Basis of Design

**[Project Title]**

[State Route], MP [Begin] to MP [End]

[Enter multiple SR and MP as necessary]

[Work Order Number], [WIN Number], [PIN Number]

[Month Day, Year]

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

Choose an item.

[City], Washington

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| **SIGNATURES** | TemplateVersion 2.2 |
| PREPARED BY | REGION APPROVAL |
|  | *Consult* [*PDM #22-03*](https://wsdot.wa.gov/engineering-standards/all-manuals-and-standards/project-delivery-memos) *to determine if the BOD must be signed by the Regional Adminstrator**[insert title]* |
| ASSISTANT STATE DESIGN ENGINEER APPROVAL |
| Consult Design Manual Chapter 300.If ASDE approval is not required, simply type “Not Applicable per Design Manual Chapter 300.” in this box. |
| **PRACTICAL DECISION MAKING** |
| Practical decision making is a philosophy that considers each situation, aligns with our financially constrained budget environment, and encourages incremental, flexible, and sustainable investments by focusing on identified performance needs and engaging stakeholders at the right time.There are six core principles that capture the essence of practical decision making:▪ Starts with a clear purpose and need ▪ Considers resource constraints and life cycle cost▪ Engages stakeholder and looks for partnerships *▪* Considers overall system performance*▪* Considers incremental, phase solutions *▪* Applies innovation and creativityThese six core principles are incorporated throughout the document. |

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| **NOTE TO DESIGNERS** *There are tips provided in red italics text. This text along with the BOD instructions are intended to help you fill out this document. Delete the red text [including this note] in the final version of the document.*There are examples and additional explanation provided in blue text. Edit to align with your project and change to black text or delete for the final version of the document.The black text is standard template language and does not need to be edited. Coordinate with your ASDE if revisions are necessary for your project. |

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| **Related Documents and Technical Reports** |
| *Insert a list of documents and reports that were integral to the origination of this project. Use Chicago style referencing, a Chicago Citation Generator is available here:* [*Free Chicago Citation Generator [Updated for 2022] (mybib.com)*](https://www.mybib.com/tools/chicago-citation-generator)*. The following are typical for fish passage projects:** Heilman, Julie. 2016. Review of US 101 MP Harlow Creek Preliminary Hydraulic Design Report: Preliminary Basis of Design. Olympia: WSDOT HQ Hydraulics.
* Doe, John. 2020. Review of SR 523 Field Operation Assessment Report. Seattle: WSDOT NW Region.
* A Policy on Geometric Design of Highways and Streets. 2018. 7th ed. AASHTO. 3.4.6.3 Sag Vertical Curves
* Review of Transportation Master Plan. 2021. Olympia: City of Olympia Public Works Transportation.
* Review of Comprehensive Plan. 2020. City of Seattle
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| **General Project Information** |
| **Route Information** | **SR** | **NHS (Y/N)** | [**Functional Class**](https://www.wsdot.wa.gov/data/tools/geoportal/?config=FunctionalClass) | [**City**](https://wsdot.maps.arcgis.com/home/item.html?id=bb7c67c334be494c88cf00ebb91fe51f) | [**County**](https://wsdot.maps.arcgis.com/home/item.html?id=fe229f9df5aa4289b8ccd2a99289951b) |
|  |  |  |  |  |
| **Project Information** | **Begin SRMP** | **End** **SRMP** | **Budget** | **Funding** **Sub-Program** | **Posted Speed** | [**AADT**](https://hqolymcognos02p.wsdot.loc/ibmcognos/bi/?pathRef=.public_folders%2FReports%2FTransportation%2BPlanning%2FTraffic%2BCounts%2FSystem-Wide%2BReports%2FAADT%2BHistory%2BReport&action=run&format=HTML&prompt=false&promptParameters=%5B%7B%22name%22%3A%22Year%22%2C%22value%22%3A%5B%5D%7D%2C%7B%22name%22%3A%22End%20AB%22%2C%22value%22%3A%5B%7B%22display%22%3A%22A%22%2C%22use%22%3A%22A%22%7D%5D%7D%2C%7B%22name%22%3A%22MPType%22%2C%22value%22%3A%5B%7B%22display%22%3A%22SRMP%22%2C%22use%22%3A%22SRMP%22%7D%5D%7D%2C%7B%22name%22%3A%22Leg%22%2C%22value%22%3A%5B%7B%22display%22%3A%22State%20Route%22%2C%22use%22%3A%22State%20Route%22%7D%5D%7D%2C%7B%22name%22%3A%22Begin%20AB%22%2C%22value%22%3A%5B%7B%22display%22%3A%22A%22%2C%22use%22%3A%22A%22%7D%5D%7D%2C%7B%22name%22%3A%22SRID%22%2C%22value%22%3A%5B%7B%22display%22%3A%22%28Use%20only%20SR%20Number%29%22%2C%22use%22%3A%22000%22%7D%5D%7D%5D) | [**Truck %**](https://hqolymcognos02p.wsdot.loc/ibmcognos/bi/?pathRef=.public_folders%2FReports%2FTransportation%2BPlanning%2FTraffic%2BCounts%2FSystem-Wide%2BReports%2FAADT%2BHistory%2BReport&action=run&format=HTML&prompt=false&promptParameters=%5B%7B%22name%22%3A%22Year%22%2C%22value%22%3A%5B%5D%7D%2C%7B%22name%22%3A%22End%20AB%22%2C%22value%22%3A%5B%7B%22display%22%3A%22A%22%2C%22use%22%3A%22A%22%7D%5D%7D%2C%7B%22name%22%3A%22MPType%22%2C%22value%22%3A%5B%7B%22display%22%3A%22SRMP%22%2C%22use%22%3A%22SRMP%22%7D%5D%7D%2C%7B%22name%22%3A%22Leg%22%2C%22value%22%3A%5B%7B%22display%22%3A%22State%20Route%22%2C%22use%22%3A%22State%20Route%22%7D%5D%7D%2C%7B%22name%22%3A%22Begin%20AB%22%2C%22value%22%3A%5B%7B%22display%22%3A%22A%22%2C%22use%22%3A%22A%22%7D%5D%7D%2C%7B%22name%22%3A%22SRID%22%2C%22value%22%3A%5B%7B%22display%22%3A%22%28Use%20only%20SR%20Number%29%22%2C%22use%22%3A%22000%22%7D%5D%7D%5D) |
|  |  |  |  |  |  |  |
| **Brief Project Description** |  |
| **Important Project History or Background**  | Permanent Injunction Regarding Culvert Correction No. C70-9213 sub proceeding 01-1 (culverts) issued by Ricardo Martinez on March 29, 2013 in the US District Court. The culvert is identified as WDFW Site ID 000000. |
| **Future and Related Projects** |  |
| **Major Environmental Considerations** | *If an Environmental Review Summary is available, summarize the highlights here. If not, conduct a GIS review of the project area to evaluate the following:* *▪ Chronic Environmental Deficiencies ▪ Climate vulnerability**▪ Fish passage barriers ▪ Habitat connectivity**▪ Historic bridges ▪ Noise walls**▪ Stormwater retrofits ▪ Wetland mitigation sites* *▪ Community/social mitigation**▪ Other considerations: Are any streams, wetlands, water bodies, or other critical areas present that could be impacted?* *IMPORTANT: Verify information with the Region Environmental Office. Seek ESO assistance if needed.* |

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| **Section 1) Project Needs** |
| **Baseline Needs (BN)** |
| **BN1: Fish Passage**Background: *The existing culvert has been identified as a barrier to fish.* Metric: Fish passage water crossingTarget: Allow fish to move freely at all flows when fish are expected to move |
| **BN#: TITLE**Background: *Write a short paragraph providing the background behind why this is a baseline need for the project. Make sure you address what are the contributing factors to this baseline need.* Metric: *What are you going to measure? This needs to be a simple statement or a few words.* Target: *What is the project’s target for the above metric? Keep this simple.* |
| **Complete Streets Needs**  |
| **Does Complete Streets apply to the project?** [ ]  **No**  [ ]  **Yes***Refer to the Complete Streets Project Screening Worksheet. If the result of the worksheet was a complete streets analysis was required, then check Yes and provide highlights of the Project Screening Worksheet in this box. Leave the remainder of the Complete Streets Model Process for Sections 2 and 4 of the BOD. If Complete Streets is not applicable, check “no” and insert a statement as to why and delete the next two rows of this BOD. If the Complete Streets Model Process results in a “no” that involved a determination by the Regional Administrator (see* [*PDM #22-03*](https://wsdot.wa.gov/engineering-standards/all-manuals-and-standards/project-delivery-memos)*), summarize the decision here and have the Regional Administrator sign in the “Region Approver” box on the signature sheet of this BOD (Page 1).* |
| **Complete Streets for Pedestrians** *Delete this cell if you are not a Complete Street project.*Background:  *Write a short paragraph providing the background behind complete streets for pedestrians.* Metric: Pedestrian Level of Traffic Stress (PLTS)Target: *2 or better* |
| **Complete Streets for Bicyclists** *Delete this cell if you are not a Complete Street project.*Background:  *Write a short paragraph providing the background behind complete streets for bicyclist. Delete this cell if you are not a Complete Street project.* Metric: Bicycle Level of Traffic Stress (BLTS)Target: *2 or better* |
| **Contextual Needs (CN)** |
| **CN1: Maintenance Clearance**Background: Vertical clearance within/under water crossing structures beyond the 100 Design Year Freeboard for maintenance and inspection purposes. The contributing factors are periodic monitoring for fish passage, maintenance/modification, and Federal mandate for biyearly structural integrity inspections.Metric: Vertical ClearanceTarget: 6-feet measured from the highest ground elevation within the horizonal limits of the Hydraulic Width to the Controlling Top Elevation (CTE)  |
| **CN#: TITLE** *… add CN2, CN3 etc. The contextual need below is an example from other fish passage projects. Each project should consider the context and include as appropriate. Reference other documents when possible. If there are no additional contextual needs, delete this row.***Examples:*****CN2 - Wildlife Connectivity (In High Priority Locations determined by ESO)***Background:  *Write a short paragraph providing the background behind why this is a contextual need for the project. Make sure you address what are the contributing factors to this contextual need.* Metric:  *What are you going to measure? This needs to be a simple statement or a few words.*Examples:CN2 – Openness Factor Target: *What is the project’s target for the above metric? Keep this simple.*Examples:CN2 – See Wildlife Connectivity Priority Location memo |
| **Safety Analysis** |
| Was a Safety Analysis performed [ ]  No [ ]  Yes *If YES, enter the title and date. If NO enter why it was not needed. See DM Chapter 321 and the Safety Analysis Guide.* |
| **Existing Variance**  |
| Are there existing Design Variances within the Project Limits? [ ]  No [ ]  Yes If YES, can this project correct any of the existing design variances? *Request a list of known variances from your ASDE. Go through this list and see if you have an opportunity to correct or change the elements associated with the design variance.*  |

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| **Section 2) Context** |
| **Roadway \_\_\_\_\_\_ MP \_\_\_\_\_ to MP \_\_\_\_\_***[Duplicate this section as necessary to reflect distinct segments with different context]* |
| **Multidisciplinary Team Members** | *List the agencies, community stakeholders, and divisions involved in determining the context for this project. Include the partners from Step 3 of the Complete Streets Model Process.*For transportation context:* WSDOT HQ Active Transportation, OR Traffic, OR Planning
* Peninsula Regional Transportation Planning Organization
* Mason County and Pierce County

For environmental context:* WDFW
* Squaxin Island Tribe
* Puyallup Tribe of Indians
* WSDOT HQ Hydraulics, OR Environmental and Hydraulic Services
 |
| **Community Engagement** | *Describe past and planned community engagement.* *For Complete Streets projects, seek feedback from the affected community (as part of normal M3 coordination) on preliminary concepts developed by the predesign team. Incorporate M3 and community feedback as appropriate.* *Provide a summary here of how that feedback influenced the final alternatives documented in Section 4.* |
| **Freeway** | [ ]  Rural [ ]  Urban | [ ]  Interstate [ ]  Non-Interstate |
| **Non-Freeway** | Existing | [ ]  Rural [ ]  Suburban [ ]  Urban [ ]  Urban Core *See DM Chapter 1102.02(1)* |
| Future | [ ]  Rural [ ]  Suburban [ ]  Urban [ ]  Urban Core |
| **Bicycles – Complete Street?** [ ]  **No** [ ]  **Yes** *If you are a Complete Street, select “Yes” and skip this section.* |
| Accommodation | Prohibited | Low  | Med  | High | Involve Multidisciplinary Team Members |
| Current | [ ]  | [ ]  | [ ]  | [ ]  |
| Future | [ ]  | [ ]  | [ ]  | [ ]  |
| Comments | *Describe any special design considerations that apply. If this is a complete street project, state “This project has been identified as a complete street and bicycle accommodation is taken into consideration in Sections 1 and 4 of the BOD.”* |
| **Pedestrians – Complete Street?** [ ]  **No** [ ]  **Yes** *If you are a Complete Street, select “Yes” and skip this section.* |
| Accommodation | Prohibited | Low | Med | High  | Involve Multidisciplinary Team Members |
| Current | [ ]  | [ ]  | [ ]  | [ ]  |
| Future | [ ]  | [ ]  | [ ]  | [ ]  |
| Comments | *Describe any special design considerations that apply here. If this is a complete street project, state “This project has been identified as a complete street and pedestrian accommodation is taken into consideration in Sections 1 and 4 of the BOD.”* |
| **Freight** |
| Classification | T-1 | T-2 | T-3 | T-4 | T-5 | See [Truck Freight Classification](https://wsdot.maps.arcgis.com/home/item.html?id=0e37044a459244d9b6414826b46e8c46) |
| Current | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Future | [ ]  | [ ]  | [ ]  | [ ]  | [ ]  |
| Comments | *Coordinate with Multidisciplinary Team Members. Describe any special design considerations that apply here. If the project will be a complete street, confirm that freight is accommodated during alternatives development.*  |
| **Transit** |
| Fixed route type | None | Local | Limited Stops | Express | Transit Agencies |
| *Current* | [ ]  | [ ]  | [ ]  | [ ]  | *List all transit agencies that operate within the project limits.* |
| *Future* | [ ]  | [ ]  | [ ]  | [ ]  |
| *Comments* | *See DM 1102.03(5). Coordinate with Multidisciplinary Team, describe special design considerations. If the project will be a complete street, confirm that transit vehicles and riders are accommodated during alternatives development.* |

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| **Section 3) Design Controls** |
| **Roadway \_\_\_\_\_\_ MP \_\_\_\_\_ to MP \_\_\_\_\_***[Duplicate this section as necessary to align with the Context described in Section 2]* |
| **Design Year** | *Design year and how it was determined (see DM 1103.02).* |
| **Design Vehicle** | *Describe the intersection design vehicles for all intersections that will be modified by the project. State the Design Vehicle for each leg of the intersection (see DM 1103.03(4)).**Describe the mainline design vehicle used for determining lane widths.* *See DM 1310.02(5) for more information about accommodating vs. designing for vehicles.* |
| **Terrain** |  [ ]  **Level** [ ]  **Rolling**  [ ]  **Mountainous** *See*[*WSDOT State Highway Log*](https://www.wsdot.wa.gov/mapsdata/roadway/statehighwaylog.htm) |
| **Access Control**  | **Existing** | No change. |
| **Planned** | No change. |
| **Proposed** | No change. |
| **Target Speed** | *Typically, this is posted speed for fish passage projects because they are spot locations. Use a Target Speed approach (see DM 1103.05) when a project might impact a corridor or has larger project limits.* |

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| **Section 4) Alternatives** |
| **Alternatives Comparison Table** |

Legend:

ഠ = Worst

◔ = Worse

◑ = Average

◕ = Better

⬤ = Best

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Alternative ID | Description |  | Cost | Operations | Safety | ↓ Baseline Needs ↓ | BN1: Fish Passage | BN#: Name(Add columns for more BNs) | ↓ Complete Streets Needs ↓ | Pedestrian LTS | Bicycle LTS | Route Directness Index | ↓ Contextual Needs ↓ | CN1: Maintenance Clearance | CN#: Name (Add columns for more CNs) | ↓ Other Impacts ↓ | Other Impacts | Other Impacts |
| A |  |  | Rate | Rate | Rate | Rate | Rate | LTS | LTS | Rate | Rate | Rate | Rate | Rate |
| B |  |  | Rate | Rate | Rate | Rate | Rate | LTS | LTS | Rate | Rate | Rate | Rate | Rate |
| C |  |  | Rate | Rate | Rate | Rate | Rate | LTS | LTS | Rate | Rate | Rate | Rate | Rate |
| D |  |  | Rate | Rate | Rate | Rate | Rate | LTS | LTS | Rate | Rate | Rate | Rate | Rate |
| E |  |  | Rate | Rate | Rate | Rate | Rate | LTS | LTS | Rate | Rate | Rate | Rate | Rate |

Add or delete columns as necessary.

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| **Cost Summary:***Discuss how cost influenced the decision to choose your preferred alternative. We don’t want a precise cost at this point. It is more important to have a general understanding of your cost in comparison to the other alternatives at this point in your project.***Operations:***Discuss how the roadway will operate with respect to different alternatives. This is vehicle operations, bicycle and pedestrian operation is reflected in the LTS captured in the Complete Streets section.***Safety:***Discuss safety performance with respect to different alternatives. This is vehicle safety, bicycle and pedestrian safety is reflected in the LTS captured in the Complete Streets section.***Baseline Need Summary:***Give a summary of how the preferred alternative met or did not meet BN1. Reference the Preliminary Hydraulics Report (PHD) and indicate how the preferred alternative met the requirements of the PHD. If there are additional BNs, add a column for each additional BN and address how the preferred alternative met the need.***Complete Streets Need Summary:***If this is not a complete streets project, then select “N/A” in the columns above and do nothing else. The reason for selecting “N/A” should be given in Section 1 of this BOD. Otherwise, for those projects that are complete streets, fill in the columns above and give a summary here on how your project addressed complete streets. The columns with black text are the minimum columns to consider. Other columns may be added as necessary.* \* If vehicle capacity or speed is reduced, otherwise delete this column.**Contextual Need Summary:***Give a summary of how the preferred alternative addressed CN1 (Maintenance Clearance). If additional CNs were defined, then add a column for each additional CN.***Other Impacts Summary:***Provide a summary of how “Other Impacts” helped select the preferred alternative.* *Let’s take a moment to explain the difference between a need and an impact. A need is a purpose of a project; why you are there. An example of a need is to preserve the pavement, improve safety, provide multimodal connectivity, or address a fish barrier. An impact is how your project affects the project location, or a result of the project. For example, you are considering alternatives of a roundabout and a signal. Both will have different affects on the project location and you may affect right of way, maintenance cost, stormwater, wetlands, and utilities. The project need might have been to improve safety, but both the signal and the roundabout affect the project location in different ways … they have different impacts. These impacts may have a bearing on selecting the preferred alternative and they can be shown in this Alternatives Comparison Table as “Other Impacts”.* **Preferred Alternative *\_\_\_\_* was selected because:** *Write a short paragraph on why you selected the preferred alternative. You may reference other documents that may have more detail, such as the PHD or Intersection Control Evaluation (ICE).* |

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| **Section 5) Design Elements Changed** |
| *For each design element below, identify the design elements that will have dimensions changed in the* ***preferred alternative*** *for each alignment or location. You can group alignments into a single location if desired. You may need to add or delete columns.* |
| **Design Element** | Alignment #1 | Alignment #2 | Alignment #3 | Alignment #4 | Alignment #5 | Alignment #6 |
| 1. **Lane**
 |  |  |  |  |  |  |
| 1. **Median / Buffer**
 |  |  |  |  |  |  |
| 1. **Shoulder**
 |  |  |  |  |  |  |
| 1. **Streetside / Roadside Zone**
 |  |  |  |  |  |  |
| 1. **Pedestrian Facility**
 |  |  |  |  |  |  |
| 1. **Bicycle Facility**
 |  |  |  |  |  |  |
| 1. **Bridges and Buried Structures**
 |  |  |  |  |  |  |
| 1. **Horizontal Alignment**
 |  |  |  |  |  |  |
| 1. **Vertical Alignment**
 |  |  |  |  |  |  |
| 1. **Cross Slope**
 |  |  |  |  |  |  |
| 1. **Side Slope**
 |  |  |  |  |  |  |
| 1. **Clear Zone**
 |  |  |  |  |  |  |
| 1. **Barrier, Guardrail & Rumble Strips**
 |  |  |  |  |  |  |
| 1. **Signals, Illumination, and ITS**
 |  |  |  |  |  |  |
| 1. **Signing and Delineation**
 |  |  |  |  |  |  |
| 1. **On/Off Connections**
 |  |  |  |  |  |  |
| 1. **Intersection / Ramp Terminal**
 |  |  |  |  |  |  |
| 1. **Road Approaches**
 |  |  |  |  |  |  |
| 1. **Roundabout**
 |  |  |  |  |  |  |
| 1. **Access Control**
 |  |  |  |  |  |  |