer](#); ["Riley-Hite, Mari \(mari.riley-hite@soundtransit.org\)"](#)
Subject: SSDCC Vote: PDB CIL #55, 56 & 57
Date: Monday, April 10, 2017 4:07:00 PM
Attachments: [Copy of PDB CIL 555657.xlsx](#)
Importance: High

SSDCC Voting Members,

You are being presented for review and acceptance of the Point Defiance Bypass (PDB) Certifiable Items #55, 56, and 57 (attached).

The following changes to the PDB CIL Items 55, 56, 57 (see attachment) are required because some of the safety/security requirements listed were not in the purview of ST Safety and Security. Please review and approve by using the voting buttons (above) before end of day Friday, April 14, 2017.

Responses not received by close of business on Friday, April 14, 2017 will be considered approved without comment. If you have any questions on the voting instructions please contact me.

Questions regarding the PDB CIL changes can be directed to Lori Bisping at extension 7482.

The deadline to vote is April 14, 2017.

Teresa Graziani
SSDCC Administrator



From: [Riley-Hite, Mari](#)
To: [Graziani, Teresa](#)
Cc: [Shaban, Ameer](#); [Taaffe, Robert](#); [Bisping, Lori](#); [Mitchell, Jodi](#)
Subject: 3 PDB CIL items that need SSDCC approval
Date: Friday, April 07, 2017 7:48:40 AM
Attachments: [PDB CIL 55,56,57.xlsx](#)

Teresa

Please prepare a request for the SSDCC members to review/approve the attached items via email vote. You can use the following verbiage in the email:

Committee Members,


The following changes to the PDB CIL Items 55, 56, 57 (see attachment) are required because some of the safety/security requirements listed were not in the purview of ST Safety and Security. Please review and approve by using the voting buttons (above) before end of day Friday, April 14, 2017.

Responses not received by close of business on Friday, April 14, 2017 will be considered approved without comment. If you have any questions on the voting instructions please contact me.

Questions regarding the changes in question can be directed to Lori Bisping at 7482.

Let me know if you have any questions/concerns. thanks

Mari Riley-Hite
System Safety & Assurance Specialist
Sound Transit



Proposed changes to Point Defiance Bypass Certifiable Items List

Hazard ID #55, 56, & 57

Safety and Security Requirements

Change from:

1. Training on train sets for all Fire and Police Dept.
2. Plan & practice emergency response routes
3. Tabletop Exercises
4. Emergency Drills
5. Emergency Responder's Manual
6. Emergency Response Plan
7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.

Change to:

1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets.
2. Provide emergency response agencies with maps of the alignment.
3. Tabletop Exercise
4. Emergency Drills
5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan"
6. Identify appropriate Fire/Life Safety Jurisdictions along alignment and provide train schedule

Haz ID	Certifiable Items List			Hazard Analysis				Safety/Security Requirements	Design Verification	Construction Verification					Operational/Testing Requirements		SQA Verification								
	Element	System	Item	CIL Description	Hazard Description	Potential Cause	Potential Effect			Initial Risk Index	Possible Controlling Measures	Residual Risk Index	Document Reference (Dwg/Specs/Etc.)	Spec/Dwg No.	Specification Article	SQA Comments	Verif	Submittal Title / Description	Submittal Type	Status	Assigned to:	SQA Comments	Verif	Title / Description	Status
55	10	2	2	Fire/Life Safety - Train way (Guideway) - Means of Access	Access/egress by emergency forces hazardous, difficult, and/or slow.	Train derailment blocks access to 66th	Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	1D	1. Identify all Fire/Life Safety jurisdictions along Entire Alignment 2. Tabletop drills and exercises for all agencies involved 3. Predetermine default emergency staging areas along alignment 4. Develop procedures to ensure that emergency access is unobstructed, adequately lighted 5. Add maintenance service roads where possible 6. Identify and practice emergency access routes.	1E	1. Training on train sets for all Fire and Police Dept. 2. Plan & practice emergency response routes 3. Tabletop Exercises 4. Emergency Drills 5. Emergency Responder's Manual 6. Emergency Response Plan 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables. 1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercises 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan" 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	Not Applicable to Design	N/A	N/A	N/A	✓	N/A	SSIMS 10/10/16	Lori Bisping updated SSIMS S/S Reqmts 4/17/17 changes accepted by SSDCC 4/18/17	✓	Emergency Responder Training records Provide emergency response agencies with maps of the alignment and PTEPP Emergency Drills & Tabletop Exercises documentation Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables				
56	10	2	3	Fire/Life Safety - Train way (Guideway) - Emergency Response	Access/egress by emergency forces hazardous, difficult, and/or slow.	First responder prioritization Limited Emergency Access Points Property Encroachments ROW width varies; limits access Corridor fence less than 15 ft. from tracks at Camp Murray	Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	1D	1. Identify all Fire/Life Safety jurisdictions along Entire Alignment 2. Tabletop drills and exercises for all agencies involved 3. Predetermine default emergency staging areas along alignment 4. Develop procedures to ensure that emergency access is unobstructed, adequately lighted 5. Add maintenance service roads where possible 6. Identify and practice emergency access routes.	1E	1. Training on train sets for all Fire and Police Dept. 2. Plan & practice emergency response routes 3. Tabletop Exercises 4. Emergency Drills 5. Emergency Responder's Manual 6. Emergency Response Plan 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables. 1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercises 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan" 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	Not Applicable to Design	N/A	N/A	N/A	✓	N/A	Lori Bisping updated SSIMS S/S Reqmts 4/17/17 changes accepted by SSDCC 4/18/17	✓	Emergency Responder Training records Provide emergency response agencies with maps of the alignment and PTEPP Emergency Drills & Tabletop Exercises documentation Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables					
57	10	2	3	Fire/Life Safety - Train way (Guideway) - Emergency Response	Access/egress by employees or emergency forces hazardous, difficult and slow due to problems in access routes	Access routes hazardous in themselves (e.g. rough, dark, steep, slippery).	Hazards relating to path itself could produce falls and minor injuries. Delay in access of emergency forces could escalate the effects of a prior accident or incident in a guide-response situation.	1D	1. Identify all Fire/Life Safety jurisdictions along Entire Alignment 2. Tabletop drills and exercises for all agencies involved 3. Predetermine default emergency staging areas along alignment 4. Develop procedures to ensure that emergency access is unobstructed, adequately lighted 5. Add maintenance service roads where possible 6. Identify and practice emergency access routes.	1E	1. Training on train sets for all Fire and Police Dept. 2. Plan & practice emergency response routes 3. Tabletop Exercises 4. Emergency Drills 5. Emergency Responder's Manual 6. Emergency Response Plan 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables. 1. Provide emergency responder training that includes features of the alignment and familiarization of the train sets. 2. Provide emergency response agencies with maps of the alignment. 3. Tabletop Exercises 4. Emergency Drills 5. Provide each emergency response jurisdiction with a copy of the "Passenger Train Emergency Preparedness Plan" 7. Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables.	Not Applicable to Design	N/A	N/A	N/A	✓	N/A	Lori Bisping updated SSIMS S/S Reqmts 4/17/17 changes accepted by SSDCC 4/18/17	✓	Emergency Responder Training records Provide emergency response agencies with maps of the alignment and PTEPP Emergency Drills & Tabletop Exercises documentation Identify appropriate Fire/Life Safety Jurisdictions and include in the timetables					

MEMORANDUM

April 26, 2017

From: Mike Rowswell, WSDOT High Speed Rail Safety Manager

To: Melissa Flores Saxe, Sound Transit Senior Project Manager
Mari Riley-Hite, System Safety & Assurance Specialist

Subject: Review of the Risk Posed by Trains Striking Errant Vehicles from I-5 on the Point Defiance Bypass

Attachments:

- I-5 Hazard Research Summary
- I-5 Clearzone Cover Memo
- I-5 to Rail Clearzone Cross Section Measurements
- I-5 to Rail ROW Measurement Field Photographs

SUMMARY

A potential hazard exists along southbound I-5 from Milepost 117.3 to Milepost 124.3 (“subject area”) that is described as a collision between a passenger train and a vehicle veering off of I-5 onto the right of way where it can foul the tracks. The resulting risk was considered unacceptable by attendees at a preliminary hazard workshop conducted in 2014. It is appropriate to reconsider the initial risk determination because of revisions to the hazard management program documented in the Sound Transit Agency Safety and Security Management Plan (SSMP), and the availability of objective data none of which was available at the workshop.

Based on the changes to the hazard management plan and a review of the information now available, the hazard may be best understood by dividing it into two classes of vehicles: semi-trucks and vehicles equal to or less than 10,000 lbs. GVWR. Semi-trucks can derail trains causing catastrophic damage, while a collision with a smaller vehicle is extremely unlikely to cause such an event but is likely to cause deaths to the vehicle passengers. Accordingly, the severity of an event for semi-trucks is in the Catastrophic range, while the severity for smaller vehicles is in the Critical range in the revised hazard management

tables. Objective data shows that the probability of an event for smaller vehicles is Remote. An event is much less likely for semi-trucks based on the ten year accident information available in the subject area and the fact that the number of trucks that travel through the subject area is one-ninth the number of smaller vehicles. Importantly, clearzone requirements are either met along the corridor or guardrails are provided. Therefore vehicle drivers have sufficient space and slopes to recover control to avoid the tracks, or they are prevented from entering the railroad right of way. Based on the information now available, the initial risk level should be set at no higher than 1E for semi-trucks, and 2D for smaller vehicles.

Highway barriers could still reduce the stated risks somewhat within the suggested risk levels. However, the barriers create a risk of collisions or increased severity of collisions on I-5 to the point where death or serious injury can result. Based upon objective data and because clearzone requirements are already met, it does not appear at this time to be sufficiently clear that the risk to trains and train occupants of train/vehicle collisions outweighs the risk posed to highway drivers by roadside barriers.

Other measures can provide some mitigation of risks to trains and passengers on trains without raising risks to highway users. Ensuring that protocols exist for local emergency responders and law enforcement to immediately notify BNSF dispatch of vehicles on the tracks can more quickly result in action to stop or warn trains. Continued monitoring of accidents in the subject area provides a means to detect accident trends that could warrant consideration of additional mitigation measures.

CONCLUSION

The hazard should be bifurcated into two categories: vehicles weighing 10,000 lbs. GVWR or less, and vehicles weighing greater than 10,000 lbs. GVWR.

It is recommended that the risk level for the lower weight vehicles be set at 2D.

It is recommended that the risk level for the greater weight vehicles be set at 1E.

Accident patterns in the subject area should be reviewed on a quarterly basis to identify trends and the possible need for further mitigation measures.

Protocols should be established for emergency responders/dispatch centers to immediately notify BNSF dispatch upon learning of a vehicle fouling the tracks.

DISCUSSION

Initial Evaluation

The Construction and Maintenance Agreement between WSDOT and Sound Transit requires Sound Transit to use its system safety plan to identify, analyze and propose mitigations for hazards on the PDB alignment (At that time the plan was set forth in the Agency System Safety Program Plan for Design and Construction). Pursuant to the Agreement, Sound Transit conducted a Preliminary Hazard Analysis

workshop in 2014 to identify and analyze hazards from the beginning of Sound Transit ownership near Nisqually Junction to 66th Street in Tacoma.

The participants at the workshop identified a hazard that became titled “Collision between train and vehicle on track.” The listed cause was an “I-5 Vehicle loses control and drives onto track.” However, no standards or standard practices are known to exist that assist in determining how close the tracks must be to the highway for the hazard to be reasonably considered to exist other than “clear zone” concepts. Also, no information was available to objectively determine the probability of the hazard occurring. Despite the lack of guidance and information, it was clear that several areas south of Thorne Street exist that needed to be reviewed because of the possibility for out of control vehicles to leave the traveled lanes of I-5 and come to rest foul of the PDB tracks. Based on a subjective discussion of the risk at the workshop, the attendees rated the risk according to Sound Transit’s then current system safety plan as IC. This meant that:

It is likely that one or more of the following will occur several times during the life of a fleet of trains: death, permanent total disability, loss exceeding \$1M, or irreversible severe environmental damage that violates law or regulation.

This level of risk was unacceptable at the time it was rated, and roadway barriers were suggested as a possible mitigation measure. However, participants recognized that more research and review was necessary to more precisely identify the level of risk before determining what mitigations are needed, if any.

Post Workshop Changes to the Sound Transit Risk Matrix

After the initial workshop where risk was set, Sound Transit revised its hazard management program after careful study with input from system safety expert consultants. The revisions are set forth in the Agency’s SSMP, and include modifications to the severity and probability tables to better fit the realities of rail service and to provide more clarity. For the severity factor, instead of a single death being considered a catastrophic event, “several deaths and/or numerous severe injuries” must occur. As further clarification, even a “Low number of deaths and/or severely injured” does not fall in the catastrophic category (it is a critical event instead). For probability, the table still provides that an improbable event for a fleet as one that is “Unlikely to occur, but possible.” The current SSMP does provide additional guidance by stating that an improbable hazard is one that will occur as follows: “[less than] 1 event during 20 years.” Also, a remote event is one that will occur more than once every five years but less than 10 events every 10 years.

Post Workshop Research

After the initial workshop, research provided objective evidence that assists in determining the probability of an occurrence of the subject hazard. First, available Utilities and Transportation Commission records show that no passenger was killed anywhere in Washington in an accident in which a train struck or was struck by a motor vehicle of any type (not including crossings) during the 17.5 year period from January 1, 1998 when UTC records begin and July 2016. Secondly, the Federal Railroad Administration casualty data base and accident reports show that no such accidents occurred anywhere in the United States from

January 1, 1990 through December 31, 2016, which expands the statistical sample to the entire nation and the period of clear, available information to 26 years.

Accident reports are available in the WSDOT data base beginning in 2005. The available information from that data base shows that only five cars or small trucks under 10,000 GVWR veered off of the highway and ended up on or near the tracks in the subject area from January 1, 2005 through December 31, 2014 during times when it will be possible for Amtrak trains to be present. No larger trucks ended up on or near the tracks in that same 10 year period. WSDOT traffic counts for 2016 on I-5 at mile post 117 indicate that truck traffic (vehicles over 10,000 lbs. GVWR) in the subject area constitutes only 10.2 percent of the total traffic in that area. Thus, there is much less opportunity for large trucks to end up fouling the tracks than vehicles weighing 10,000 lbs. GVWR or less.

The WSDOT design consultant determined that only 4100 feet of the seven mile stretch under consideration presented a realistic opportunity for errant cars to end up fouling the right of way. Only fourteen passenger trains will pass through the potential hazard area per day resulting in a total of less than 14 minutes of exposure per day for the fleet. Furthermore the 4100 feet is made up of four shorter linear areas. The clear zone requirement for each of the areas is met or is protected by guardrail; thus, any vehicle that leaves the roadway will encounter a barrier or has enough room to stop or steer away from the tracks.

Recommendations

Based on the changes to the hazard management program and the availability of pertinent objective information, it is recommended that the hazard be split into two categories:

- Trucks with a GVWR greater than 10,000 lbs. because it is conceivable that a collision between such a truck and a passenger train could derail the train.
- Vehicles with a GVWR of 10,000 lbs. or less because there is no indication that a collision between such a vehicle and a passenger train will result in a catastrophic derailment.

For the same reasons, the initial risks should probably be reset as follows:

- For semi-trucks: Change the initial risk rating of 1C to 1E (based upon a WSDOT fleet-wide basis)
 - Severity does not change because it fits the following factors under the new Level 1 (Catastrophic) terms: a possible derailment with many deaths; property loss exceeding \$5M; and ongoing media coverage, irreparable reputational damage, and FRA/STB intervention from weeks to months.
 - Probability changes to Improbable because new information indicates that it is likely that an event will occur involving WSDOT's fleet less than once every 20 years. It is noted that the opportunity for a hazard occurrence is much lower for such trucks than for smaller vehicles because there are only about one-ninth as many large trucks as the smaller vehicles. The data on errant vehicles in the attached Hazard Research Summary

bears this out. Additionally, the clear zone safety requirements are met by recoverable distances and slopes, or guardrail already exists if those requirements are not met.

- For vehicles under 10,000 lbs. GVWR: Change the initial risk rating of 1C to 2D
 - Severity should change to 2 (Critical). The criterion for Level 2 is met by a collision between a train and a vehicle less than 10,000 GVWR because a low number of deaths of vehicle passengers in an incident are reasonably likely even though train passengers are unlikely to be killed.
 - Probability should change to Level D (Remote) because it appears that, under the most conservative approach, an event will fall into the category of occurring more often than once every 5 years but less often than ten times every 10 years. This means that it is unlikely but can be expected to occur in the life of the fleet. The approach may actually be too conservative. Given the nationwide statistics of no accidents resulting in passenger train deaths for a subject occurrence for at least 26 years, and the very few number of vehicles ending up foul of the tracks in the subject study area, it may be more likely that there will be at most one incident in 20 years. There is no probability level available for one incident in 20 years shown in the Sound Transit System Safety Plan, but zero incidents in that time frame changes the probability level to improbable.

Recommendations for future action.

All risks should be mitigated to the lowest reasonably possible level. However, until it is probable that the reduction of risk to trains, passengers and train crews is greater than the increase in risk to highway users created by constructing additional barriers, the barriers should not be used.

- The risk for truck/train collisions is already at the improbable level, but use of guard rails could possibly slightly reduce the probability of occurrence. Before considering the use of guardrails, it is important to weigh the probability of increasing collisions or the severity of collisions on I-5 by placing additional objects (barriers) in the clear zone.
 - Suggestion: monitor I-5 collision data quarterly to detect accident trends or facts that indicate a need for reconsideration of placing of additional guardrails.
 - Suggestion: ensure that local emergency dispatch centers have the telephone numbers and protocols to immediately contact BNSF dispatch when a vehicle is reported on the tracks.
- The risk for collisions between a train and a vehicle under 10,000 GVWR might be lowered from remote to improbable by use of guardrails. However, that increases the risk of additional or more severe accidents that is created by placing barriers along I-5. At this point insufficient information is available to make a clear and reasoned decision to place additional barriers along I-5. Thus, the suggestions for future action are the same as those for truck analysis.
 - Suggestion: monitor I-5 collision data quarterly to detect accident trends or facts that indicate a need for reconsideration of placing of additional guardrails.

- Suggestion: ensure that local emergency dispatch centers have the telephone numbers and protocols to immediately contact BNSF dispatch when a vehicle is reported on the tracks.

Accident Research Summary

WSDOT maintains records of crashes on state and federal highways. Accident reports are not available before 2005. Thus, we reviewed accident reports for accidents occurring between January 1, 2005 and December 31, 2014 for the area between I-5 Mileposts 117.3 and 124.3 and between 0630 and 2230 when Amtrak trains are scheduled to be in the area (includes a half hour buffer on each end). The following information was gleaned:

- 29 southbound vehicles left the traveled portion of the road towards the tracks (note: this includes all accidents with the seven miles; there are only four areas totaling about 4100 linear feet where there is a possibility where vehicles can reach the tracks).
- The number of such vehicles range in a given year from a low of 1 in 2012 and 2013, and a high of 5 in 2008. No discernable pattern of increase or decrease exists.
- Of the 29 vehicles, only 5 ended up on or near the tracks.
- All of the 5 vehicles were cars or vans less than 10,000 lbs. GVRW.
- Vehicles ended up on or near the tracks in only three of the ten years.
- During the ten year period only two semitrucks veered off the roadway in a reportable accident in the subject seven mile stretch. Both struck a barrier without going further towards the tracks. The accidents involved a reaction to, or collision with, another vehicle rather than sleep, operating under the influence or a medical event.
- Data collected by WSDOT shows that only 10.2 percent of the vehicles traveling southbound in the subject area (as measured at Milepost 117) are trucks that weigh more than 10,000 lbs. GVRW.

There are a number of areas in the state where state and federal highways (including I-5 south of Kelso) appear to match the type of areas of concern on the PDB. The Utilities and Transportation Commission maintains records of trespass fatalities (which include vehicles not at railroad/highway crossings) starting on January 1, 1998. Records are current through June 1, 2016 (17.5 years). No incidents of any vehicles losing control and ending up on tracks have resulted in fatalities as a result of a train/vehicle collision. I note that two drivers were killed who purposely drove their cars down the tracks towards a train, and one was killed when he backed onto a main line while maneuvering out of a parking area. No train passengers were injured or killed.

The Federal Railroad Administration maintains a database which includes summaries of accidents involving injuries and fatalities to passengers on trains. A query of the database and a review of accident detail reports revealed that no Amtrak trains struck vehicles of any sort at any place on a mainline anywhere in the United States except at highway/railroad crossings between January 1, 1990 and October 31, 2016 that resulted in a passenger fatality (26 years).

Memo

Date: Monday, April 10, 2017

Project: Point Defiance Bypass – Track and Signal

To: WSDOT – Joshua Cheatham, Project Lead

From: HDR – Josh Metcalf, Project Manager

Subject: WSDOT Clear Zone documentation

In response to an item identified on the project PHA, we identified four locations between Gravelly Lake Drive and the Mounts Road Interchange where Interstate 5 is adjacent to the ST rail corridor and (the freeway) is at a higher elevation than the railroad tracks. These locations were reviewed in the field with representatives from both WSDOT and Sound Transit on September 1, 2016.

Per Sound Transit's request, HDR has prepared the attached set of exhibits to illustrate the approximate limits of the WSDOT Clear Zone in relationship to the location of the railroad tracks in the four locations identified in the field. The HDR team does not have any survey data along the I-5 corridor, so the worst case was assumed and the larger dimensions from the WSDOT Design Manual were used to prepare the exhibits. The exhibits include aerial photos that show guardrail in some of these locations, which would indicate WSDOT has addressed any Clear Zone issues along the I-5 corridor in these locations.

WSDOT has a clear zone policy that governs when and where barrier is installed and it is specific to roadside hazards within the Clear Zone limits. Our experience is WSDOT does not install guardrail without having a reason and that is typically to protect drivers from an object within the Clear Zone limits.

CLEARZONE FROM WSDOT DESIGN MANUAL

Exhibit 1600-2 Design Clear Zone Distance Table

ASSUMED WSDOT SLOPE EASEMENT IS FOR 4:1 SLOPES

Posted Speed (mph)	Average Daily Traffic	Cut Section (Backslope) (H:V)						Fill Section (H:V)					
		3:1	4:1	5:1	6:1	8:1	10:1	3:1	4:1	5:1	6:1	8:1	10:1
35 or Less		The Design Clear Zone Distance is 10 ft											
40	Under 250	10	10	10	10	10	10	*	13	12	11	11	10
	251 – 800	11	11	11	11	11	11	*	14	14	13	12	11
	801 – 2,000	12	12	12	12	12	12	*	16	15	14	13	12
	2,001 – 6,000	14	14	14	14	14	14	*	17	17	16	15	14
45	Under 250	11	11	11	11	11	11	*	16	14	13	12	11
	251 – 800	12	12	13	13	13	13	*	18	16	14	14	13
	801 – 2,000	13	13	14	14	14	14	*	20	17	16	15	14
	2,001 – 6,000	15	15	16	16	16	16	*	22	19	17	17	16
50	Under 250	11	12	13	13	13	13	*	19	16	15	13	13
	251 – 800	13	14	14	15	15	15	*	22	18	17	15	15
	801 – 2,000	14	15	16	17	17	17	*	24	20	18	17	17
	2,001 – 6,000	16	17	17	18	18	18	*	27	22	20	18	18
55	Under 250	12	14	15	16	16	17	*	25	21	19	17	17
	251 – 800	14	16	17	18	18	19	*	28	23	21	20	19
	801 – 2,000	15	17	19	20	20	21	*	31	26	23	22	21
	2,001 – 6,000	17	19	21	22	22	23	*	34	29	26	24	23
60	Under 250	13	16	17	18	19	19	*	30	25	23	21	20
	251 – 800	15	18	20	20	21	22	*	34	28	26	23	23
	801 – 2,000	17	20	22	22	23	24	*	37	31	28	26	25
	2,001 – 6,000	18	22	24	25	26	27	*	41	34	31	29	28
65	Under 250	15	18	19	20	21	21	*	35	27	25	23	22
	251 – 800	17	20	22	22	24	24	*	38	31	29	26	25
	801 – 2,000	19	22	24	25	26	27	*	41	34	31	29	28
	2,001 – 6,000	20	25	27	27	29	30	*	46	37	35	32	31
70	Under 250	16	19	21	21	23	23	*	36	29	27	25	24
	251 – 800	18	22	23	24	26	26	*	41	33	31	28	27
	801 – 2,000	20	24	26	27	28	29	*	45	37	34	31	30
	2,001 – 6,000	22	27	29	29	31	32	*	50	40	38	34	33
75	Under 250	16	19	21	21	23	23	*	36	29	27	25	24
	251 – 800	18	22	23	24	26	26	*	41	33	31	28	27
	801 – 2,000	20	24	26	27	28	29	*	45	37	34	31	30
	2,001 – 6,000	22	27	29	29	31	32	*	50	40	38	34	33
80	Under 250	16	19	21	21	23	23	*	36	29	27	25	24
	251 – 800	18	22	23	24	26	26	*	41	33	31	28	27
	801 – 2,000	20	24	26	27	28	29	*	45	37	34	31	30
	2,001 – 6,000	22	27	29	29	31	32	*	50	40	38	34	33

Notes:

This exhibit applies to:

- All state highways outside incorporated cities.
- Limited access state highways within cities.

For Roadside and Median areas on managed access state highways within incorporated cities, see 1600.03 for guidance. Curb is not considered adequate to redirect an errant vehicle.

Design Clear Zone distances are given in feet, measured from the edge of traveled way.

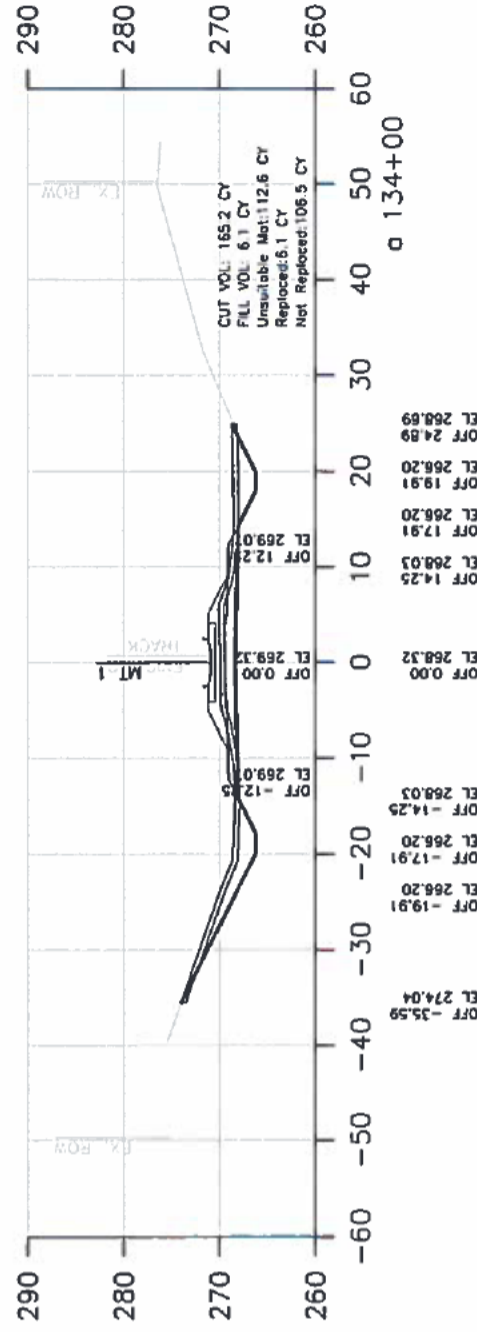
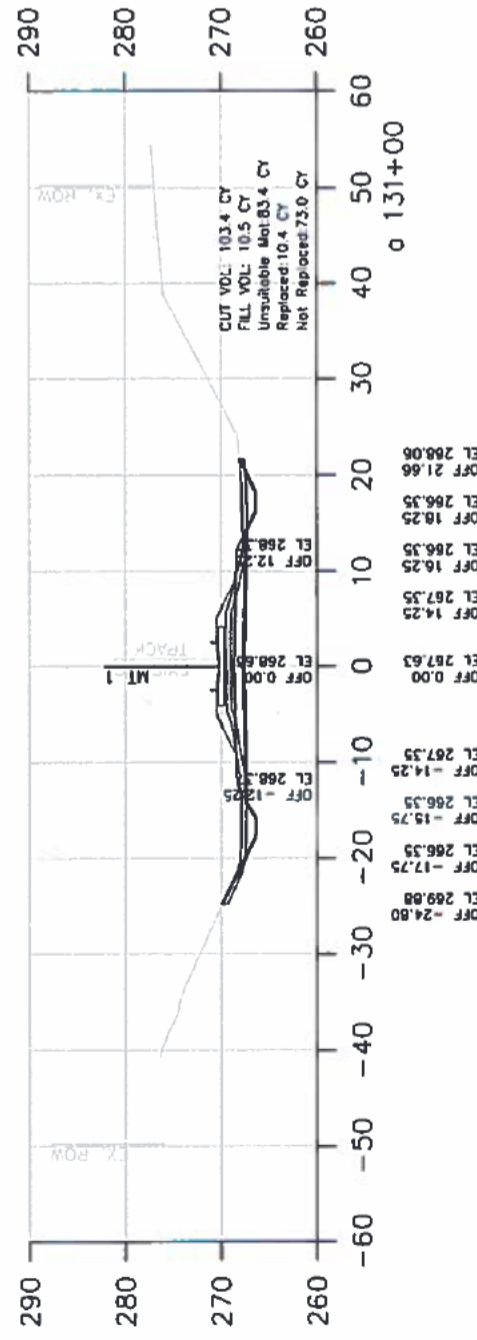
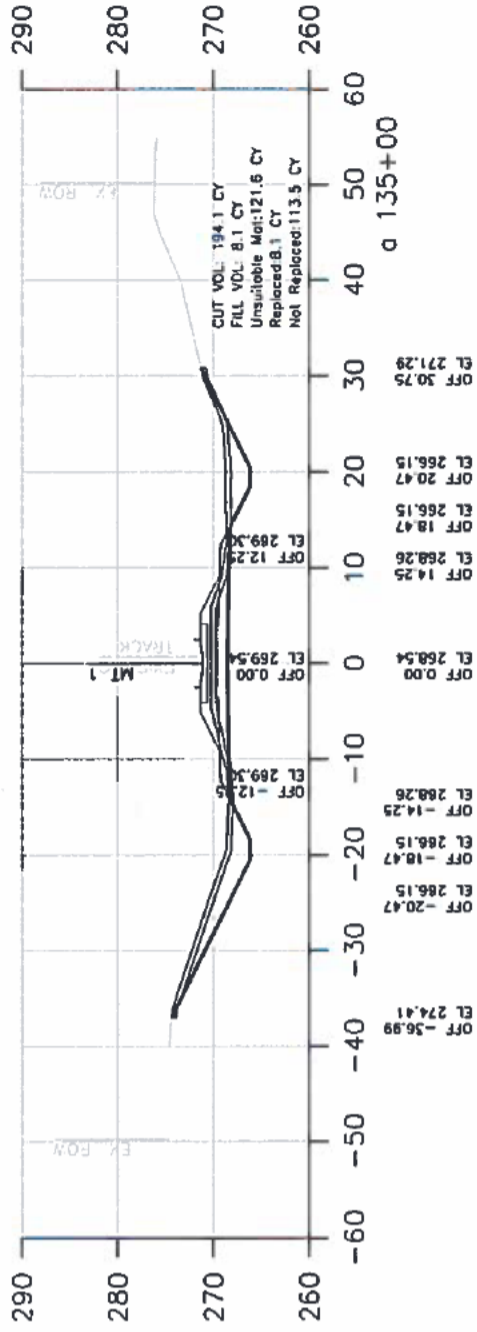
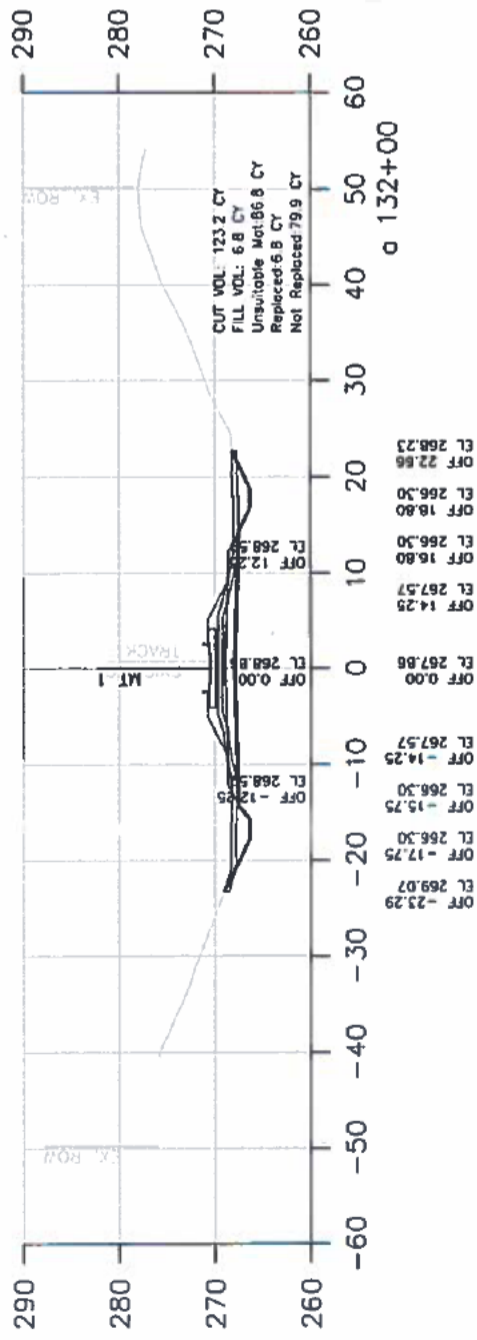
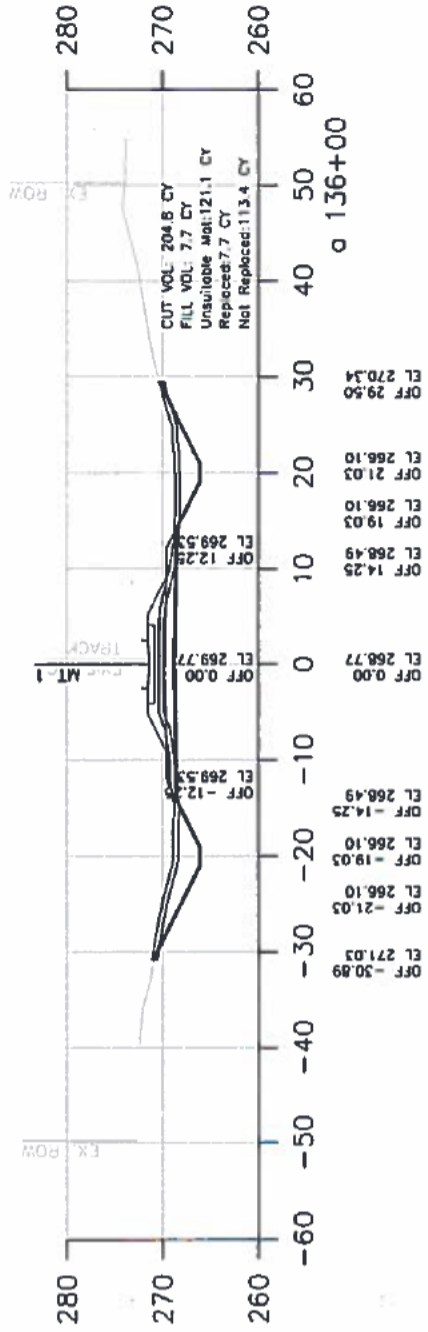
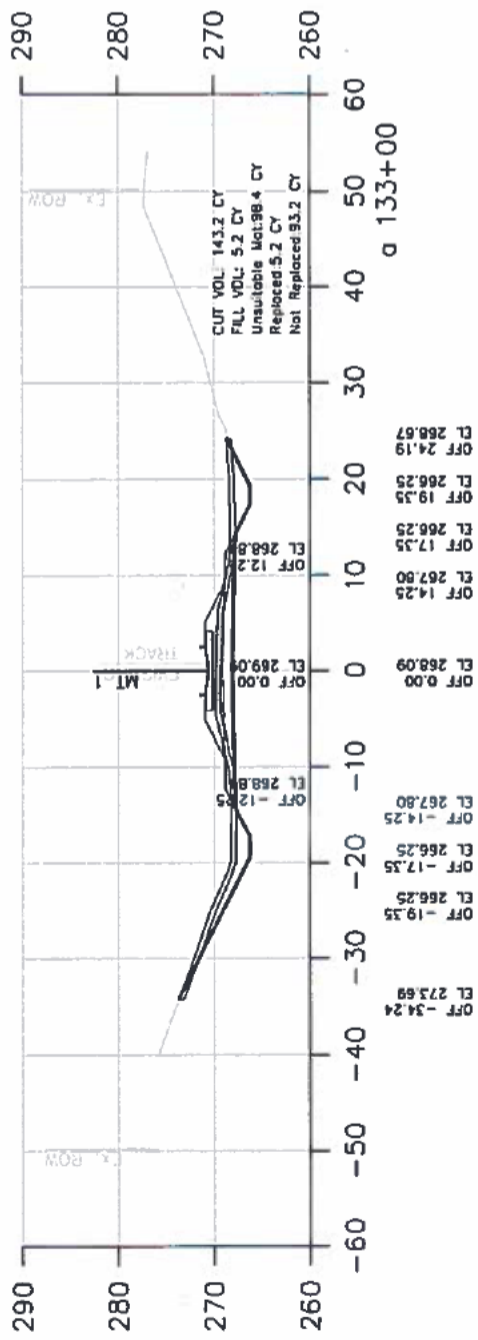
*When the fill section slope is steeper than 4H:1V, but not steeper than 3H:1V, the Design Clear Zone distance is modified by the recovery area formula (see Exhibit 1600-4) and is referred to as the recovery area. The basic philosophy behind the recovery area formula is that the vehicle can traverse these slopes but cannot recover (control steering); therefore, the horizontal distance of these slopes is added to the Design Clear Zone distance to form the recovery area.

STA a126+00 TO STA a135+00



STREET VIEW





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DATE: 2/10/2015	CONTRACT NO.	RTA/CN
DESIGNED BY: joe.donaldson	DATE	BY
ENTERED BY: BB	REVISION	
CHECKED BY: RDH		
PROJ. ENGR. RFP		
REGIONAL ADM.		







POINT DEFICANCE BYPASS
 TRACK & SIGNAL IMPROVEMENTS
 TRACK CROSS SECTIONS
 STA. 131+00 TO STA. 136+00

TRACK CROSS SECTIONS

XS261

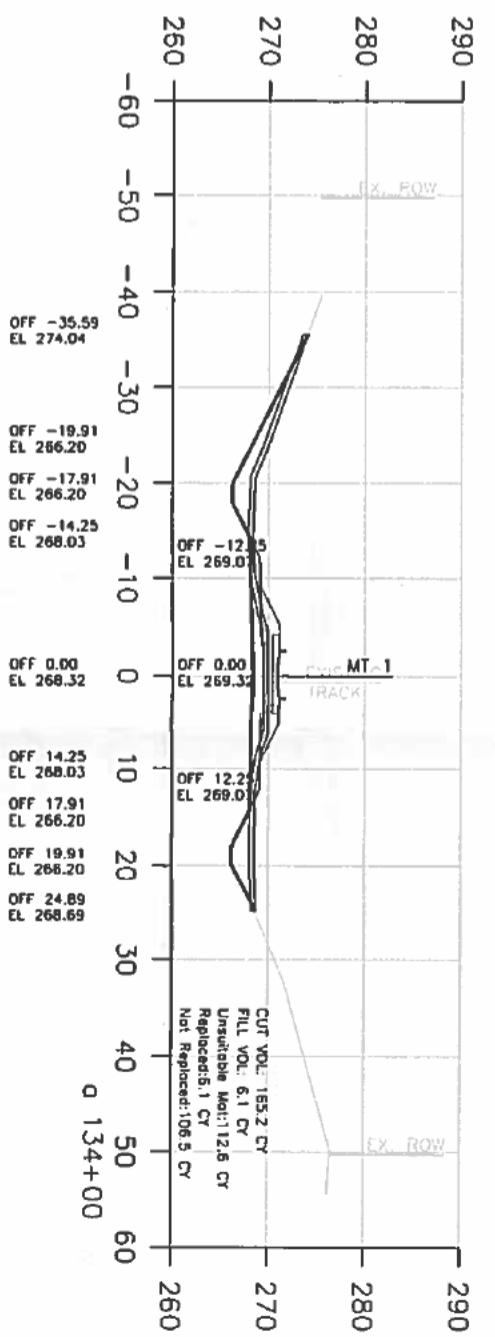
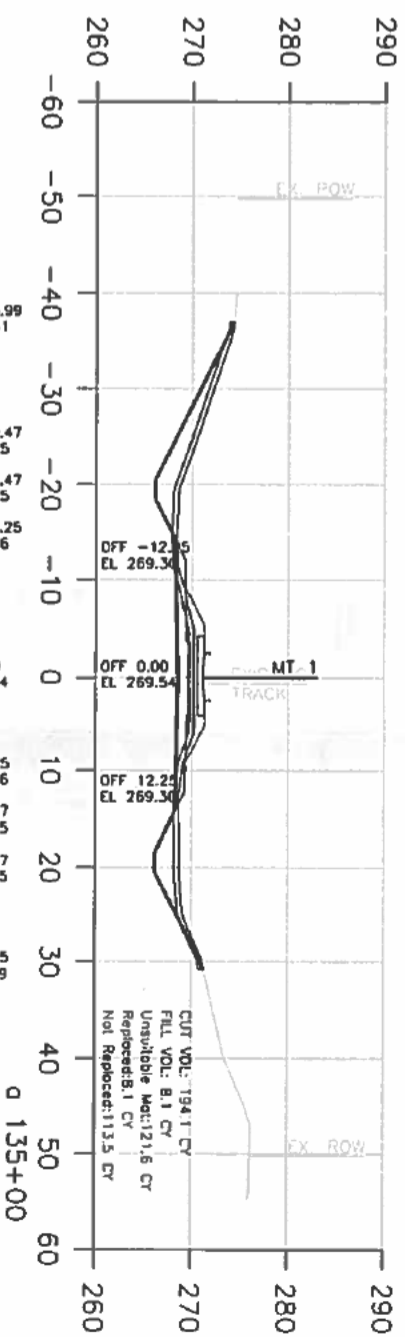
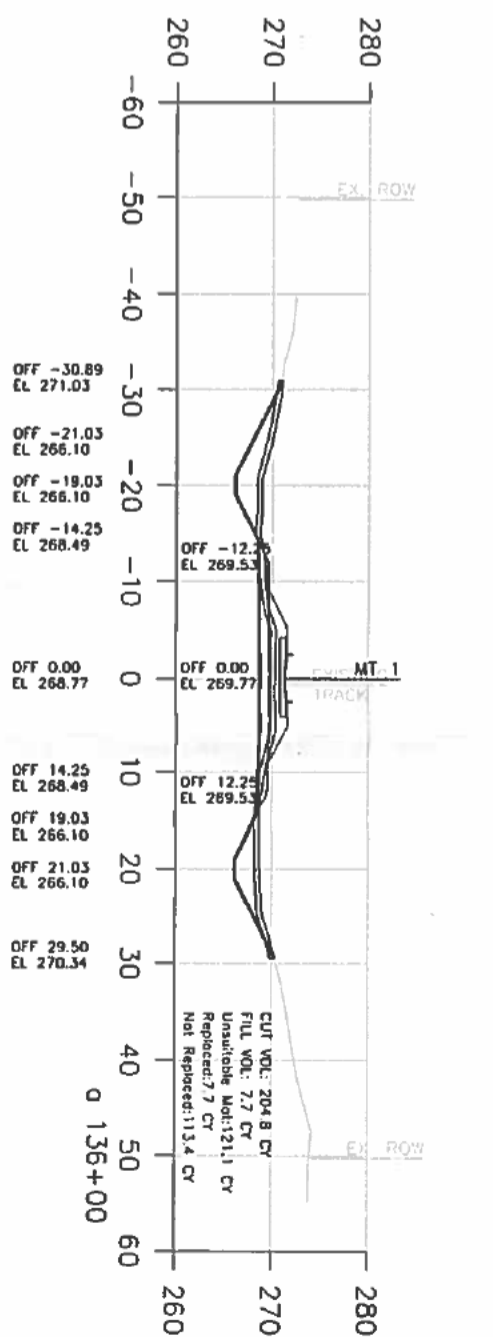
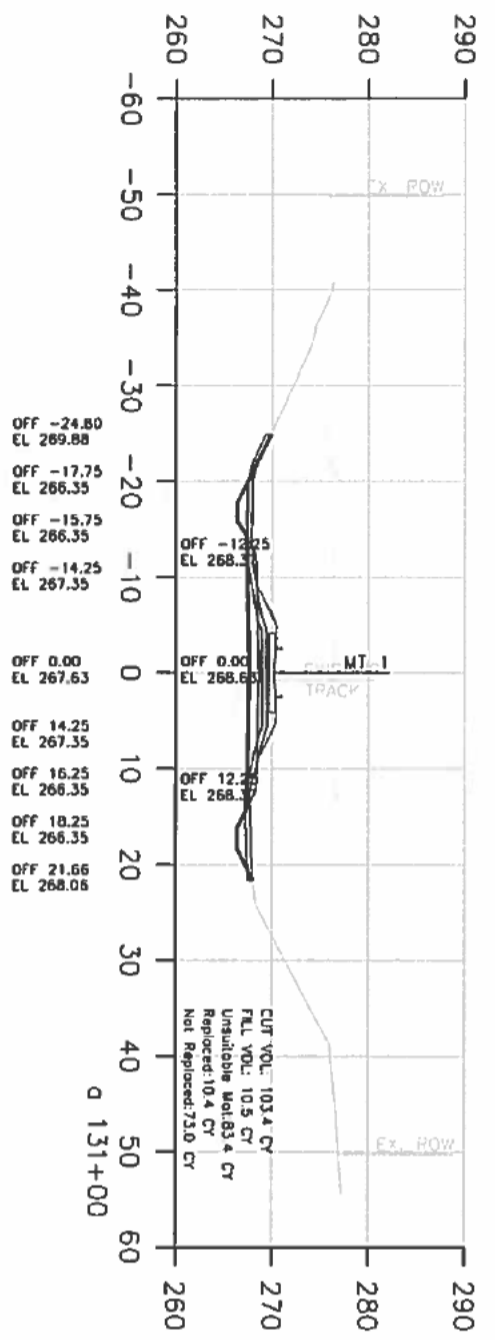
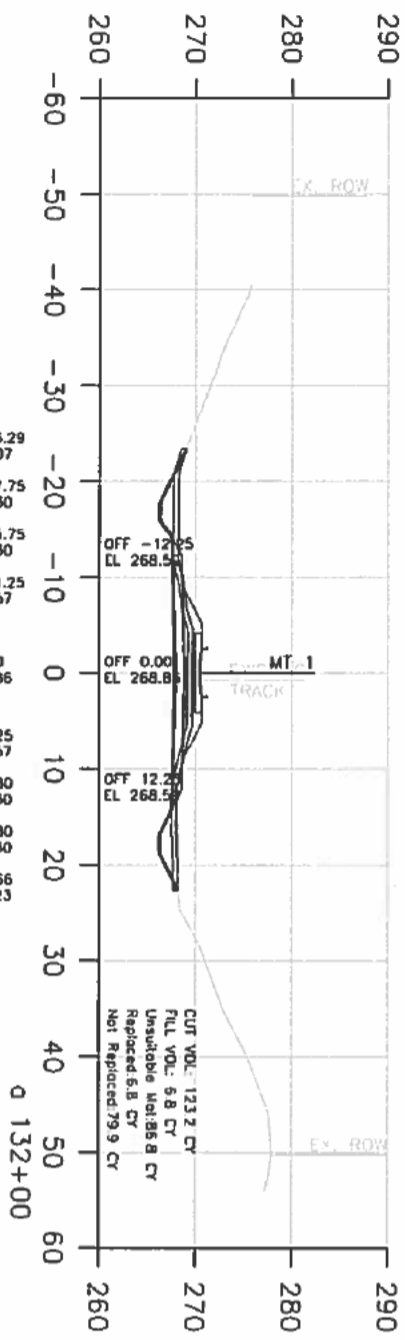
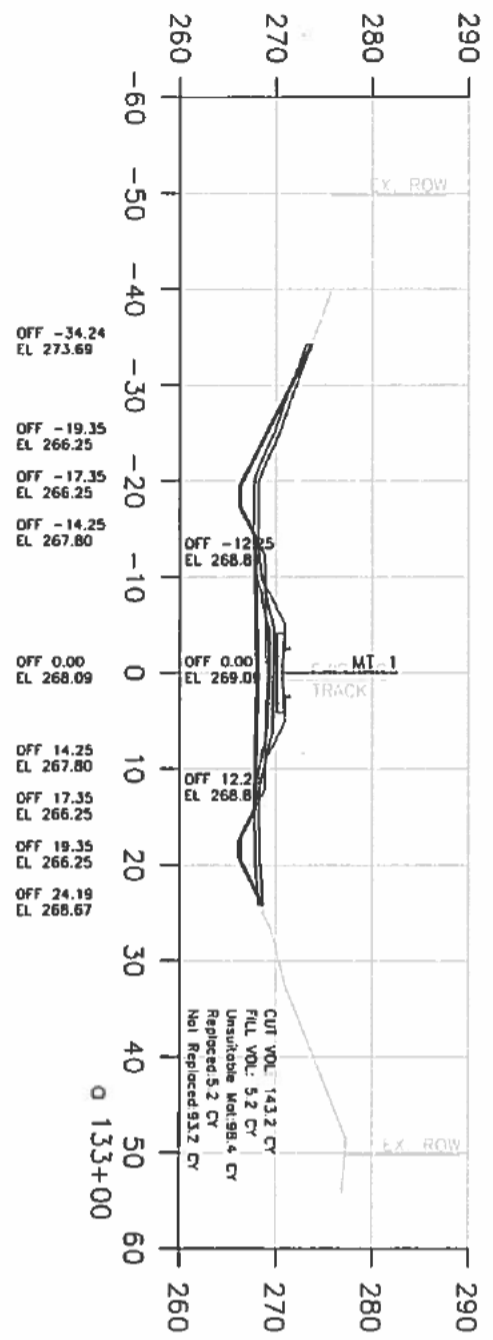
SHEET 321 OF 390 SHEETS

STA a340+00 TO STA a350+00



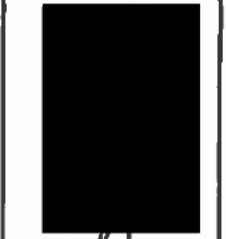
STREET VIEW



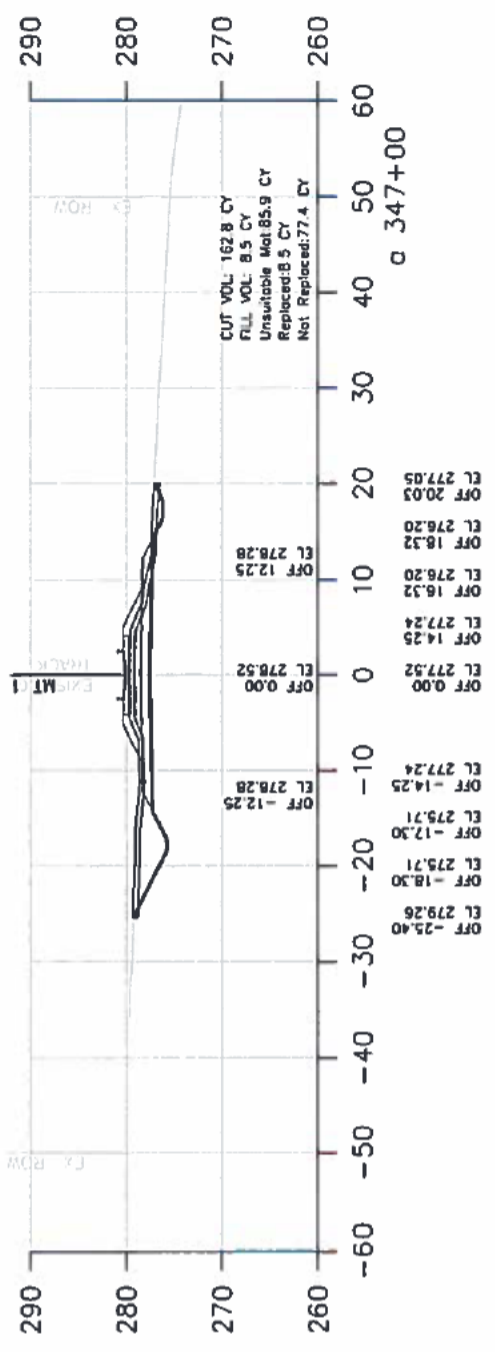
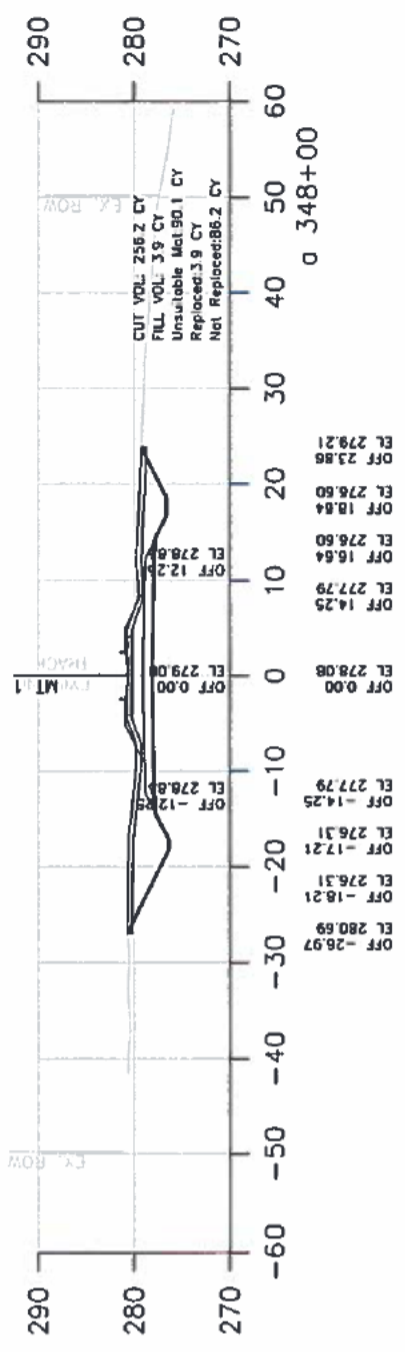
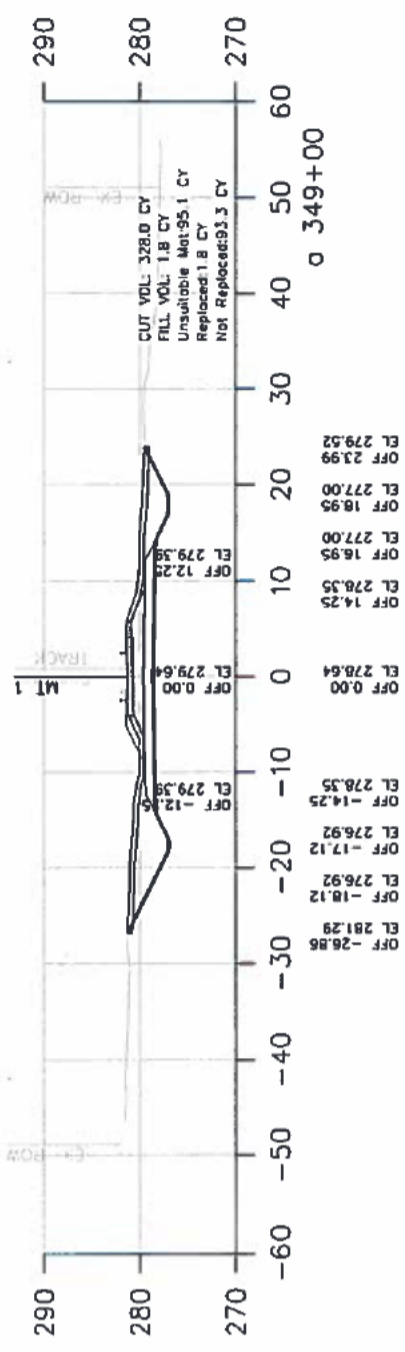
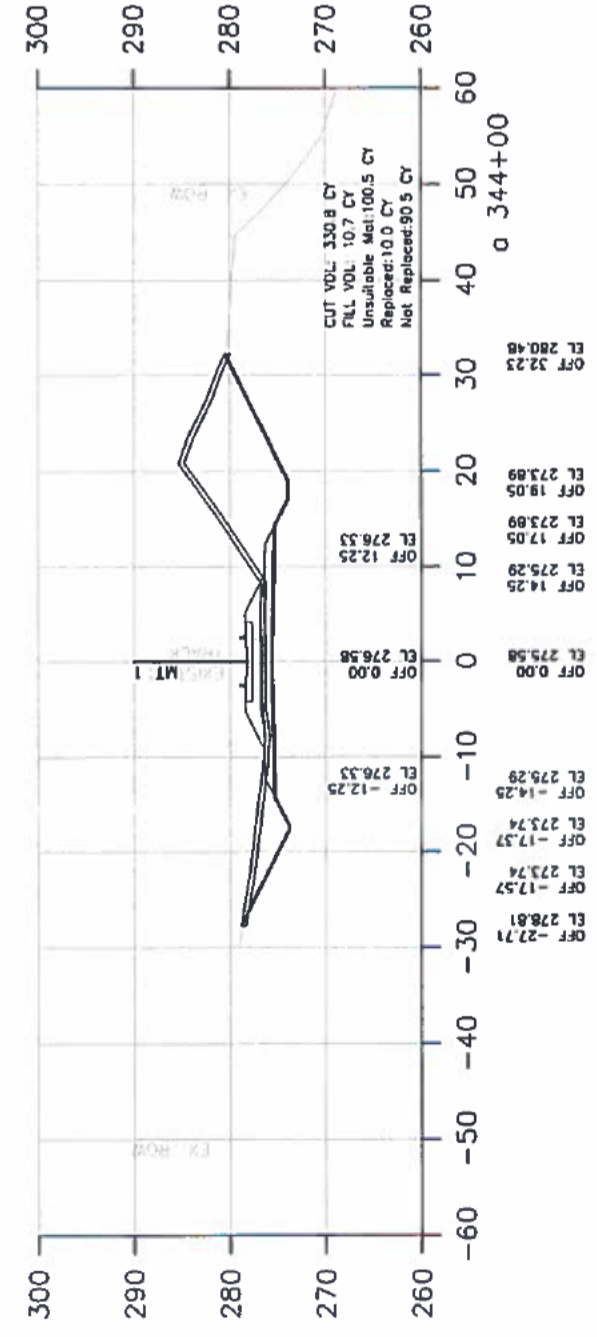
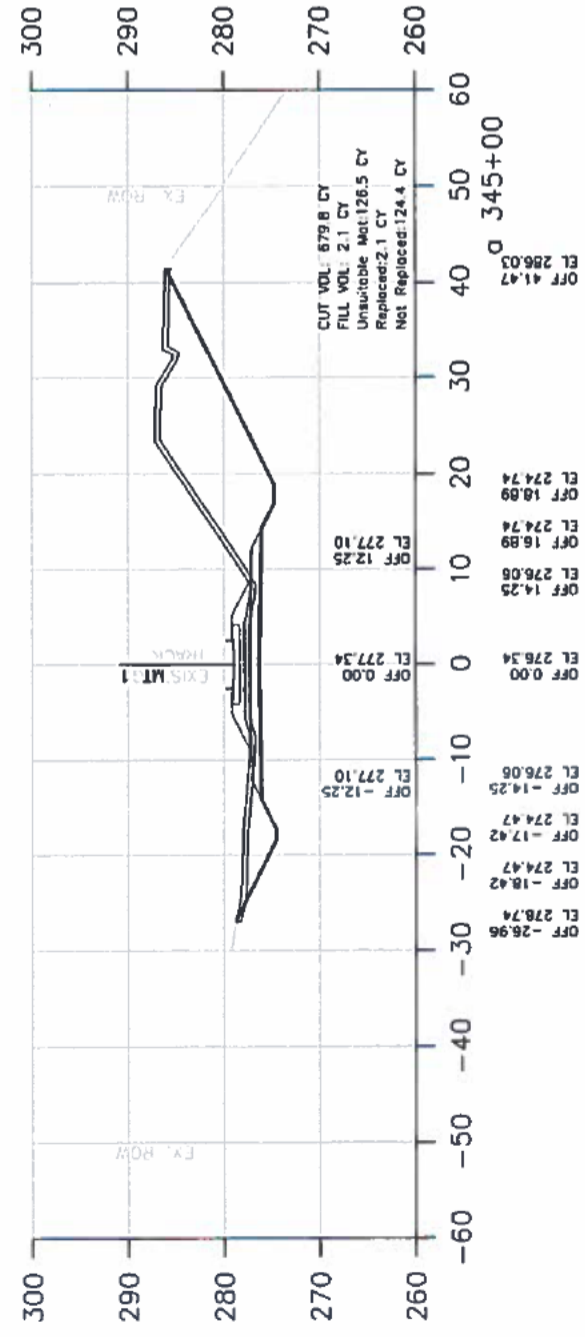
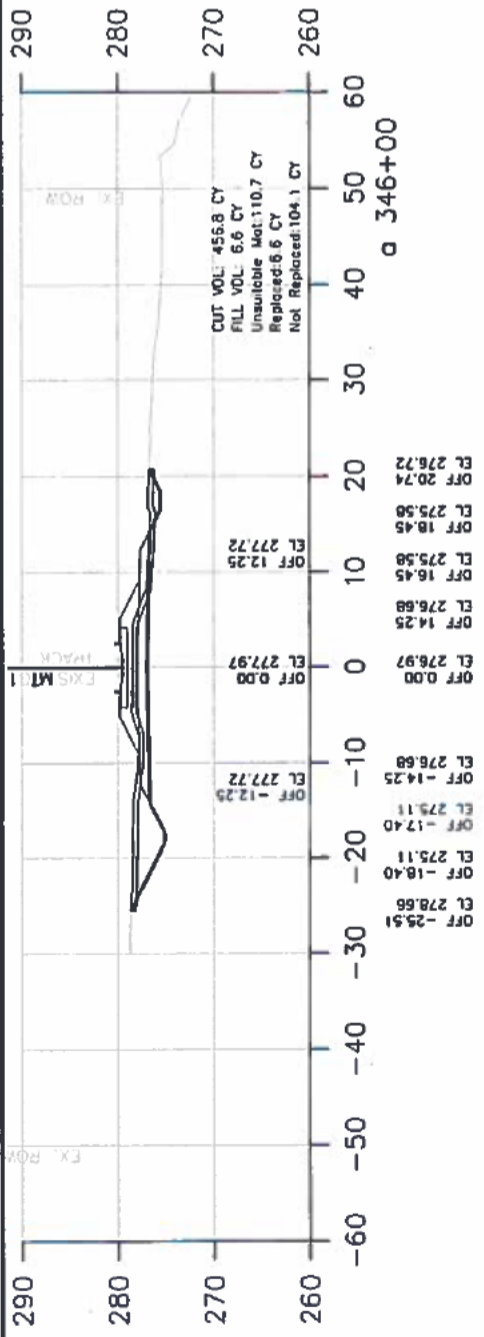


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 ENTERED BY: RDH
 CHECKED BY: RPP
 PROJ. ENGR.:
 REGIONAL ADM:

REVISION	DATE	BY



POINT DEFANCE BYPASS
 TRACK & SIGNAL IMPROVEMENTS
 TRACK CROSS SECTIONS
 STA. 131+00 TO STA. 136+00
 TRACK CROSS SECTIONS



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DESIGNED BY	BB	DATE	
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CHECKED BY	RFP	BY	
PROJ. ENGR.			
REGIONAL ADM.			



Washington State
Department of Transportation

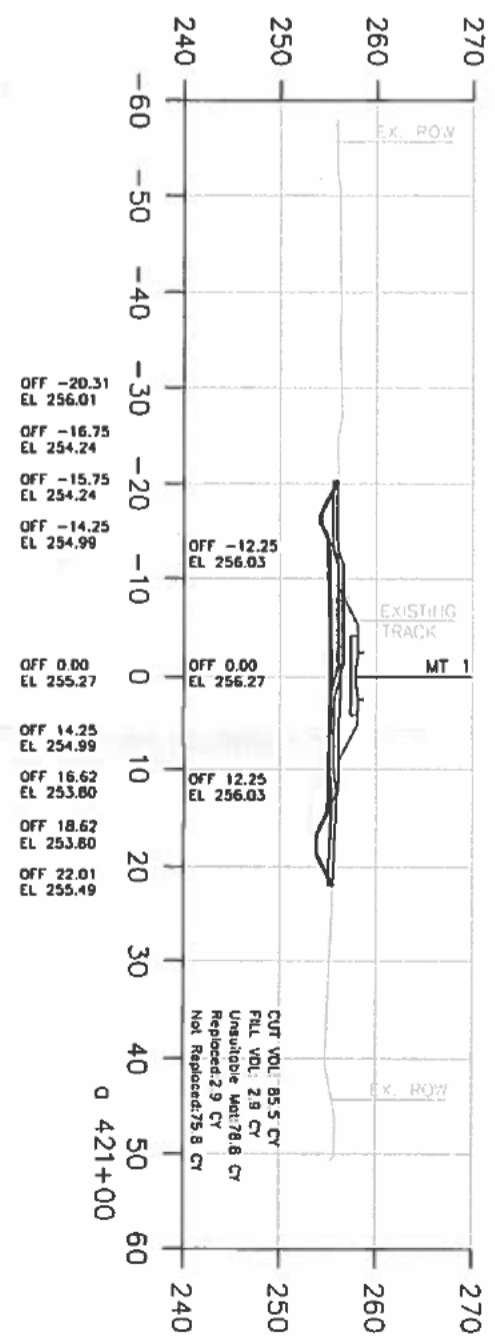
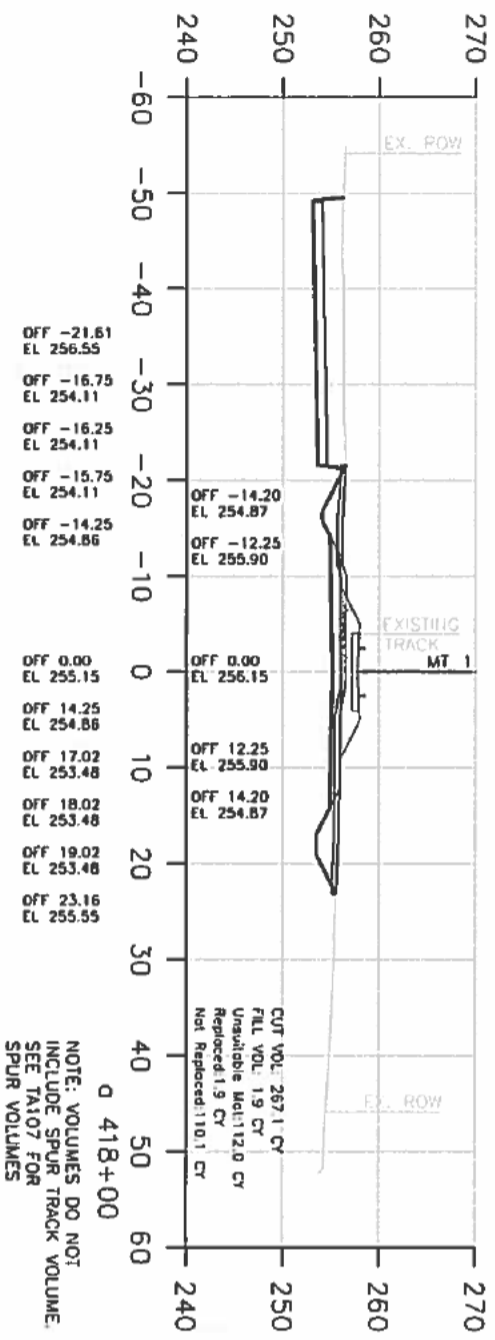
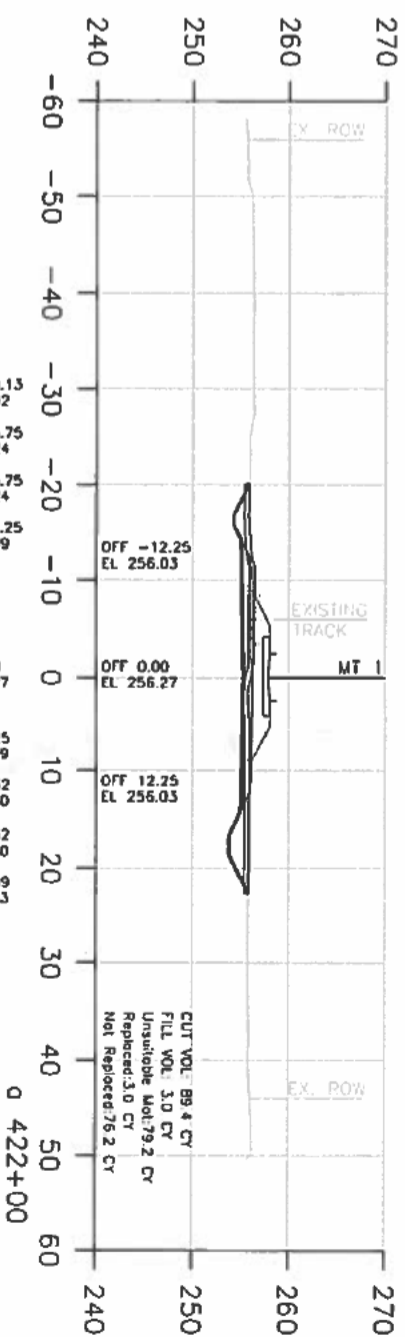
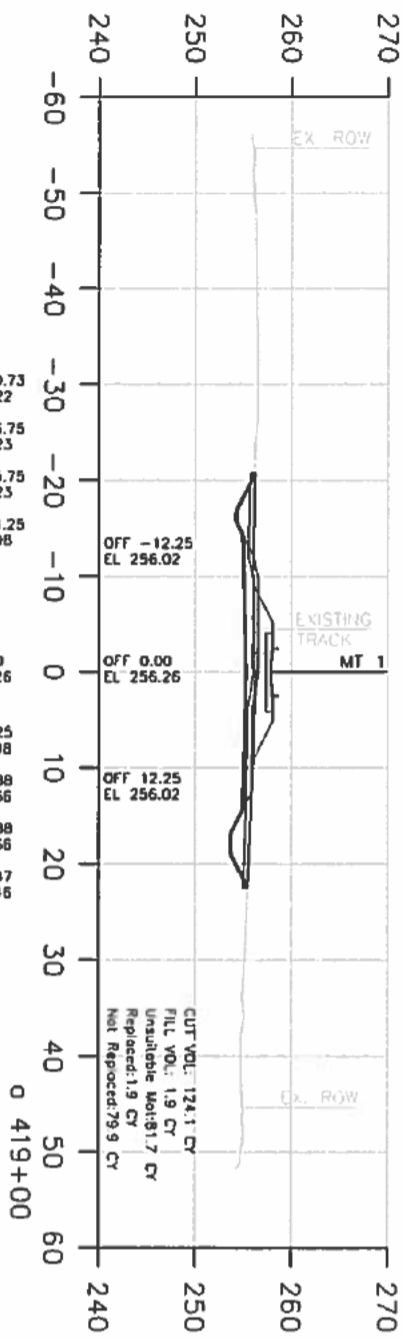
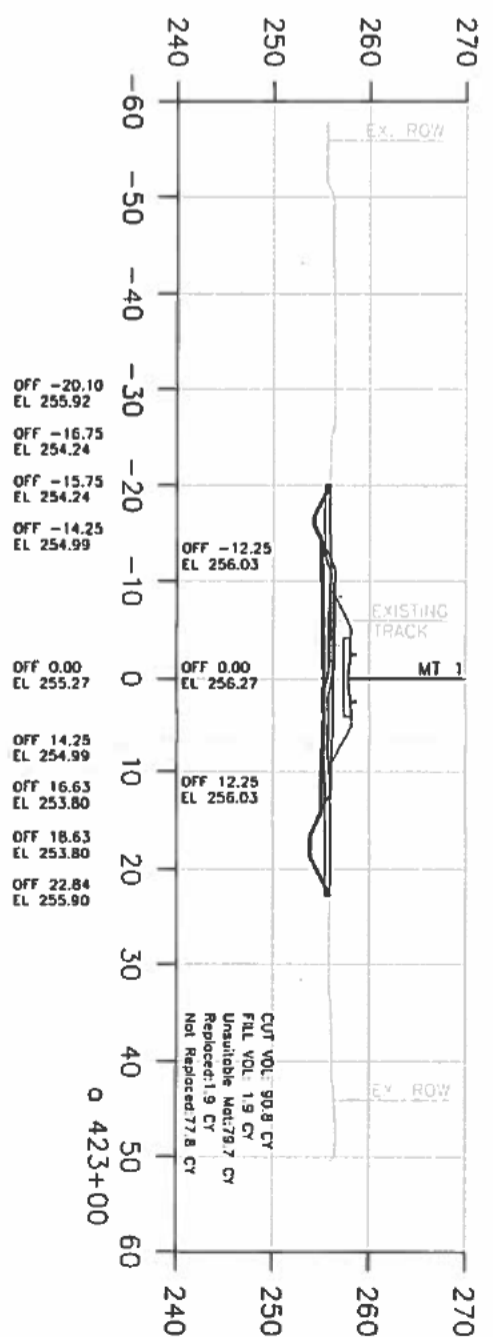
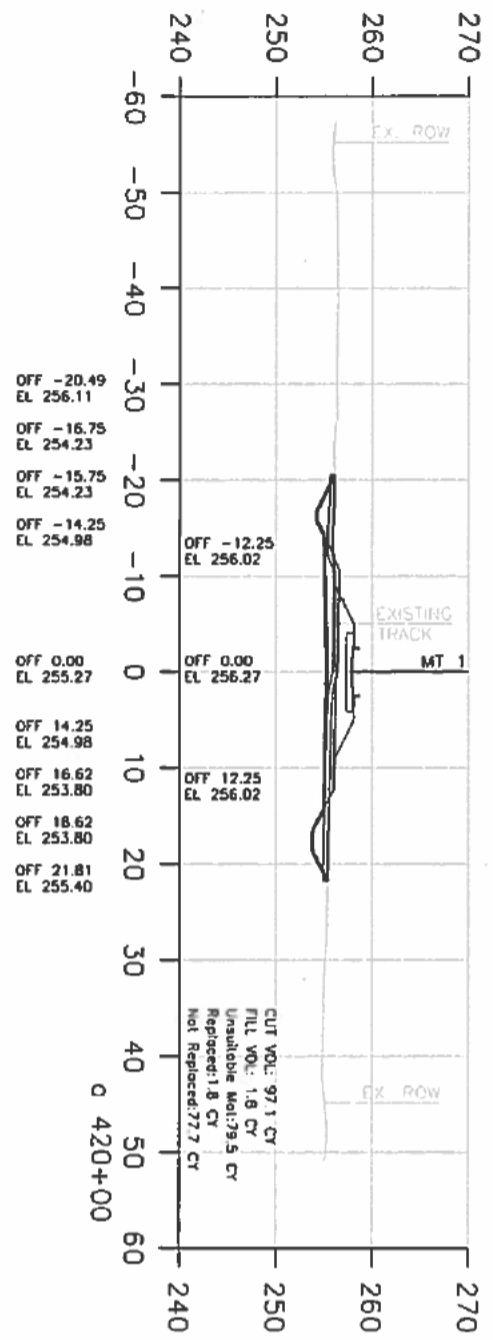
POINT DEFICANCE BYPASS
TRACK & SIGNAL IMPROVEMENTS
TRACK CROSS SECTIONS
STA. a 344+00 TO STA. a 349+00
TRACK CROSS SECTIONS

STA a420+00 TO STA a434+00



STREET VIEW



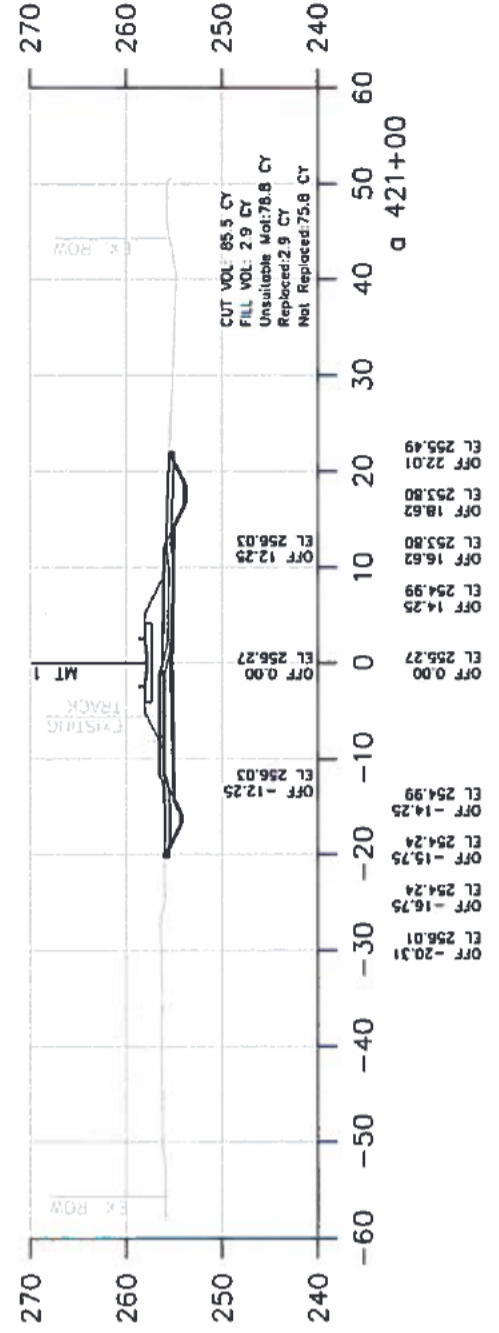
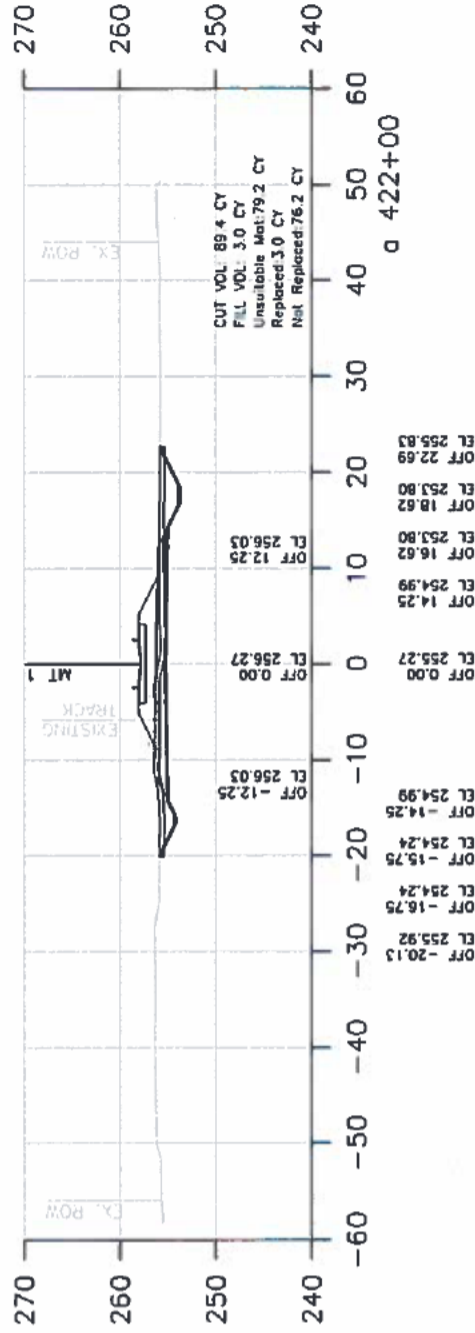
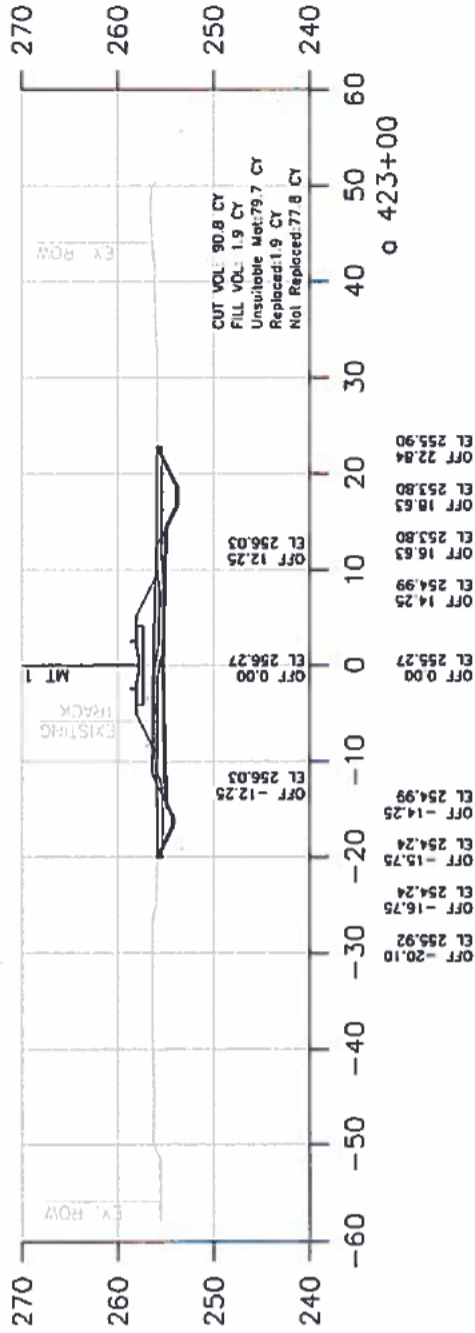
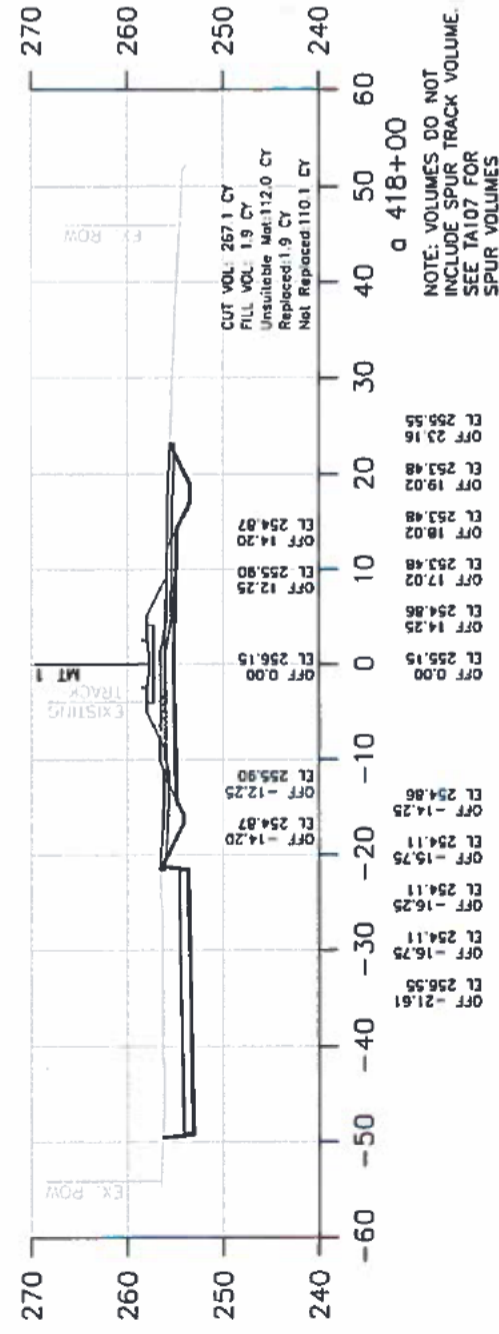
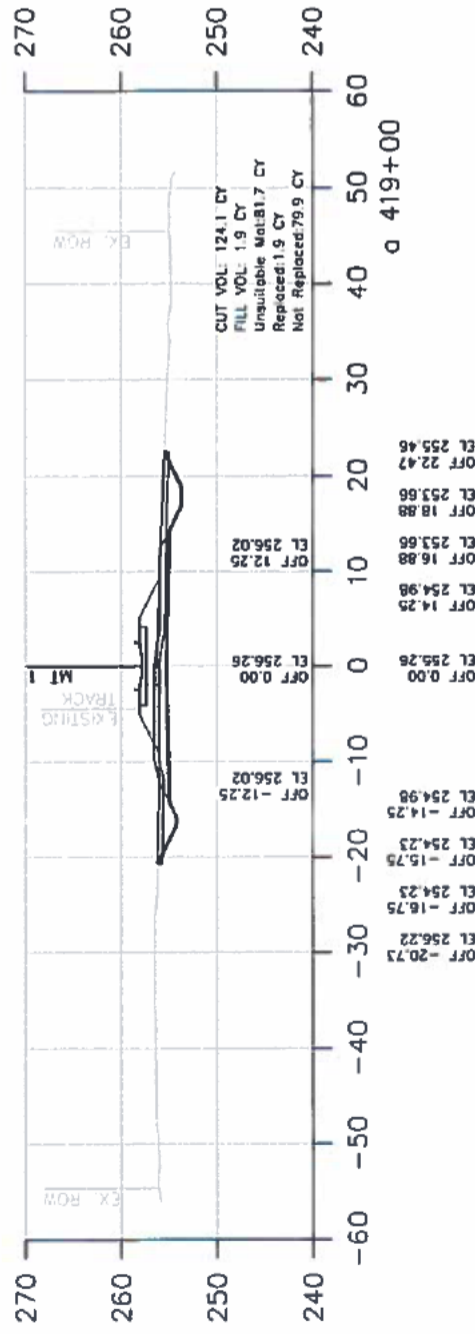
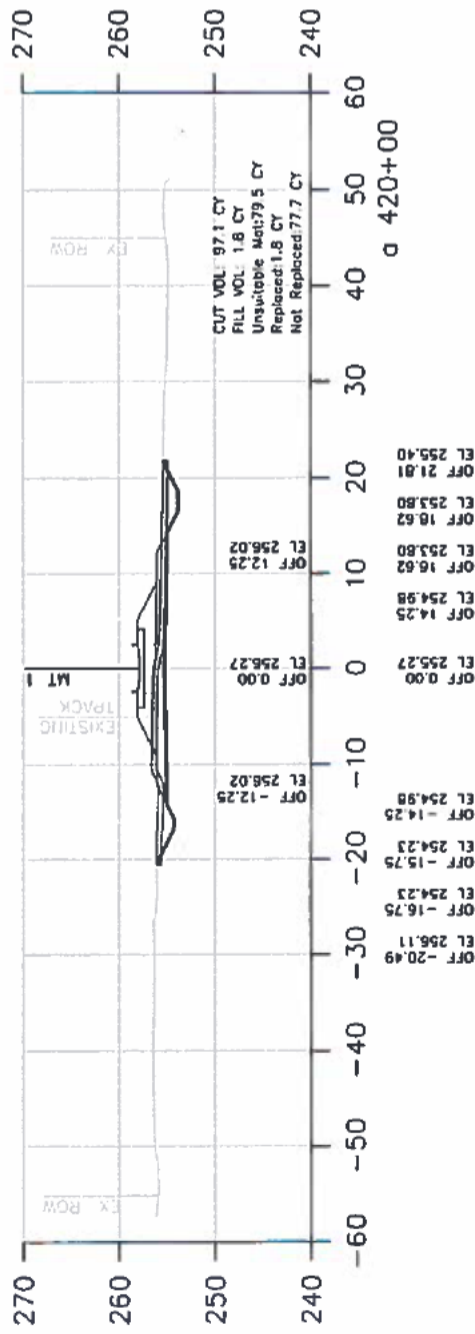


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DATE	8/21/2015
DESIGNED BY	Brian Reppner
ENTERED BY	BB
CHECKED BY	RFP
PROJ. ENGR.	
REGIONAL ADM.	
REVISION	
DATE	BY

TRACK CROSS SECTIONS
 STA. 418+00 TO STA. 423+00

REGION	STATE
JOB NUMBER	CONTRACT NO.
RTA/CN	0132-14

XS305
 SHEET
 365
 OF
 390
 SHEETS



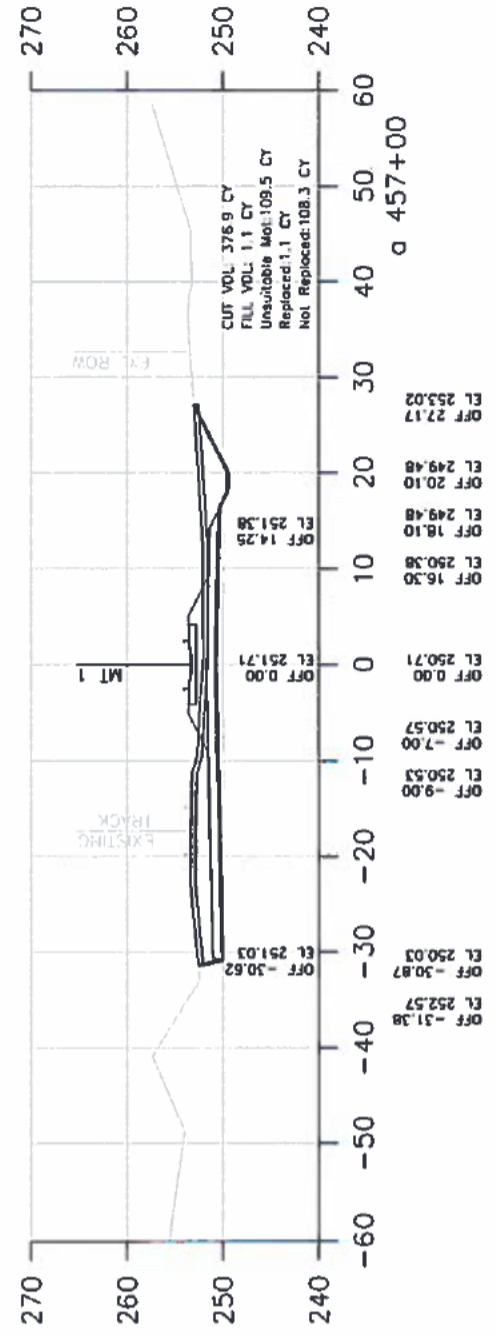
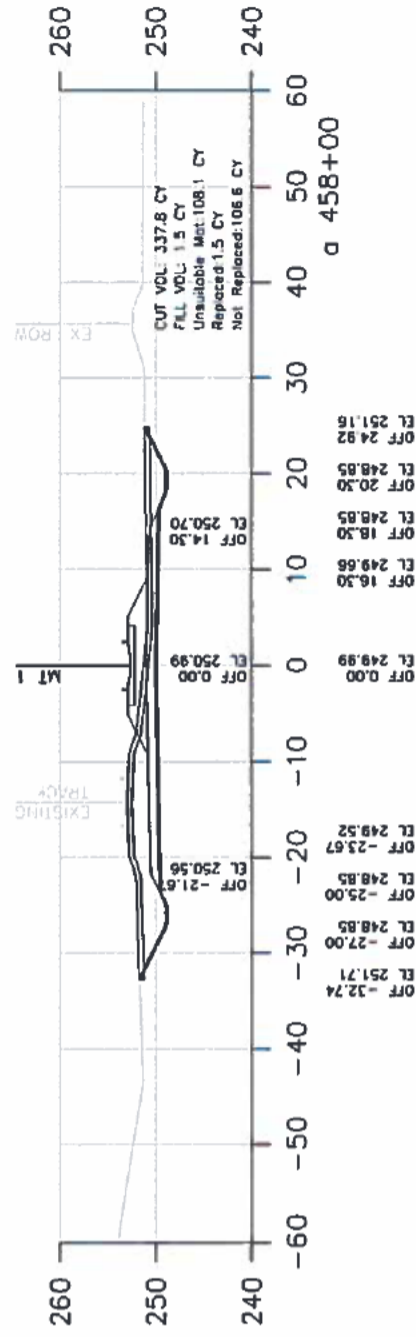
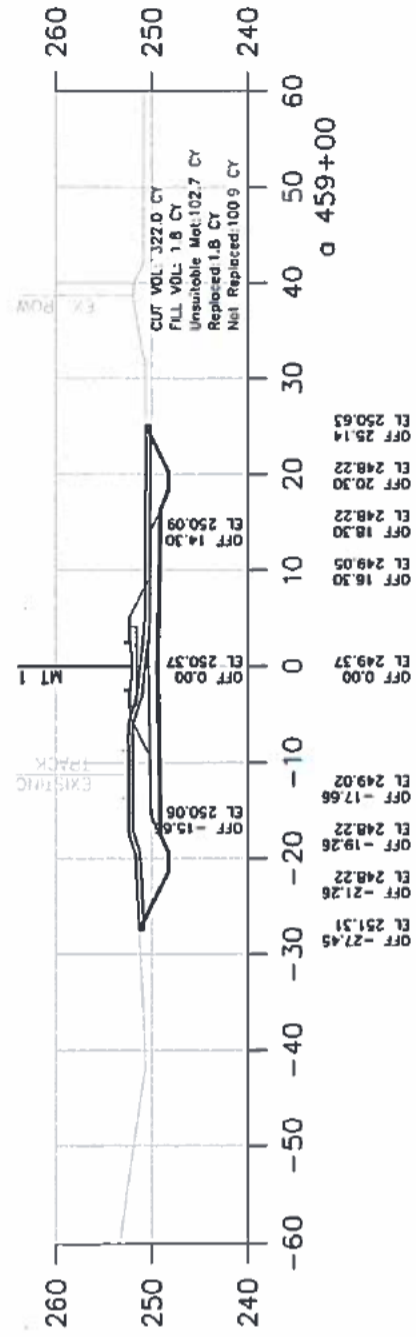
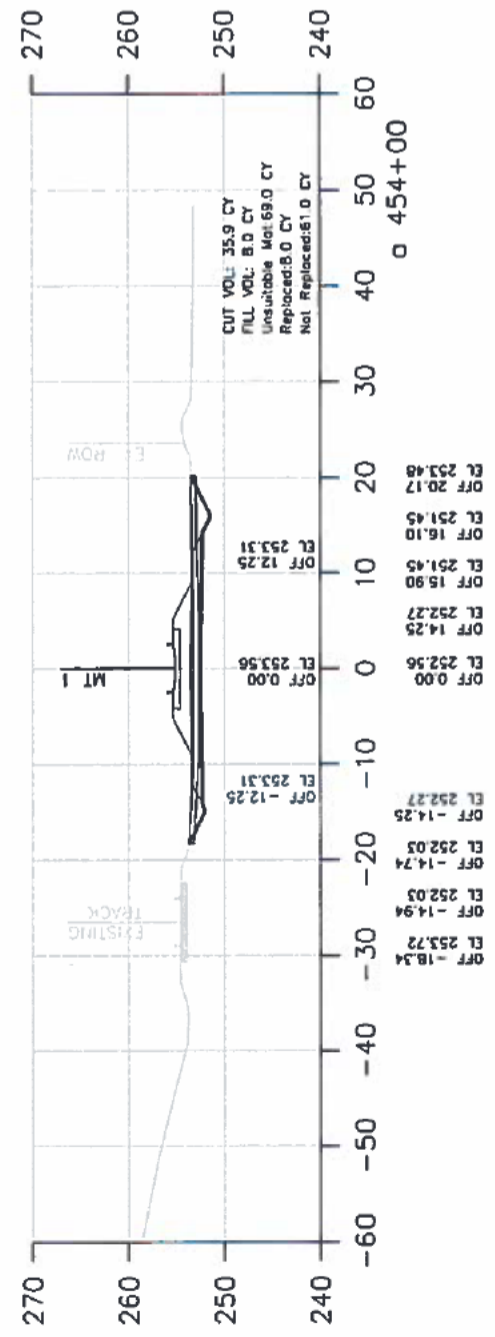
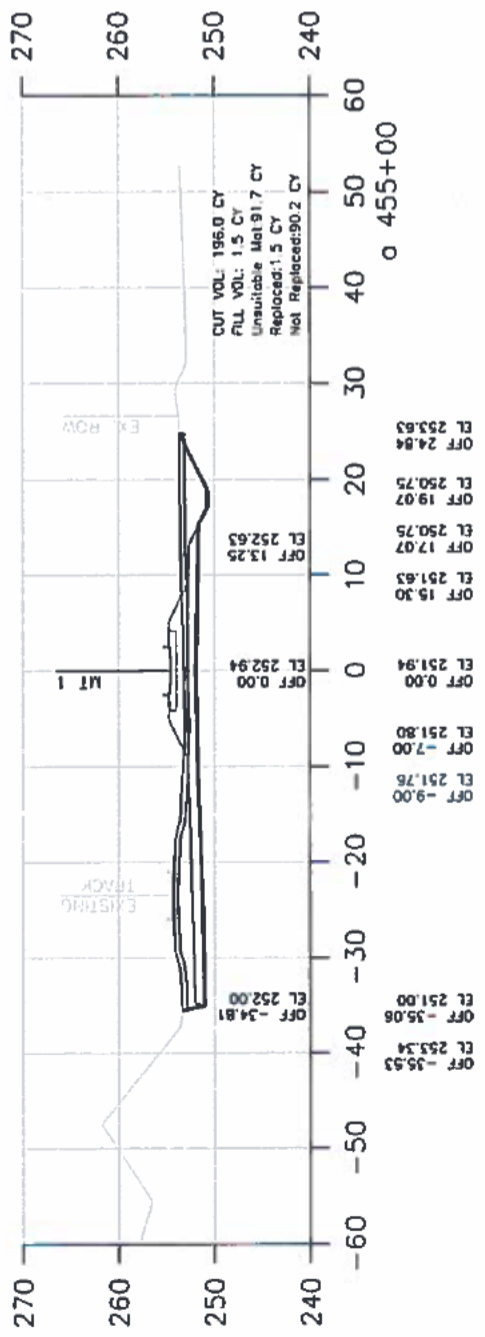
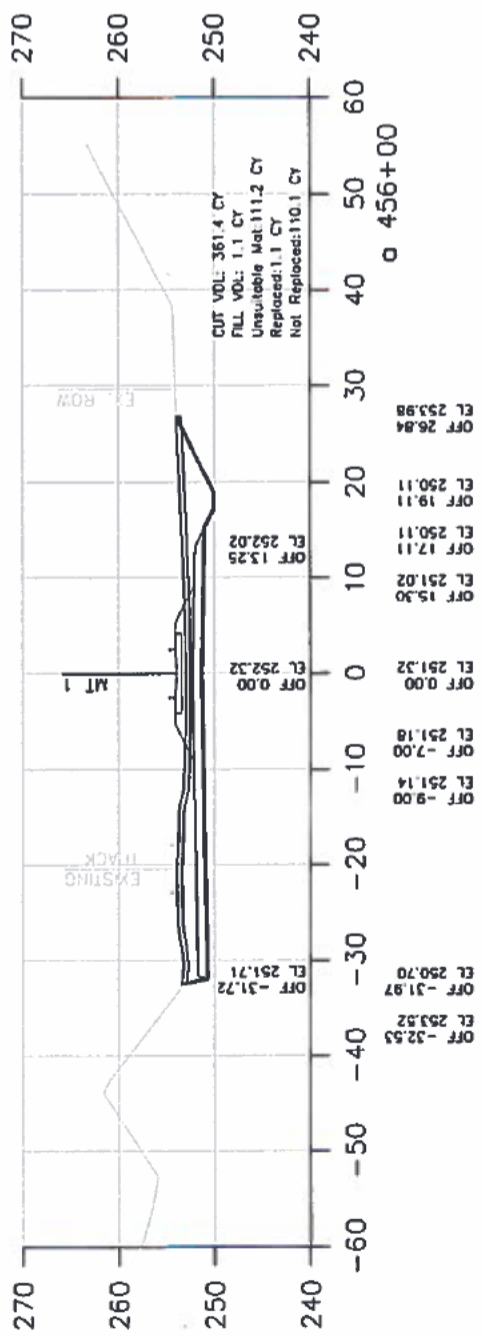
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STA a448+00 TO STA a456+00



STREET VIEW





FILE NAME: V:\PD PW Files\XS\PD_XS311.dgn
 TIME: 3:12:28 PM
 DATE: 2/10/2015
 PLOTTED BY: joe.donaldson
 DESIGNED BY: BB
 ENTERED BY: RDH
 CHECKED BY: RFP
 PROJ. ENGR.
 REGIONAL ADM.

REVISION	DATE	BY
0132-14		



Washington State
 Department of Transportation

POINT DEFIANCE BYPASS
 TRACK & SIGNAL IMPROVEMENTS
 TRACK CROSS SECTIONS
 STA. 454+00 TO STA. 459+00
 TRACK CROSS SECTIONS

I 5 to Rail Clearzone Cross Section Measurements

Design Clear Zone Distance Table 45 Feet Minimum Clearzone

I 5 to Rail ROW Measurement Field Photographs

Station 135 + 00 – Northbound view of track, ditch, and slope up to I 5.

FOG to Rail Fence – 26 Feet

FOG to Ditch within Rail Fence – 47 Feet

FOG to nearest Rail within Rail Fence – 63 Feet



4/11/2017

I 5 to Rail ROW Measurement Field Photographs

Station 340 + 00 – View north of track, rail fence, slope and I 5 FOG line.

FOG to Rail Fence – 36 Feet

FOG to Ditch within Rail Fence – 49 Feet

FOG to nearest Rail within Rail Fence – 63.5 Feet



4/11/2017

I 5 to Rail ROW Measurement Field Photographs

Station 350 + 00 – View of I 5 FOG line and rail fence.

FOG to Rail Fence – 35.5 Feet

FOG to Ditch within Rail Fence – 54.5 Feet

FOG to nearest Rail within Rail Fence – 66.5 Feet

4/11/2017



I 5 to Rail ROW Measurement Field Photographs

Station 434 + 00 – View south along I 5 toward sign showing steep slope.

FOG to Rail Fence – 101 Feet

FOG to nearest Rail within Rail Fence – 112 Feet

Bottom of slope to Rail Fence – 51.5 Feet



I 5 to Rail ROW Measurement Field Photographs

Station 456+00– View south from near FOG
toward rail fence, track and on-ramp
structure showing slope.

FOG to ditch – 45.5 Feet

FOG to nearest Rail within Rail Fence – 61.5

Feet



From: Riley-Hite, Mari

Sent: Monday, March 13, 2017 9:04:33 AM

To: Shaban, Ameer; Taaffe, Robert; Al-Tamimi, Salah

Cc: Mai, Bien; Saxe, Melissa Flores; Mitchell, Jodi

Subject: **Meeting Summary regarding Discussion about PDB Safety Cert Item regarding study for intrusion detection for fencing along portions of I-5**

Meeting took place Friday 3/10/17. The internal meeting was attended by Mark Johnson, Melissa Saxe, Inder Singh, Andrew Rawls, Branden Porter, John Weston, Ameer Shaban, Bien Mai, and Mari Riley-Hite. After internal discussion, Mike Rowswell and Josh Cheatham, WSDOT joined the meeting.

Discussion about the intrusion detection proposal made at the SSDCC meeting; Andrew pointed out that adding intrusion detection into the Signal System would be very complicated and did not recommend it. In addition, the magnetic sensors on the metal fences can cause false information. It is undetermined who will pay for installation, maintenance and monitoring. Overall, not an agreeable option.

Discussion about the Certifiable Item hazard description and rating; it was agreed that the hazard should be divided into two, with one addressing a semi-truck and one for vehicles weighing under 10K lb. Due to the incident data provided by Mike Rowswell, it was also agreed to reduce the initial risk for semi-truck to 1D and for car to 2D. More information was required to assess the residual risk of WSDOT's proposal to remove the vehicle barriers option.

WSDOT was asked to provide and map inventory of clear zones in the areas of concern and, to formally submit this along with Mike Roswell's analysis report, with letterhead and signature. ST will meet internally after receipt of the additional information from WSDOT to assess the results.



INTEGRATION TESTING SUMMARY

Sound Transit Systems Designer and the Construction Contractor prepared and submitted to the Construction Manager (CM) for approval, the System Integration Test Plan (SITP) – Point Defiance Bypass, Rev 1, 10/2016 comprised of contract specific commissioning, pre-revenue test plans and procedures for contractually required tests including safety-critical items identified in the Contract Specifications. CM approval is required before the Contractor can proceed with conducting tests. Sound Transit's General Commissioning Plan, Rev 0, 3/2012, further elaborates on each level and type of test conducted. Integration testing for SITP Stages 1 through 8 were conducted for Point Defiance Bypass Track & Signal Improvements Safety/Security Certification (SITP Stages 9 through 11 will be certified under the Tacoma Trestle Project). Tests were witnessed by the Resident Engineer team and Sound Transit to verify that the interfaces of different systems and sub-systems function properly as a whole. Integration test reports at the conclusion of each test, including the pass/fail criteria, were reviewed and approved by Sound Transit Systems Engineering.

Verification of the Integration Tests has concluded that all safety-critical design aspects have been implemented for the Sounder Point Defiance Bypass Track & Signals Improvements Project. Back up Integration Test documentation is maintained by SQA group.

A certificate for Integration Testing Completion is issued to confirm the Integration Test Plan & Procedures, and the Integration Test Reports have been completed for the Point Defiance Bypass Project; any exceptions are listed on the Certificate and will be tracked to closure. No significant hazards remain that will affect Sound Transit's ability to conduct safe train operations. The Integration Testing Completion Certificate is included in this report.

SOUND TRANSIT

SOUNDER COMMUTER RAIL



Point Defiance Bypass Track & Signals Project

Safety & Security Certification Integration Testing Completion Certificate

This signed certificate exhibits concurrence that the safety/security certifiable element identified and all associated items have been mitigated to an acceptable level of risk, and verification that those mitigations have been incorporated into the Project.

Certifiable Element: The following Systems Integration Tests were completed and verified to confirm that the systems and sub-systems function properly and have been adequately documented. The tests verified are:

<u>Test #</u>	<u>Test Title</u>	<u>Test #</u>	<u>Test Title</u>
101	Radio Communications Device	404	Control Interface
201	Train/ROW Static/Dynamic Clearance	405	Signal Aspect Sighting
205	Train/Track Ride Quality	407	Wayside Sign/Marker/ Verification/Visibility
401	Train Control/Track Circuit Shunting	409	Grade/Pedestrian Crossing/ Intersection Interface
403	Signal Verification/Control Line		

Exceptions Noted: None

[Redacted Signature]

Mark Johnson
Project Director, Point Defiance Bypass
Sound Transit

Date

9.19.2017

[Redacted Signature]

Jodi Mitchell
Rail Activation Lead
Sound Transit

Date

9.19.2017

[Redacted Signature]

Craig DeLalla
Deputy Director, Systems Engineering & Integration
Sound Transit

Date

10/4/17

[Redacted Signature]

Kenneth Cummins
Director of Public Safety
Sound Transit

Date

19 Sept 17

[Redacted Signature]

Joseph Gildner
Deputy Executive Director-Project Management
Sound Transit

Date

9/19/17

[Redacted Signature]

Salah Al-Tamimi
Safety and Quality Assurance Director
Sound Transit

Date

10/5/17

MEMO



June 28, 2017

TO: Salah Al-Tamimi, Safety & Quality Assurance Director
FROM: Shannon McNutt, RE Point Defiance Bypass Project [REDACTED]
SUBJECT: Non-Witnessed Railroad Signal testing during Stages 6 – 8

This memo is to confirm that all Railroad signal tests were not witnessed during stages 6 to 8. It was determined during the Signal Commissioning meetings that many of the CTC tests would be conducted simultaneous and more personnel would be required in order to witness all signal tests. As an alternative to hiring more personnel for short periods of time, critical tests were identified by Sound Transit and witnessed by the Construction Management team and/or Sound Transit. All tests will be reviewed and sent back signed by the Owners Representative for Acceptance. The list of unwitnessed tests will be sent over once Stage testing is approved.

APPENDICES

(Under separate cover)

1. Cutover 1: Stages 1 and 3 – Track & Signal Placement
2. Cutover 2: Stage 4 – Crossover
3. Cutover 3: Stage 5 –Track Shift
4. Change Orders