National Forest Foundation

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Missoula, Montana 59804
TEL 406.542.2805
nationalforests.org

Request for Proposals
Trillium Lake Boardwalk Reconstruction
Mt. Hood National Forest, Oregon

Background and Statement of Work: The National Forest Foundation, in partnership with the Mt. Hood National Forest, seeks proposals for construction services to rebuild 2 segments of boardwalk along the Trillium Lake Loop Trail (#761). The original boardwalks have deteriorated over time. In 2022-2023, 7 segments of boardwalk, through areas with the most standing water, were reconstructed. The selected contractor for this project will construct the remaining 2 segments of boardwalk, totaling 425 feet. Construction of the boardwalk will adhere to Forest Service approved designs, Trails Accessibility Guidelines, and agency Standard Trail Plans and Specifications.

Information Requested

If interested in submitting a bid for this project, please provide a proposal for the above statement of work by providing:

- technical approach
- work experience
- cost
- capacity for this project
- experience in similar projects

Specific requirements are detailed below.

I. PROJECT OVERVIEW AND REQUIREMENTS

General Specifications

(a) Description of Work – This Request for Proposals is for restoration services related to Trillium Lake Boardwalk Reconstruction, including the following:

1. Procurement of all materials for boardwalk construction, including curb, decking, stringers and fasteners as specified in approved design.
2. Construction of boardwalk Segment VIII (264 linear feet).
3. Construction of boardwalk Segment IX (161 linear feet).
4. Disposal of all construction related debris.

The Contractor shall identify what they can supply in terms of materials, labor, equipment, supplies, supervision, quality control, and incidentals required to complete the work described. The Contractor shall perform all work in a safe and conscientious manner.

(b) Project Location – Trillium Lake is located on the Zigzag Ranger District of the Mt. Hood National Forest, in Clackamas County, Oregon. The segments of boardwalk are on the northeast side of the lake. Actual perimeter and staging area shall be defined by Forest Service representatives.

(c) Work Schedule – Construction is possible at any time when the site is clear from snow, typically from late May or early June through November.

Other Project Requirements and Specifications

(a) Utilities – There is no running water, electrical or housing services available. The Contractor shall coordinate with the Forest Service on approved locations for camping and staging of materials. The Contractor shall make its own arrangements for any other temporary facilities if needed.

(b) Specifications – Project work shall be accomplished in accordance with the following:

- **Appendix A** – Trail Construction Plans for Trillium Lake Boardwalk Reconstruction. *These plans were produced for the reconstruction of all 9 segments of boardwalk. This RFP and subsequent contract is only for the reconstruction of segments VIII & IX. The plans have been noted with red text to indicate which pages are relevant to this RFP.*
    - *A field change was approved during the construction of the first phase of new boardwalk. Curbs and guardrails were built continuously, with no gaps and no chamfers. Contractor should build curbs and guardrails on segments VIII & IX to match what was constructed on the other new segments.*
- **Appendix B** – Standard Specifications for the Trillium Lake Trail Boardwalk Reconstruction Project
- **Appendix C** – Structural Calculations
- **Appendix D** – Federal Flowdown Provisions

Insurance Requirements

Upon selection of the winning bid, the Contractor agrees that it has and shall maintain the following insurance coverage indicated below. The effective date of all coverage shall precede the start of any work.

a. State minimum workers' compensation insurance coverage for its employees, if any.

b. Broad form general liability, property damage, and automotive liability insurance in the minimum amount of $1,000,000 for bodily injury, death, or damage to property of any person and $2,000,000 for bodily injury, death, or damage to property of more than one person. The Contractor shall name NFF an Additional Named Insured and provide NFF with a certificate of insurance evidencing such coverages, prior to the initiation of the Scope of Services.

c. If the Scope of Services includes professional services as identified herein,

Contractor shall also provide professional errors and omissions liability insurance. Professional services for purposes of this section include, but are not limited to performing architecture, engineering, landscape architecture, land surveying or planning, preparation and signing or stamping of drawings, maps, surveys or construction specifications, or design and development of computer software, programs or websites by the Contractor or by subcontractors on behalf of the Contractor, for which professional liability insurance would typically be required. The minimum coverage limits required are $1,000,000 for each claim and $1,000,000 annual aggregate.

Prohibited Telecommunications Services and Equipment

If required, the Contractor is responsible for compliance with the prohibition on certain telecommunications and video surveillance services or equipment identified in 2 CFR 200.216.

Payment/Performance Security

Contractor shall post cash, a letter of credit, bond, or other financial security that is easily convertible into cash in a form acceptable to the NFF, in its sole determination, to assure completion of the work required under any subsequent agreement and payment of all amounts lawfully due to all persons supplying or furnishing to the Contractor or Contractor's subcontractors with labor, laborers, materials, rental machinery, tools or equipment used or to perform the work. Contractor may incorporate required associated costs into mobilization costs or other approved expenses.

a. Work that is classified as construction in accordance with the Miller Act or Little Miller Act or if required per conditions of the funding source, payment and performance bonding will be required in the full amount of any Agreement. For the purposes of this Request for Proposal, construction is defined as "any contract greater than $100,000 for the construction, alteration, or repair of any public building or public work where the federal government is the owner", or

b. If Contractor is not self-performing at least 85% of the total contract value or if the cost of materials is in excess of the larger of $100,000 or 50% of the contract total, payment and performance bonding will be required in the full amount of the agreement, or

c. If the value of the agreement is in excess of $250,000, Contractor will be required to post financial security in a form acceptable to the NFF in the amount of 5% of the total agreement value up to $250,000 in total financial security.

Federal Exclusion Verification

The selected Contractor will be required to affirm that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

Federal Flowdown Provisions

Flowdown Requirements: Any Agreement associated with this RFP may be subject to flowdown requirements under associated federal or state funding agreements, which are included and made part of by this reference.

II. REQUIRED COMPONENTS

Technical Proposal

Please provide a detailed technical approach to the work.

Contractor Qualifications

(a) Past Experience – Please provide a brief explanation of previous work experience with land management agencies.

(b) References – Please provide three professional references that can speak to past performance.

Pricing Schedule

Contractor shall price work according to the schedule below. Prevailing wages are required per conditions of funding sources.

	Task/Item	Units	Quantity	Unit Cost	Extended Cost
(a)	Mobilization	LS	1		
(b)	Construction of boardwalk segment VIII (264 linear feet)	LS	1		
(c)	Construction of boardwalk segment IX (161 linear feet)	LS	1		
(d)	Materials	LS	1		
(e)	Disposal of all construction debris	LS	1		
				Total Bid	

III. SUBMISSION, EVALUATION, AND CONTACTS

Contractor Selection Process

This is a request for proposals only and bids furnished are not offers from the National Forest Foundation. This request does not commit the National Forest Foundation to pay any costs incurred in the preparation or submission of the proposal or to contract for supplies or services.

The NFF will use the Evaluation Factors below to review each submitted bid. Based on the outcomes of that selection process, the NFF will notify successful and unsuccessful bidders by November 20, 2024 and will prepare a separate contract document.

Evaluation Factors and Relative Importance

The following criteria will be used in the evaluation of submitted proposals, ordered from highest weighting (level 3) to lowest weighting (level 1).

Level 3 Criteria
- Price / cost
- Equipment and contractor capability
- Timing of when contractor can begin and/or finish the project
- Past performance, references, and USFS feedback

Level 2 Criteria
- Technical proposal / proposed approach to project
- Overall strategic benefits to meeting NFF goals and grant needs, requirements, and timelines

Level 1 Criteria
- Benefits to the local community
- Relationship to local community

Point of Contact

Please submit any questions about the project in writing to the Point of Contact.

Jeff Malik
National Forest Foundation, Oregon Recreation Projects Coordinator
jmalik@nationalforests.org

Responses will be shared with known interested parties by email or otherwise posted at https://www.nationalforests.org/rfp.

Pre-bid Meeting

The National Forest Foundation and the Forest Service will provide a virtual pre-bid meeting to answer any questions about the scope of work for the project. The meeting will be held via Microsoft Teams on November 1, 2024 at 10am Pacific Time. Click here to join the meeting.

Attendance at the Pre-bid Meeting is not required to submit a bid.

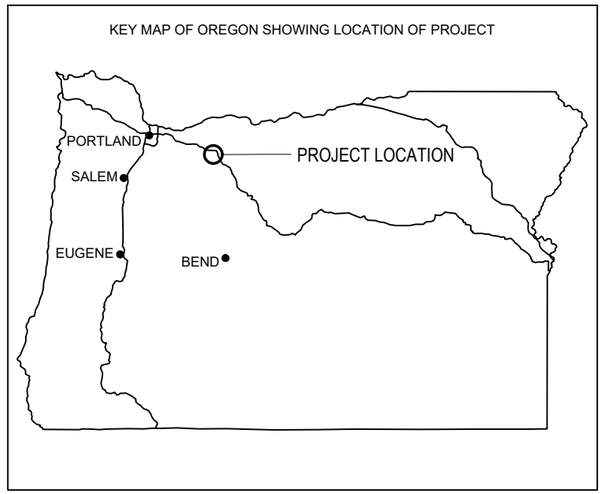
Contact jmalik@nationalforests.org if you need a call-in number or for other meeting questions.

Bid Submission

Submit bids via email to jmalik@nationalforests.org by 5PM Pacific Time on November 8, 2024.

Equal Opportunity Provider

In accordance with Federal law and U.S. Department of Agriculture policy, the National Forest Foundation is prohibited from discriminating on the basis of race, color, national origin, sex, age, religion, political beliefs, or disability.



UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

PACIFIC NW REGION

MT. HOOD NATIONAL FOREST

ZIGZAG RANGER DISTRICT

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TRAIL CONSTRUCTION PLANS FOR THE

TRILLIUM LAKE TRAIL BOARDWALK RECONSTRUCTION PROJECT

APPENDIX A

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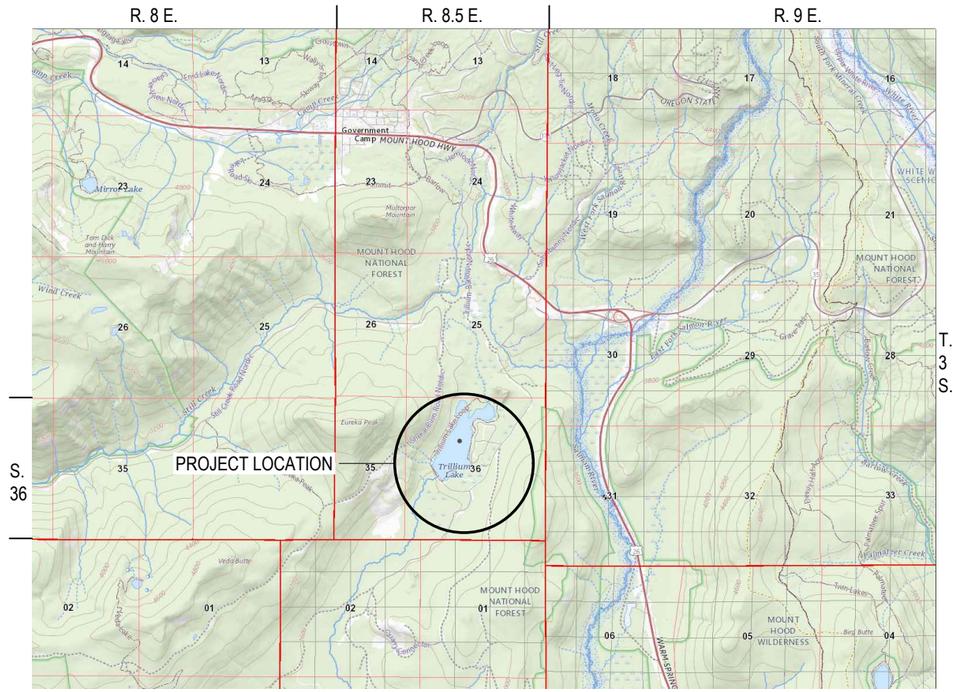
TRAVEL DIRECTIONS FROM ZIGZAG RANGER STATION 70220 US-26, RHODODENDRON, OR 97049

HEAD NORTHEAST TOWARDS US-26 E
TURN RIGHT ONTO US-26 E AND TRAVEL APPROX. 11.1 MILES
TURN RIGHT ONTO NFSR-2656 AND TRAVEL APPROX. 1.4
CONTINUE HEADING SOUTHEAST ON TRILLIUM LAKE ROAD AT THE INTERSECTION TO THE TRILLIUM LAKE CAMPGROUND APPROX. 1.1 MILES TO SECOND PROJECT ACCESS POINT
TRAVEL APPROX. 150' TO STA 0+00 OF THE PROJECT SITE.



PROJECT SITE

REVIEWED BY:

BEN WATTS — DATE

DYLAN NICOLE — DATE

RECOMMENDED BY:

PETE HUPPI, ZONE ENGINEER — DATE

JENNY LYMAN, FOREST ENGINEER — DATE

BILL WESTBROOK, DISTRICT RANGER — DATE

APPROVED BY:

META LOFTSGAARDEN, FOREST SUPERVISOR — DATE

NOT FOR CONSTRUCTION

REVISIONS:

		DATE	INITIALS
No. 1			
No. 2			
No. 3			

DESIGN:	SHAPIRO DIDWAY, LLC	3/11/2022 DATE
DRAWN:	MARIO MARTIN	3/11/2022 DATE
CHECKED:	NATE OTANI	3/11/2022 DATE

PROJECT NAME
TRILLIUM LAKE TRAIL BOARDWALK RECONSTRUCTION
TITLE SHEET

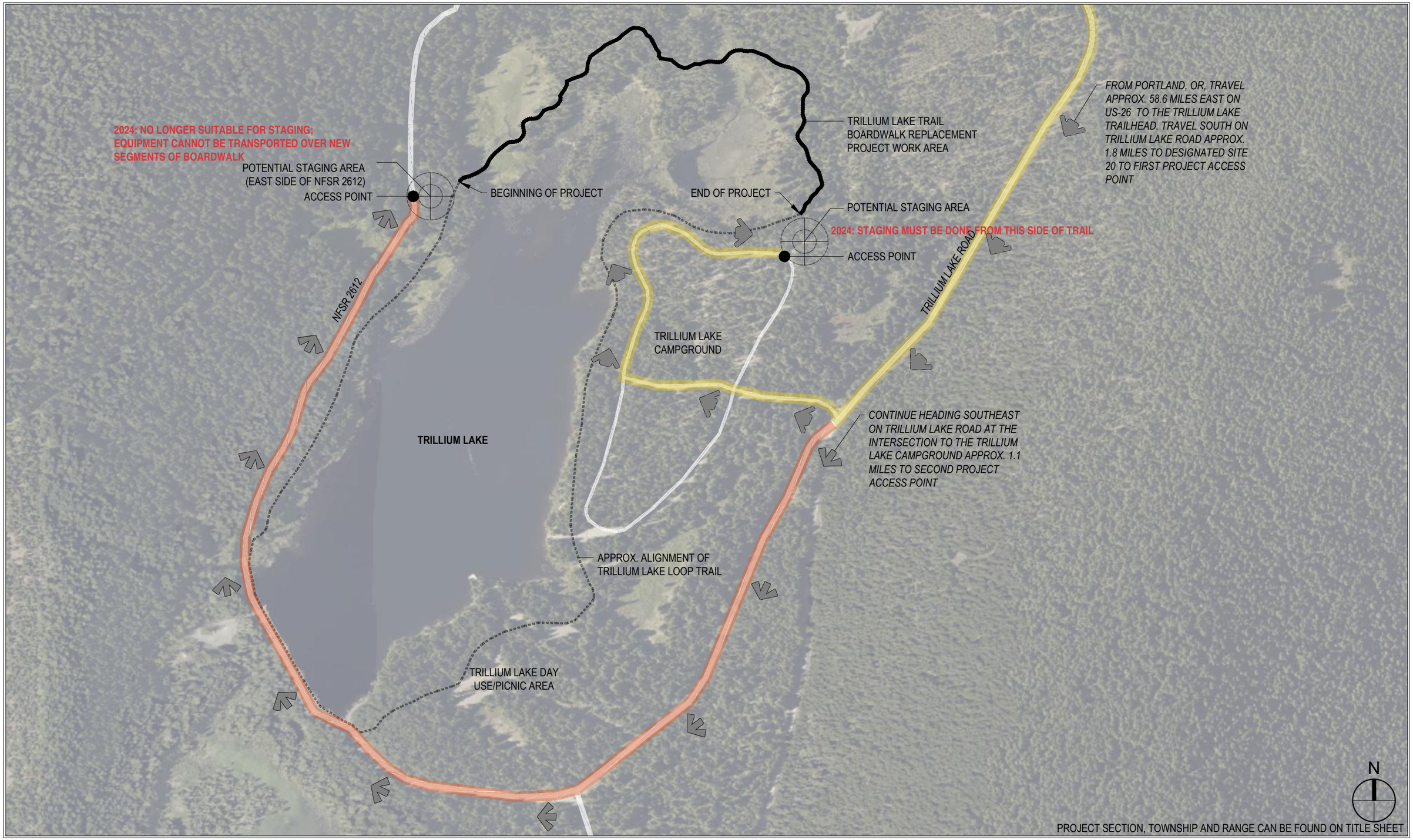
SECTION
900-GENERAL

REVISION DATE

SCALE
NO SCALE

DRAWING NO.
900-01

SHEET **1** OF **46**



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

VICINITY MAP

SECTION **900-GENERAL** **VCM**

REVISION DATE

0 200 400 ft
SCALE: 1"=400'

DRAWING NO. **900-02**

SHEET **2** OF **46**

GENERAL SITE NOTES:

A. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH:
   - USDA FOREST SERVICE STANDARD TRAIL PLANS AND SPECIFICATIONS
   - USDA FOREST SERVICE TRAIL ACCESSIBILITY GUIDELINES
   - USDA FOREST SERVICE GUIDE TO NOXIOUS WEED PREVENTION PRACTICES
   - USDA FOREST SERVICE NATION BEST MANAGEMENT PRACTICES FOR WATER QUALITY MANAGEMENT ON NATIONAL FOREST SYSTEM LANDS
   - ARCHITECTURAL BARRIERS ACT STANDARDS
   - AMERICANS WITH DISABILITIES ACT (ADA) STANDARDS

B. AREA OF DISTURBANCE SHALL NOT EXTEND MORE THAN 10-FEET BEYOND EACH SIDE OF TRAIL CENTERLINE.

C. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL UNDERGROUND UTILITIES WITHIN THE PROJECT LIMITS.

D. CONTRACTOR RESPONSIBLE TO PROVIDE SUBCONTRACTORS THE NECESSARY INFORMATION APPLICABLE TO COMPLETE THEIR AREA OF WORK.

E. CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING ALL INSPECTION CRITERIA AND SCHEDULES AS AGREED UPON BY THE CONTRACTING OFFICER (CO).

F. CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE CO OF APPARENT ERRORS, DISCREPANCIES, OR OMISSIONS FOUND IN THE DESIGN DOCUMENTS.

G. ALL QUANTITIES OF MATERIALS TO BE PURCHASED SHALL BE APPROVED BY THE CO PRIOR TO THE PURCHASE OF MATERIALS.

H. ALL COMMUNICATION REQUESTING INFORMATION, CLARIFICATION, OR DIRECTION SHALL BE IN WRITTEN FORM.

I. CONTRACTOR SHALL NOT LEAVE THE WORK AREA IN AN UNSAFE CONDITION TO THE PUBLIC WHILE NOT ON SITE. ANY UNSAFE AREAS SHALL BE CLOSED AS APPROVED BY THE CO.

J. ALL COMPLETED WORK SHALL BE CLOSED TO PUBLIC ACCESS AND DEMARCATED WITH BARRIERS AND CLOSURE SIGNAGE. ALL BARRIERS AND SIGNAGE SHALL REMAIN IN PLACE UNTIL FINAL ACCEPTANCE OF THE WORK.

K. AFTER COMPLETION OF CONSTRUCTION, ALL TRASH, DEBRIS, EXCESS MATERIAL, AND EQUIPMENT SHALL BE REMOVED PRIOR TO FINAL ACCEPTANCE OF THE WORK.

L. ALL TRACKED AND WHEELED EQUIPMENT MUST OPERATE EITHER FROM THE EXISTING TRAIL OR BOARDWALK OR FROM THE NEWLY CONSTRUCTED BOARDWALK. EQUIPMENT USED ON THE NEWLY CONSTRUCTED BOARDWALK SHALL NOT EXCEED 250 LBS/SF. CONTRACTOR TO PROVIDE CRIBBING OR OTHER METHOD TO EVENLY DISTRIBUTE CONCENTRATED WHEEL LOADS.

M. BOARDWALK SUPERSTRUCTURE MATERIALS INCLUDING HEADERS, STRINGERS, DECK, AND CURBS SHALL BE COMPRISED OF CORROSION/DECAY RESISTANT MATERIALS SUCH AS NATURALLY DECAY RESISTANT TIMBER OR TREATED TIMBER AS APPROVED BY THE CO.

N. BOARDWALK SUBSTRUCTURE ELEMENTS SHALL BE COMPRISED OF CORROSION RESISTANT MATERIALS AND CAN INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING: CASED INJECTION-BORE MICRO-PILES, HOT-DIPPED GALVANIZED STEEL, CONCRETE, STRUCTURAL SYNTHETIC PLASTIC OR EQUAL MEETING OR EXCEED THE DESIGNED STRUCTURAL REQUIREMENTS AS APPROVED BY THE CO.

O. TIMBER AND LUMBER MEMBERS WITH A PRESERVATIVE TREATMENT SHALL BE DONE IN ACCORDANCE WITH THE CURRENT SPECIFICATIONS UNDER CODE REPORT ICC - ESR3834 TRUCORE PTI TREATED WOODS. ALL TREATED WOOD SHALL HAVE AN ACCREDITED AGENCY CERTIFYING INSPECTION AND COMPLIANCE.

P. PRESERVATIVE TREATED TIMBER AND LUMBER ABOVE GROUND SHALL MEET OR EXCEED AWPA USE CATEGORY SYSTEM (U1), CATEGORY UC3B.

Q. ALL LUMBER TO USED SHALL BE DEFECT FREE WITH NO GAPS OR SPLITS GREATER THAN 1/4-INCH IN WIDTH OR DEPTH.

R. REFERENCE PROJECT GEOTECHNICAL REPORT BY GEOCONSULTANTS NORTHWEST(GCN) DATED FEBRUARY 16, 2022 (REVISED FEBRUARY 23, 2022) FOR ADDITIONAL SITE INFORMATION AND INFORMATION REGARDING DEEP FOUNDATION ELEMENTS.

S. ALL AGGREGATE SHALL BE IN ACCORDANCE WITH THE GRADING REQUIREMENTS OF TABLE 913.10.06 'GRADING A' AND SHALL MEET THE COMPACTION REQUIREMENTS OF SECTION 913.10.06(b) OF THE PROJECT SPECIFICATIONS.

T. NOTIFY CO OF ANY FIELD CHANGES TO THE SITE PLANS WHICH MAY REQUIRE ADJUSTMENT OF DESIGN.

U. EXISTING TREES AND VEGETATION TO BE PROTECTED.

V. REFERENCE PROJECT STRUCTURAL CALCULATIONS REPORT BY MILLER CONSULTING ENGINEERS (MCE) DATED FEBRUARY 23, 2022 FOR STRUCTURAL DESIGN AND INFORMATION.

W. ALL STRUCTURAL STEEL TO BE GALVANIZED. EMBEDDED SURFACES SHALL BE FREE OF CONTAMINANTS. ALL ZINC (GALV.) COATINGS ON IRON AND STEEL PRODUCTS SHALL CONFORM TO ASTM A123. REPAIRS OF GALVANIZED COATINGS ARE TO CONFORM TO ASTM A780.

X. ALL STRUCTURAL AND MISCELLANEOUS STEEL SHALL CONFORM TO THE FOLLOWING MATERIAL STANDARDS:
ANGLES - ASTM A36, FY = 36 KSI PIPE - A53, GRADE B, TYPE E OR S, FY = 35 KSI

Y. STRUCTURAL STEEL WELDING - ALL WELDING SHALL CONFORM TO AMERICAN WELDING SOCIETY (AWS) D1.1 USING E70XX ELECTRODES. WELDING SHALL BE PERFORMED BY WELDERS CERTIFIED BY AWS FOR THE WELD TYPES SPECIFIED. WELD LENGTHS SHOWN ARE EFFECTIVE AS SPECIFIED PER THE SPECIFICATIONS OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC). WHERE WELD LENGTHS ARE NOT SHOWN, THE WELD SHALL BE FULL LENGTH OF MEMBERS BEING JOINED. FIELD WELDING SYMBOLS HAVE NOT NECESSARILY BEEN INDICATED ON THE DRAWINGS. WHERE SHOWN, PROPER FIELD WELDING PER AWS D1.1 SHALL BE USED. WHERE NO FIELD WELDING SYMBOLS ARE SHOWN, IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE USE OF SHOP AND FIELD WELDS.

Z. ALL PREFABRICATED METAL TIMBER CONNECTORS AND HANGERS SHALL BE FULLY BOLTED AND/OR NAILED AS INDICATED BY MANUFACTURER, UNLESS NOTED OTHERWISE. ALL CONNECTORS, HANGERS AND FASTENERS SHALL BE STAINLESS STEEL SIMPSON PREFABRICATED METAL TIMBER CONNECTORS NOTED. ALTERNATE CONNECTORS MAY ONLY BE USED WITH PRIOR APPROVAL BY THE ENGINEER OF RECORD.

SURVEY REFERENCE NOTE:

A. SITE SURVEY WAS PREPARED BY S&F LAND SERVICES, ALL LAYOUT INFORMATION AND GRADES SHOWN ON THE DRAWINGS ARE BASED UPON THE DATUM ESTABLISHED BY THE SURVEYOR. SHAPIRO DIDWAY ASSUMES NO RESPONSIBILITY FOR ACCURACY OF SURVEYED CONDITIONS AS SHOWN. SURVEY INFORMATION IS PROVIDED FOR REFERENCE ONLY. NOT ALL SURVEYED SPOT ELEVATION ARE SHOWN.

GRADING NOTES:

A. VERIFY ACCURACY OF EXISTING GRADES AND INTERPOLATED ELEVATIONS PRIOR TO BEGINNING WORK. NOTIFY CO OF ANY DISCREPANCY PRIOR TO BEGINNING WORK.

B. DRAWINGS INDICATE GENERAL REQUIREMENTS FOR TYPE SIZE LOCATION AND GENERAL DIMENSIONS OF IMPROVEMENTS.

C. ADJUSTMENTS TO CENTERLINES AND GRADES MAY BE MADE TO ACCOMMODATE THE DESIGN AS AGREED UPON BY THE CO.

D. PROTECT ALL TREES WITHIN 10-FEET OF EACH SIDE OF TRAIL CENTERLINE.

E. ALL PROPOSED GRADES ARE TO MEET AND BLEND IN WITH EXISTING GRADING.

F. "ROUND OFF" ALL SHARP RIDGES EXISTING WITHIN LIMIT OF WORK WHETHER OR NOT SUCH CONDITIONS ARE INDICATED ON PLANS.

G. ALL NEWLY CONSTRUCTED TRAIL APPROACHES AND TRANSITION ZONES SHALL HAVE SMOOTH AND CONTINUOUS ELEVATION CHANGES TO MEET ADA STANDARDS.

H. NEWLY CONSTRUCTED BOARDWALK WALKING SURFACE ELEVATION SHALL NOT EXCEED 30" ABOVE FINISHED GRADE.

STAGING NOTES:

A. STAGING AREAS ARE AVAILABLE ALONG THE TRILLIUM LAKE NATIONAL FOREST SYSTEM ROAD (NFSR) 2612. ACTUAL LOCATION AND PERIMETER OF STAGING AREA SHALL BE DEFINED BY THE CONTRACTOR AND AGREED UPON BY THE CO.

B. CONTRACTOR SHALL INSTALL STAGING AND TRAIL CLOSURE BARRIERS AND SIGNAGE AT STAGING LOCATIONS AND BOTH ENDS OF THE BOARDWALK REPLACEMENT PROJECT. ALL BARRIERS AND SIGNAGE SHALL REMAIN IN PLACE UNTIL FINAL ACCEPTANCE OF THE WORK.

C. All STAGING AND STORAGE SITES SHALL BE REHABILITATED TO PRE-PROJECT CONDITION PRIOR TO FINAL ACCEPTANCE OF THE WORK.

D. STAGING AREA PERIMETER(S) SHALL BE DEFINED BY TEMPORARY PLASTIC FENCING FASTENED TO STEEL T-POSTS. FENCING SHALL BE 48" TALL WITH T-POSTS INSTALLED TO A DEPTH OF 1/3 OF THE TOTAL POST HEIGHT AT A SPACING NO GREATER THAN 10-FEET ON CENTER.

EROSION CONTROL NOTES:

A. CONTRACTOR IS RESPONSIBLE FOR PROVIDING EFFECTIVE EROSION CONTROL MEASURES THROUGHOUT THE DURATION OF THE PROJECT, THAT MEETS THE TECHNICAL GUIDELINES AND REQUIREMENTS OF THE USDA FOREST SERVICE.

B. SEDIMENT LADEN WATER SHALL NOT LEAVE THE WORK SITE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO USE ALL MEANS AVAILABLE TO ACHIEVE THIS RESULT.

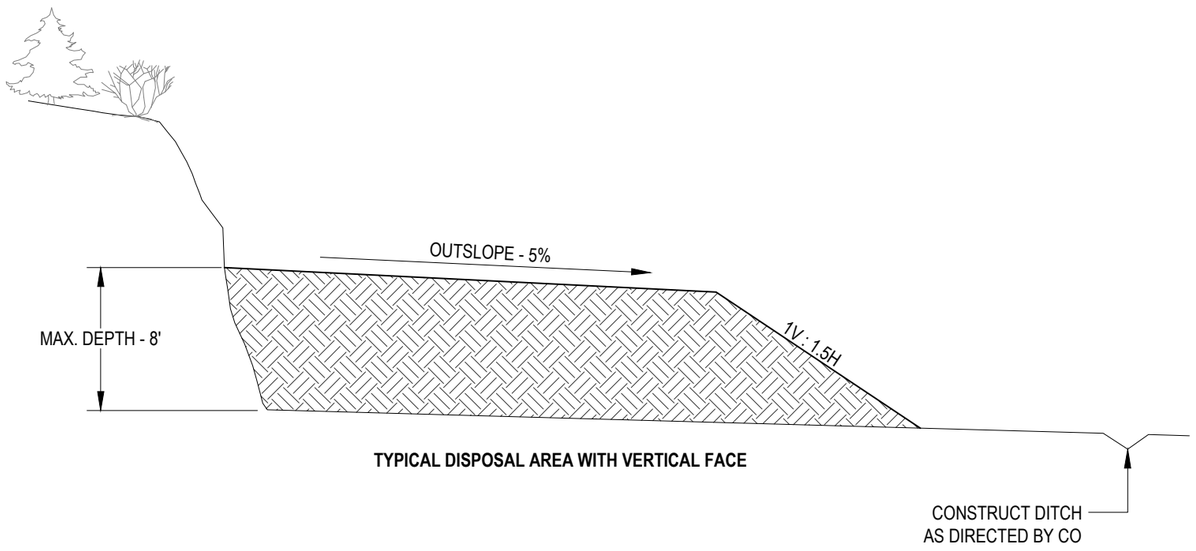
C. TEMPORARY EROSION CONTROL MEASURES SHALL REMAIN FUNCTIONAL AND IN PLACE UNTIL ALL PROJECT WORK IS COMPLETE. TEMPORARY EROSION CONTROL MEASURES SHALL BE REMOVED PRIOR TO FINAL ACCEPTANCE.

D. CONTRACTOR SHALL RESTORE ALL AREAS DISTURBED BY REMOVAL OF TEMPORARY EROSION CONTROL MEASURES.

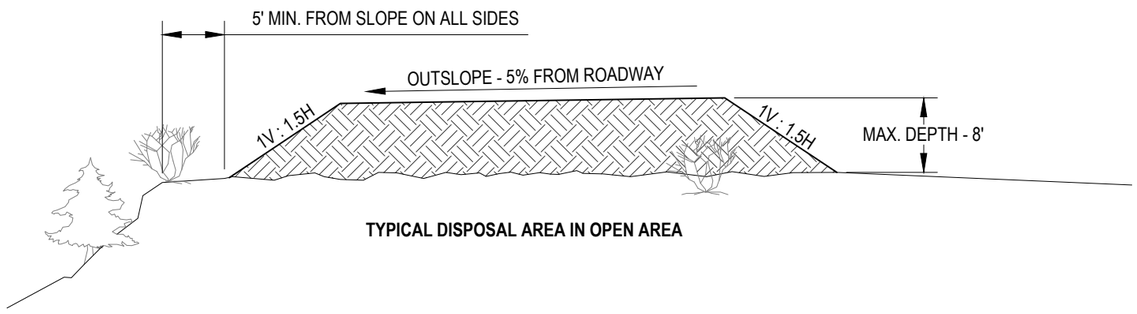
E. CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISPOSAL OF ALL REMOVED MATERIALS. MATERIALS SHALL BE DISPOSED OF OFF GOVERNMENT LANDS IN ACCORDANCE WITH LOCAL JURISDICTIONAL REQUIREMENTS.

SOURCE AND DESIGNATION NOTES

A. THE DESIGNATED WATER SOURCE SHALL BE THE SOUTH EDGE OF TRILLIUM LAKE. PROCUREMENT OF WATER FROM THE LAKE SHALL BE SUBJECT TO ALL APPLICABLE USDA FOREST SERVICE REGULATIONS AND REQUIREMENTS.
B. HAZARD TREES OF CONCERN LOCATED WITHIN THE PROJECT LIMITS SHALL BE DETERMINED AND IDENTIFIED BY THE CO PRIOR TO THE START OF CONSTRUCTION.
C. THE DESIGNATED ROCK SOURCE SHALL BE A COMMERCIAL SOURCE.
D. THE DESIGNATED WASTE SITE SHALL BE DETERMINED BY THE CO.
E. THE DESIGNATED BORROW SITE SHALL BE DETERMINED BY THE CO.
F. THE DESIGNATED DISPOSAL SITE SHALL BE DETERMINED BY THE CO. MATERIALS RESULTING FROM THE BRUSHING OR LOGGING OUT OPERATIONS IN EXCESS OF 12 INCHES IN LENGTH OR 3 INCHES IN DIAMETER ARE NOT ALLOWED TO REMAIN WITHIN THE BRUSHING LIMITS, IN DITCHES, OR WITHIN WATER COURSES. DISPOSE OF MATERIALS ACCORDING TO USDA FOREST SERVICE REQUIREMENTS.
G. DISPOSAL AREA SHALL BE FLAGGED BY THE CO PRIOR TO CONSTRUCTION.
H. DISPOSAL OF ALL WATER AND SPOILS FROM DRILLING OPERATIONS SHALL BE AT THE DESIGNATED DISPOSAL SITE.
I. WASTE AREA IS LESS THAN 5 MILES FROM THE PROJECT ON FOREST SERVICE ROADS.
J. SEE BELOW FOR additional DISPOSAL REQUIREMENTS:



TYPICAL DISPOSAL AREA WITH VERTICAL FACE



TYPICAL DISPOSAL AREA IN OPEN AREA

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME
GENERAL NOTES
SECTION
900-GENERAL

REVISION DATE
NO SCALE

DRAWING NO.
900-04
SHEET **4** OF **46**

2024: PHASE 3 CONSTRUCTION IS ONLY FOR SEGMENTS VIII & IX. PLEASE SUBMIT A BID ONLY FORTHOSE 2 SEGMENTS

ESTIMATE OF QUANTITIES

		BOARDWALK SEGMENT		I	II	III	IV	V	VI	VII	VIII	IX	TOTAL ESTIMATED QUANTITY
		SEGMENT LENGTH		23 (FT)	467 (FT)	24 (FT)	16 (FT)	192 (FT)	16 (FT)	48 (FT)	264 (FT)	161 (FT)	
PAY ITEM NO.	DESCRIPTION	METH OF MEAS.	UNIT OF MEAS.	STA. 00+00 TO STA. 00+22.63	STA.00+40.96 TO STA.05+07.50	STA.12+48.25 TO STA. 12+72.25	STA. 12+83.83 TO STA. 12+99.83	STA. 15+59.83 TO STA. 17+51.60	STA. 20+97.10 TO STA. 21+13.10	STA. 21+77.60 TO STA. 22+25.60	STA. 22+89.76 TO STA. 25+53.90	STA. 25+89.23 TO STA. 27+50.25	
93802 A	BACKWALL & APPROACH AT EACH END OF BOARDWALK SEGMENT ON TYPE I SUPPORTS	EA	1	0	2	0	0	2	0	0	0	0	**4**
93802 B	BOARDWALK PANELS ON TYPE I SUPPORTS	EA	1	0	53	0	0	21	0	0	0	0	**74**
93802 C	BOARDWALK OBSERVATION POINT PANELS ON TYPE I SUPPORTS	EA	1	0	4	0	0	4	0	0	0	0	**8**
93802 D	BOARDWALK TURNOUT PANELS ON TYPE I SUPPORTS	EA	1	0	4	0	0	0	0	0	0	0	**4**
93802 E	BACKWALL & APPROACH AT EACH END OF BOARDWALK SEGMENT WITH TYPE II SUPPORTS	EA	1	2	0	2	2	0	2	2	2	2	**14**
93802 F	BOARDWALK PANELS ON TYPE II SUPPORT	EA	1	3	0	3	2	0	2	6	31	19	**66**
93802 G	BOARDWALK TURNOUT PANELS ON TYPE II SUPPORT	EA	1	0	0	0	0	0	0	0	3	2	**5**

2024: THIS PAGE NOT RELEVANT TO PHASE 3

WORK LIST

TRAIL SEGMENT	BEGIN STATION	END STATION	TASK	DRAWING NO.	SPECIFICATION NO.	PAY ITEM	UNIT OF MEASURE	QUANTITY
	VERIFY IN THE FIELD (V.I.F.)	V.I.F.	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.10	93802 C	EA	1
I	V.I.F.	00+15.09	CONSTRUCT BOARDWALK PANEL E ON TYPE II SUPPORT (FORMER STA 40+60)	938-E / 938-10-02	938.10	93802 D	EA	2
I	00+15.09	00+22.63	CONSTRUCT BOARDWALK PANEL I ON TYPE II SUPPORT	938-I / 938-10-02	938.10	93802 D	EA	1
	h	V.I.F.	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.10	93802 C	EA	1
	V.I.F.	00+40.96	CONSTRUCT BACKWALL & APPROACH TYPE I	938-20-01	938.20	93802 A	EA	1
II	00+40.96	00+48.96	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	1
II	00+48.96	00+56.60	CONSTRUCT BOARDWALK PANEL H ON TYPE I SUPPORT	938-H / 938-20-02	938.20	93802 B	EA	1
II	00+56.60	00+96.60	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	5
II	00+96.60	1+04.10	CONSTRUCT BOARDWALK PANEL F ON TYPE I SUPPORT	938-F / 938-20-02	938.20	93802 B	EA	1
II	1+04.10	1+12.00	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	1
II	1+12.00	1+19.50	CONSTRUCT BOARDWALK PANEL E ON TYPE I SUPPORT	938-E / 938-20-02	938.20	93802 B	EA	1
II	1+19.50	1+34.50	CONSTRUCT BOARDWALK PANEL F ON TYPE I SUPPORT	938-F / 938-20-02	938.20	93802 B	EA	2
II	1+34.50	1+42.50	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	1
II	1+42.50	1+50.00	CONSTRUCT BOARDWALK PANEL N ON TYPE I SUPPORT	938-N / 938-20-02	938.20	93802 B	EA	1
II	1+50.00	1+58.00	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	1
II	1+58.00	1+65.63	CONSTRUCT BOARDWALK PANEL H ON TYPE I SUPPORT	938-H / 938-20-02	938.20	93802 B	EA	1
II	1+65.63	1+80.63	CONSTRUCT BOARDWALK PANEL E ON TYPE I SUPPORT	938-E / 938-20-02	938.20	93802 B	EA	2
II	1+80.63	1+88+13	CONSTRUCT BOARDWALK PANEL F ON TYPE I SUPPORT	938-F / 938-20-02	938.20	93802 B	EA	1
II	1+88+13	1+95.63	CONSTRUCT BOARDWALK PANEL Q ON TYPE I SUPPORT	938-Q / 938-20-02	938.20	93802 B	EA	1
II	1+95.63	2+03.63	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	1
II	2+03.63	2+11.38	CONSTRUCT BOARDWALK PANEL B ON TYPE I SUPPORT	938-B / 938-20-02	938.20	93802 B	EA	1
II	2+11.38	2+18.88	CONSTRUCT BOARDWALK PANEL Q ON TYPE I SUPPORT	938-Q / 938-20-02	938.20	93802 B	EA	1
II	2+18.88	2+50.88	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	4
II	2+50.88	2+58.51	CONSTRUCT BOARDWALK PANEL H ON TYPE I SUPPORT	938-H / 938-20-02	938.20	93802 B	EA	1
II	2+58.51	2+66.00	CONSTRUCT BOARDWALK PANEL E ON TYPE I SUPPORT	938-E / 938-20-02	938.20	93802 B	EA	1
II	2+66.00	2+82.00	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	2
II	2+82.00	2+89.63	CONSTRUCT BOARDWALK PANEL H ON TYPE I SUPPORT	938-H / 938-20-02	938.20	93802 B	EA	1
II	2+89.63	2+97.13	CONSTRUCT BOARDWALK PANEL P ON TYPE I SUPPORT	938-P / 938-20-02	938.20	93802 B	EA	1
II	2+97.13	3+04.38	CONSTRUCT BOARDWALK PANEL K ON TYPE I SUPPORT	938-K / 938-20-02	938.20	93802 B	EA	1
II	3+04.38	3+11.88	CONSTRUCT BOARDWALK PANEL P ON TYPE I SUPPORT	938-P / 938-20-02	938.20	93802 B	EA	1
II	3+11.88	3+19.63	CONSTRUCT BOARDWALK PANEL B ON TYPE I SUPPORT	938-B / 938-20-02	938.20	93802 B	EA	1
II	3+19.63	3+26.88	CONSTRUCT BOARDWALK PANEL L ON TYPE I SUPPORT	938-L / 938-20-02	938.20	93802 B	EA	1
II	3+26.88	3+34.63	CONSTRUCT BOARDWALK PANEL B ON TYPE I SUPPORT	938-B / 938-20-02	938.20	93802 B	EA	1
II	3+34.63	3+49.13	CONSTRUCT BOARDWALK PANEL L ON TYPE I SUPPORT	938-L / 938-20-02	938.20	93802 B	EA	2
II	3+49.13	3+65.13	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	2
II	3+65.13	3+72+63	CONSTRUCT BOARDWALK PANEL F ON TYPE I SUPPORT	938-F / 938-20-02	938.20	93802 B	EA	1

2024: THIS PAGE NOT RELEVANT TO PHASE 3

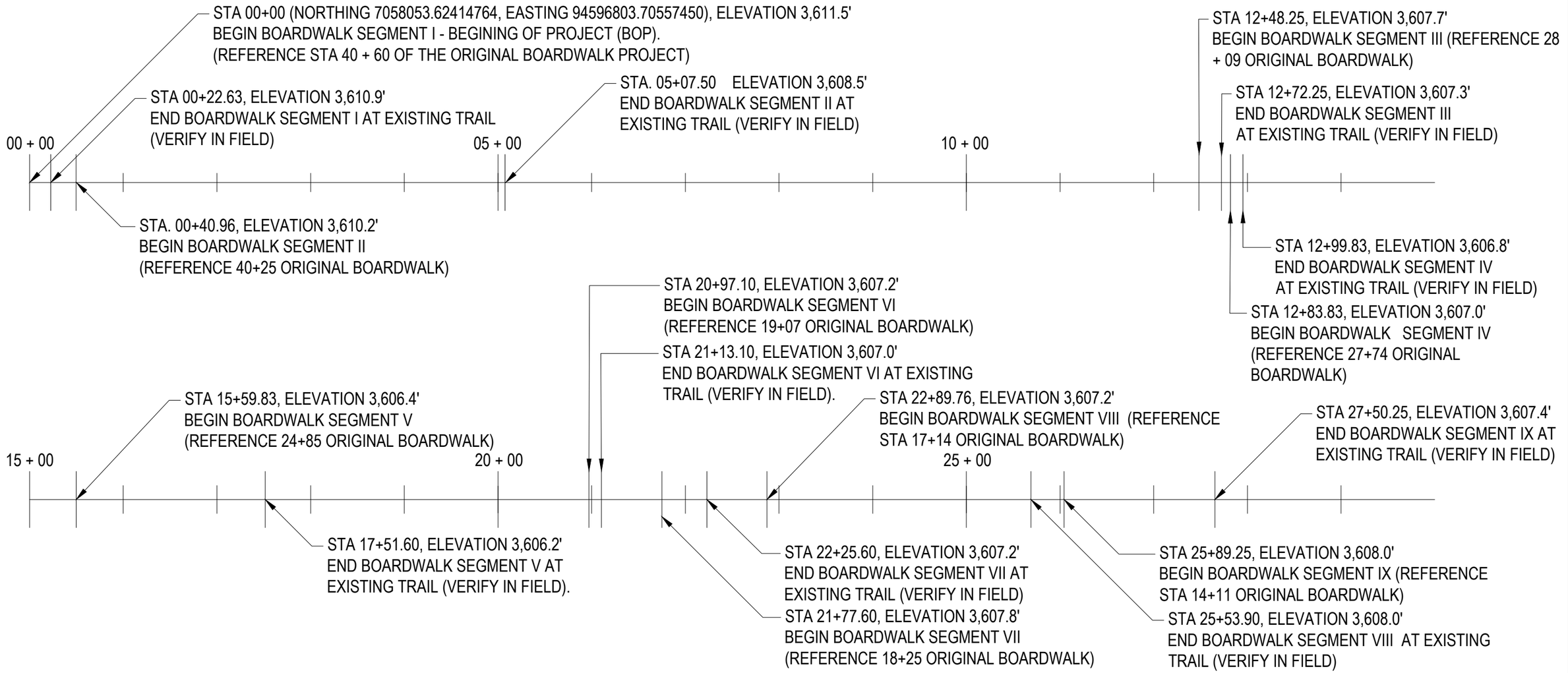
WORK LIST

TRAIL SEGMENT	BEGIN STATION	END STATION	TASK	DRAWING NO.	SPECIFICATION NO.	PAY ITEM	UNIT OF MEASURE	QUANTITY
II	3+72+63	3+79.88	CONSTRUCT BOARDWALK PANEL L ON TYPE I SUPPORT	938-L / 938-20-02	938.20	93802 B	EA	1
II	3+79.88	3+87.38	CONSTRUCT BOARDWALK PANEL N ON TYPE I SUPPORT	938-N / 938-20-02	938.20	93802 B	EA	1
II	3+87.38	4+03.38	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	2
II	4+03.38	4+11.01	CONSTRUCT BOARDWALK PANEL I ON TYPE I SUPPORT	938-I / 938-20-02	938.20	93802 B	EA	1
II	4+11.01	4+32.76	CONSTRUCT BOARDWALK PANEL K ON TYPE I SUPPORT	938-K / 938-20-02	938.20	93802 B	EA	3
II	4+32.76	4+40.26	CONSTRUCT BOARDWALK PANEL P ON TYPE I SUPPORT	938-P / 938-20-02	938.20	93802 B	EA	1
II	4+40.26	4+47.51	CONSTRUCT BOARDWALK PANEL K ON TYPE I SUPPORT	938-K / 938-20-02	938.20	93802 B	EA	1
II	4+47.51	4+55.00	CONSTRUCT BOARDWALK PANEL P ON TYPE I SUPPORT	938-P / 938-20-02	938.20	93802 B	EA	1
II	4+55.00	4+69.50	CONSTRUCT BOARDWALK PANEL K ON TYPE I SUPPORT	938-K / 938-20-02	938.20	93802 B	EA	2
II	4+69.50	4+85.00	CONSTRUCT BOARDWALK PANEL C ON TYPE I SUPPORT	938-C / 938-20-02	938.20	93802 B	EA	2
II	4+85.00	05+07.50	CONSTRUCT BOARDWALK PANEL F ON TYPE I SUPPORT	938-F / 938-20-02	938.20	93802 B	EA	3
	05+07.50	V.I.F.	CONSTRUCT BACKWALL & APPROACH TYPE I	938-20-01	938.20	93802 A	EA	1
	V.I.F.	12+48.25	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.10	93802 C	EA	1
III	12+48.25	12+72.25	CONSTRUCT BOARDWALK PANEL M ON TYPE II SUPPORT	938-M / 938-10-02	938.10	93802 D	EA	3
	12+72.25	V.I.F.	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.10	93802 C	EA	1
	V.I.F.	12+83.83	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.10	93802 C	EA	1
IV	12+83.83	12+99.83	CONSTRUCT BOARDWALK PANEL M ON TYPE II SUPPORT	938-M / 938-10-02	938.10	93802 D	EA	2
	12+99.83	V.I.F.	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.10	93802 C	EA	1
	V.I.F.	15+59.83	CONSTRUCT BACKWALL & APPROACH TYPE I	938-20-01	938.10	93802 C	EA	1
V	15+59.83	15+67.33	CONSTRUCT BOARDWALK PANEL E ON TYPE I SUPPORT	938-E / 938-20-02	938.20	93802 B	EA	1
V	15+67.33	15+75.08	CONSTRUCT BOARDWALK PANEL B ON TYPE I SUPPORT	938-B / 938-20-02	938.20	93802 B	EA	1
V	15+75.08	15+91.08	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	2
V	15+91.08	15+98.83	CONSTRUCT BOARDWALK PANEL A ON TYPE I SUPPORT	938-A / 938-20-02	938.20	93802 B	EA	1
V	15+98.83	16+14.83	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	2
V	16+14.83	16+22.08	CONSTRUCT BOARDWALK PANEL L ON TYPE I SUPPORT	938-L / 938-20-02	938.20	93802 B	EA	1
V	16+22.08	16+29.58	CONSTRUCT BOARDWALK PANEL P ON TYPE I SUPPORT	938-P / 938-20-02	938.20	93802 B	EA	1
V	16+29.58	16+36.83	CONSTRUCT BOARDWALK PANEL L ON TYPE I SUPPORT	938-L / 938-20-02	938.20	93802 B	EA	1
V	16+36.83	16+44.33	CONSTRUCT BOARDWALK PANEL P ON TYPE I SUPPORT	938-P / 938-20-02	938.20	93802 B	EA	1
V	16+44.33	16+51.96	CONSTRUCT BOARDWALK PANEL J ON TYPE I SUPPORT	938-J / 938-20-02	938.20	93802 B	EA	1
V	16+51.96	16+67.96	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	2
V	16+67.96	16+75.60	CONSTRUCT BOARDWALK PANEL J ON TYPE I SUPPORT	938-J / 938-20-02	938.20	93802 B	EA	1
V	16+75.60	16+83.10	CONSTRUCT BOARDWALK PANEL P ON TYPE I SUPPORT	938-P / 938-20-02	938.20	93802 B	EA	1
V	16+83.10	16.90.72	CONSTRUCT BOARDWALK PANEL J ON TYPE I SUPPORT	938-J / 938-20-02	938.20	93802 B	EA	1
V	16.90.72	16+98.22	CONSTRUCT BOARDWALK PANEL P ON TYPE I SUPPORT	938-P / 938-20-02	938.20	93802 B	EA	1

2024: PHASE 3 WORK LIST
BEGINS AT THIS STATION

WORK LIST								
TRAIL SEGMENT	BEGIN STATION	END STATION	TASK	DRAWING NO.	SPECIFICATION NO.	PAY ITEM	UNIT OF MEASURE	QUANTITY
V	16+98.22	17+05.47	CONSTRUCT BOARDWALK PANEL L ON TYPE I SUPPORT	938-L / 938-20-02	938.20	93802 B	EA	1
V	17+05.47	17+17.97	CONSTRUCT BOARDWALK PANEL F ON TYPE I SUPPORT	938-F / 938-20-02	938.20	93802 B	EA	1
V	17+17.97	17+20.47	CONSTRUCT BOARDWALK PANEL E ON TYPE I SUPPORT	938-E / 938-20-02	938.20	93802 B	EA	1
V	17+20.47	17+28.10	CONSTRUCT BOARDWALK PANEL H ON TYPE I SUPPORT	938-H / 938-20-02	938.20	93802 B	EA	1
V	17+28.10	17+35.60	CONSTRUCT BOARDWALK PANEL F ON TYPE I SUPPORT	938-F / 938-20-02	938.20	93802 B	EA	1
V	17+35.60	17+51.60	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-20-02	938.20	93802 B	EA	2
	17+51.60	V.I.F.	CONSTRUCT BACKWALL & APPROACH TYPE I	938-20-01	938.20	93802 C	EA	1
	V.I.F.	20+97.10	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.10	93802 C	EA	1
VI	20+97.10	21+13.10	CONSTRUCT BOARDWALK PANEL M ON TYPE II SUPPORT	938-M / 938-10-02	938.10	93802 D	EA	2
	21+13.10	V.I.F.	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.10	93802 C	EA	1
	V.I.F.	21+77.60	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.10	93802 C	EA	1
VII	21+77.60	22+25.60	CONSTRUCT BOARDWALK PANEL M ON TYPE II SUPPORT	938-M / 938-10-02	938.10	93802 D	EA	6
	22+25.60	V.I.F.	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.10	93802 C	EA	1
	V.I.F.	22+89.76	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.20	93802 A	EA	1
VIII	22+89.76	23+05.76	CONSTRUCT BOARDWALK PANEL M ON TYPE II SUPPORT	938-M / 938-10-02	938.20	93802 B	EA	2
VIII	23+05.76	23+21.02	CONSTRUCT BOARDWALK PANEL I ON TYPE II SUPPORT	938-I / 938-10-02	938.20	93802 B	EA	2
VIII	23+21.02	23+51.03	CONSTRUCT BOARDWALK PANEL F ON TYPE II SUPPORT	938-F / 938-10-02	938.20	93802 B	EA	4
VIII	23+51.03	23+58.77	CONSTRUCT BOARDWALK PANEL A ON TYPE II SUPPORT	938-A / 938-10-02	938.20	93802 B	EA	1
VIII	23+58.77	23+66.28	CONSTRUCT BOARDWALK PANEL N ON TYPE II SUPPORT	938-N / 938-10-02	938.20	93802 E	EA	1
VIII	23+66.28	23+74.28	CONSTRUCT BOARDWALK PANEL M ON TYPE I SUPPORT	938-M / 938-10-02	938.20	93802 B	EA	1
VIII	23+74.28	23+82.02	CONSTRUCT BOARDWALK PANEL B ON TYPE II SUPPORT	938-B / 938-10-02	938.20	93802 B	EA	1
VIII	23+82.02	23+89.52	CONSTRUCT BOARDWALK PANEL E ON TYPE II SUPPORT	938-E / 938-10-02	938.20	93802 B	EA	1
VIII	23+89.52	24+05.02	CONSTRUCT BOARDWALK PANEL A ON TYPE II SUPPORT	938-A / 938-10-02	938.20	93802 B	EA	2
VIII	24+05.02	24+12.77	CONSTRUCT BOARDWALK PANEL C ON TYPE II SUPPORT	938-C / 938-10-02	938.20	93802 B	EA	1
VIII	24+12.77	24+28.77	CONSTRUCT BOARDWALK PANEL M ON TYPE II SUPPORT	938-M / 938-10-02	938.20	93802 B	EA	2
VIII	24+28.77	24+36.52	CONSTRUCT BOARDWALK PANEL B ON TYPE II SUPPORT	938-B / 938-10-02	938.20	93802 B	EA	1
VIII	24+36.52	24+44.16	CONSTRUCT BOARDWALK PANEL I ON TYPE II SUPPORT	938-I / 938-10-02	938.20	93802 B	EA	1
VIII	24+44.16	24+51.90	CONSTRUCT BOARDWALK PANEL B ON TYPE II SUPPORT	938-B / 938-10-02	938.20	93802 B	EA	1
VIII	24+51.90	24+59.40	CONSTRUCT BOARDWALK PANEL N ON TYPE II SUPPORT	938-N / 938-10-02	938.20	93802 E	EA	1
VIII	24+59.40	24+67.16	CONSTRUCT BOARDWALK PANEL D ON TYPE II SUPPORT	938-D / 938-10-02	938.20	93802 B	EA	1
VIII	24+67.16	24+83.16	CONSTRUCT BOARDWALK PANEL M ON TYPE II SUPPORT	938-M / 938-10-02	938.20	93802 B	EA	2
VIII	24+83.16	24+91.16	CONSTRUCT BOARDWALK PANEL O ON TYPE II SUPPORT	938-O / 938-10-02	938.20	93802 E	EA	1
VIII	24+91.16	25+07.16	CONSTRUCT BOARDWALK PANEL M ON TYPE II SUPPORT	938-M / 938-10-02	938.20	93802 B	EA	2
VIII	25+07.16	25+14.90	CONSTRUCT BOARDWALK PANEL B ON TYPE II SUPPORT	938-B / 938-10-02	938.20	93802 B	EA	1

WORK LIST								
TRAIL SEGMENT	BEGIN STATION	END STATION	TASK	DRAWING NO.	SPECIFICATION NO.	PAY ITEM	UNIT OF MEASURE	QUANTITY
VIII	25+14.90	25+22.90	CONSTRUCT BOARDWALK PANEL K ON TYPE II SUPPORT	938-K / 938-10-02	938.20	93802 B	EA	1
VIII	25+22.90	25+30.41	CONSTRUCT BOARDWALK PANEL E ON TYPE II SUPPORT	938-E / 938-10-02	938.20	93802 B	EA	1
VIII	25+30.41	25+38.40	CONSTRUCT BOARDWALK PANEL M ON TYPE II SUPPORT	938-M / 938-10-02	938.20	93802 B	EA	1
VIII	25+38.40	25+46.16	CONSTRUCT BOARDWALK PANEL B ON TYPE II SUPPORT	938-B / 938-10-02	938.20	93802 B	EA	1
VIII	25+46.16	25+53.90	CONSTRUCT BOARDWALK PANEL C ON TYPE II SUPPORT	938-C / 938-10-02	938.20	93802 B	EA	1
	25+53.90	V.I.F.	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.20	93802 A	EA	1
	V.I.F.	25+89.23	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.20	93802 A	EA	1
IX	25+89.23	25+97.23	CONSTRUCT BOARDWALK PANEL M ON TYPE II SUPPORT	938-M / 938-10-02	938.20	93802 B	EA	1
IX	25+97.23	26+04.48	CONSTRUCT BOARDWALK PANEL L ON TYPE II SUPPORT	938-L / 938-10-02	938.20	93802 B	EA	1
IX	26+04.48	26+11.73	CONSTRUCT BOARDWALK PANEL K ON TYPE II SUPPORT	938-K / 938-10-02	938.20	93802 B	EA	1
IX	26+11.73	26+19.48	CONSTRUCT BOARDWALK PANEL A ON TYPE II SUPPORT	938-A / 938-10-02	938.20	93802 B	EA	1
IX	26+19.48	26+27.11	CONSTRUCT BOARDWALK PANEL J ON TYPE II SUPPORT	938-J / 938-10-02	938.20	93802 B	EA	1
IX	26+27.11	26+34.86	CONSTRUCT BOARDWALK PANEL B ON TYPE II SUPPORT	938-B / 938-10-02	938.20	93802 B	EA	1
IX	26+34.86	26+42.86	CONSTRUCT BOARDWALK PANEL O ON TYPE II SUPPORT	938-O / 938-10-02	938.20	93802 E	EA	1
IX	26+42.86	26+50.61	CONSTRUCT BOARDWALK PANEL D ON TYPE II SUPPORT	938-D / 938-10-02	938.20	93802 B	EA	1
IX	26+50.61	26+57.86	CONSTRUCT BOARDWALK PANEL K ON TYPE II SUPPORT	938-K / 938-10-02	938.20	93802 B	EA	1
IX	26+57.86	26+65.50	CONSTRUCT BOARDWALK PANEL G ON TYPE II SUPPORT	938-G / 938-10-02	938.20	93802 B	EA	1
IX	26+65.50	26+73.50	CONSTRUCT BOARDWALK PANEL M ON TYPE II SUPPORT	938-M / 938-10-02	938.20	93802 B	EA	1
IX	26+73.50	26+80.75	CONSTRUCT BOARDWALK PANEL L ON TYPE II SUPPORT	938-L / 938-10-02	938.20	93802 B	EA	1
IX	26+80.75	26+88.50	CONSTRUCT BOARDWALK PANEL B ON TYPE II SUPPORT	938-B / 938-10-02	938.20	93802 B	EA	1
IX	26+88.50	26+96.13	CONSTRUCT BOARDWALK PANEL I ON TYPE II SUPPORT	938-I / 938-10-02	938.20	93802 B	EA	1
IX	26+96.13	27+03.63	CONSTRUCT BOARDWALK PANEL N ON TYPE II SUPPORT	938-N / 938-10-02	938.20	93802 E	EA	1
IX	27+03.63	27+11.26	CONSTRUCT BOARDWALK PANEL G ON TYPE II SUPPORT	938-G / 938-10-02	938.20	93802 B	EA	1
IX	27+11.26	27+34.50	CONSTRUCT BOARDWALK PANEL D ON TYPE II SUPPORT	938-D / 938-10-02	938.20	93802 B	EA	3
IX	27+34.50	27+42.25	CONSTRUCT BOARDWALK PANEL B ON TYPE II SUPPORT	938-B / 938-10-02	938.20	93802 B	EA	1
	27+42.25	27+50.25	CONSTRUCT BOARDWALK PANEL M ON TYPE II SUPPORT (FORMER STA. 12+43)	938-M / 938-10-02	938.20	93802 B	EA	1
	27+50.25	V.I.F.	CONSTRUCT BACKWALL & APPROACH TYPE II	938-10-01	938.20	93802 A	EA	1



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

LINE DIAGRAM

SECTION

900 - GENERAL

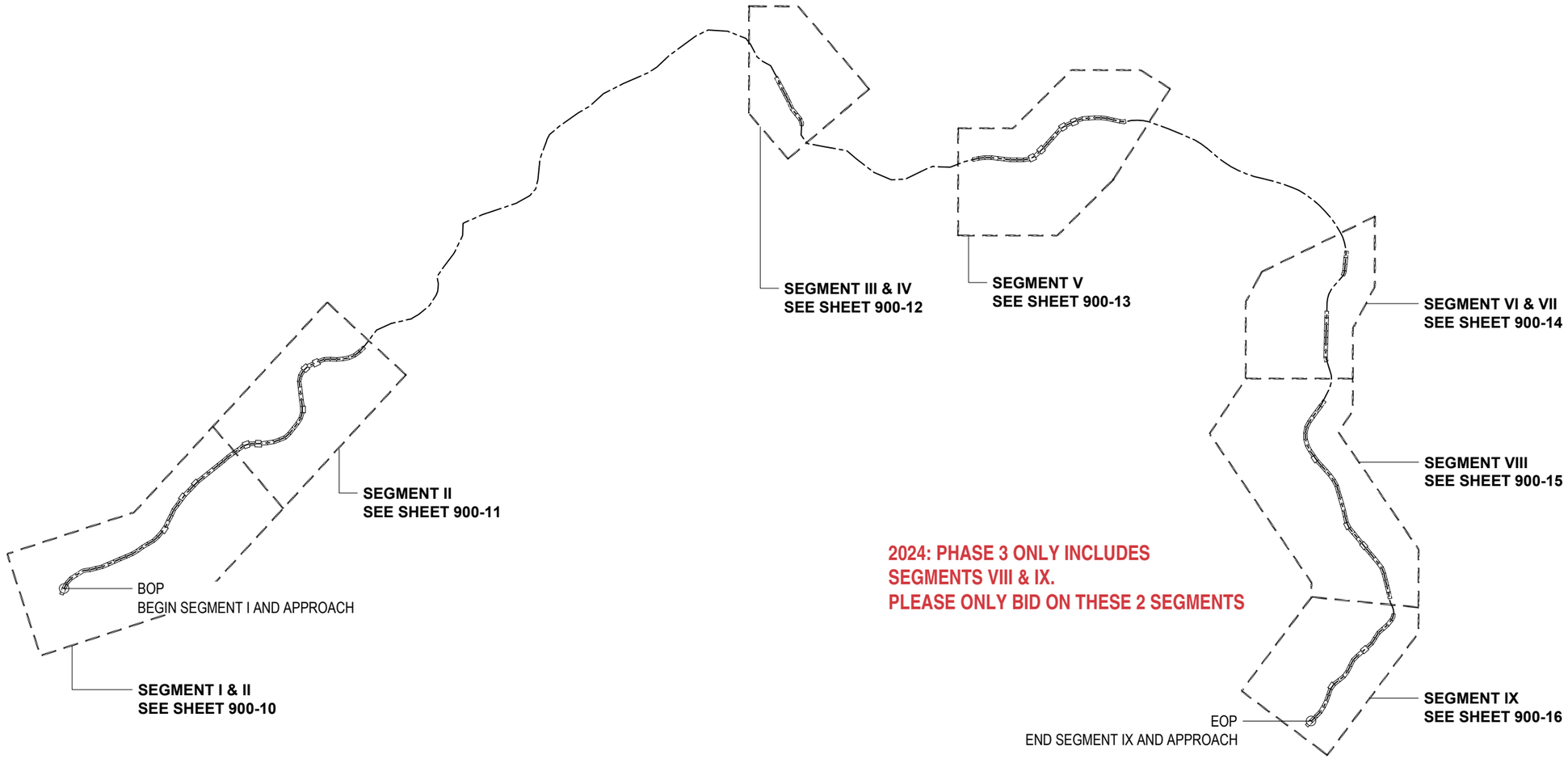
REVISION DATE

NO SCALE

DRAWING NO.

900-08

SHEET **10** OF **46**



2024: PHASE 3 ONLY INCLUDES SEGMENTS VIII & IX.
PLEASE ONLY BID ON THESE 2 SEGMENTS

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U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

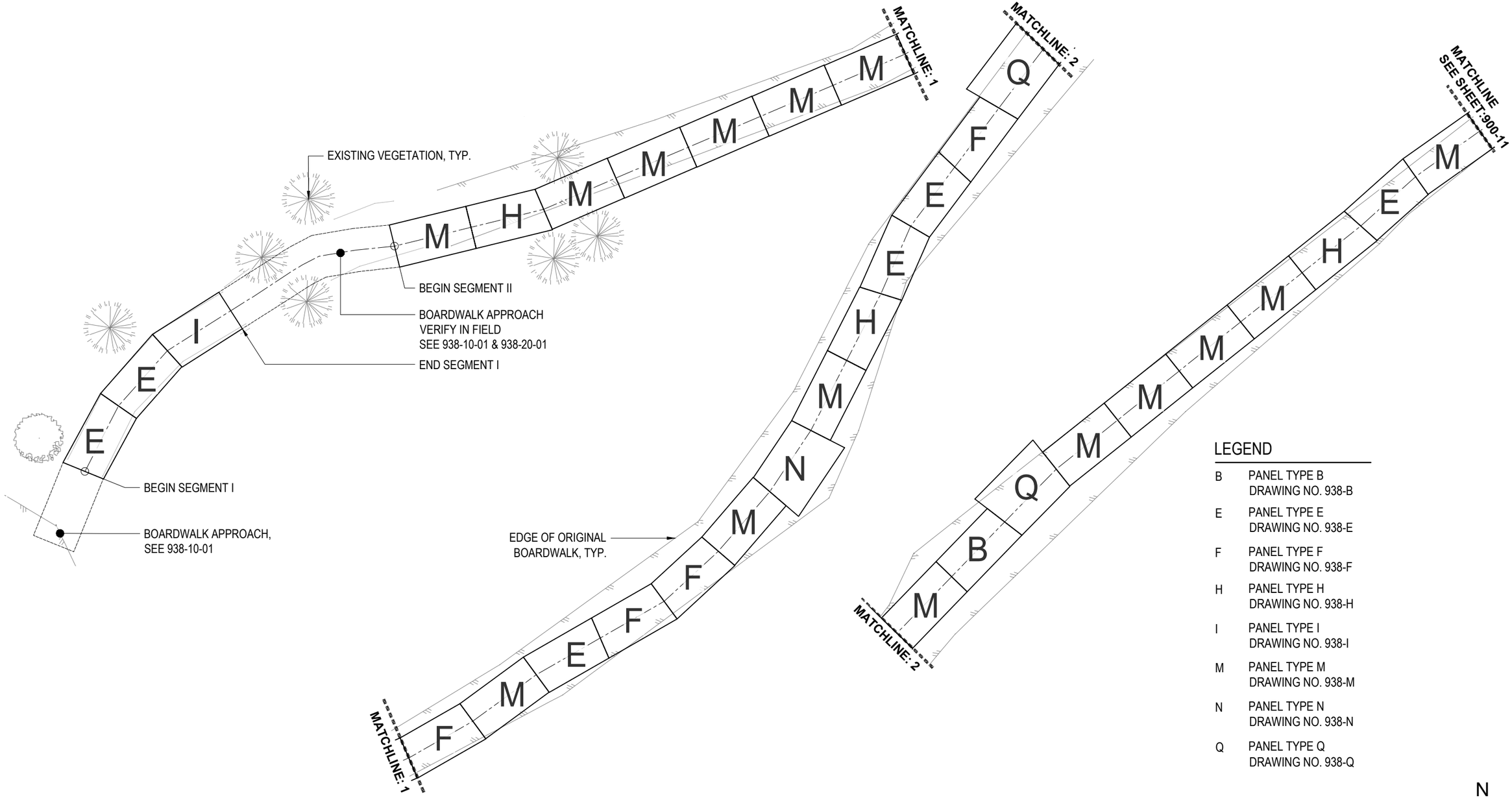
DRAWING NAME
LAYOUT SITE KEY PLAN
SECTION
900-GENERAL

REVISION DATE

0 75 150 ft

DRAWING NO.
900-09
SHEET **11** OF **46**

2024: THIS PAGE NOT RELEVANT TO PHASE 3



LEGEND

B	PANEL TYPE B DRAWING NO. 938-B
E	PANEL TYPE E DRAWING NO. 938-E
F	PANEL TYPE F DRAWING NO. 938-F
H	PANEL TYPE H DRAWING NO. 938-H
I	PANEL TYPE I DRAWING NO. 938-I
M	PANEL TYPE M DRAWING NO. 938-M
N	PANEL TYPE N DRAWING NO. 938-N
Q	PANEL TYPE Q DRAWING NO. 938-Q

N

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME
LAYOUT PLAN SEGMENTS I & II
SECTION
900-GENERAL

REVISION DATE

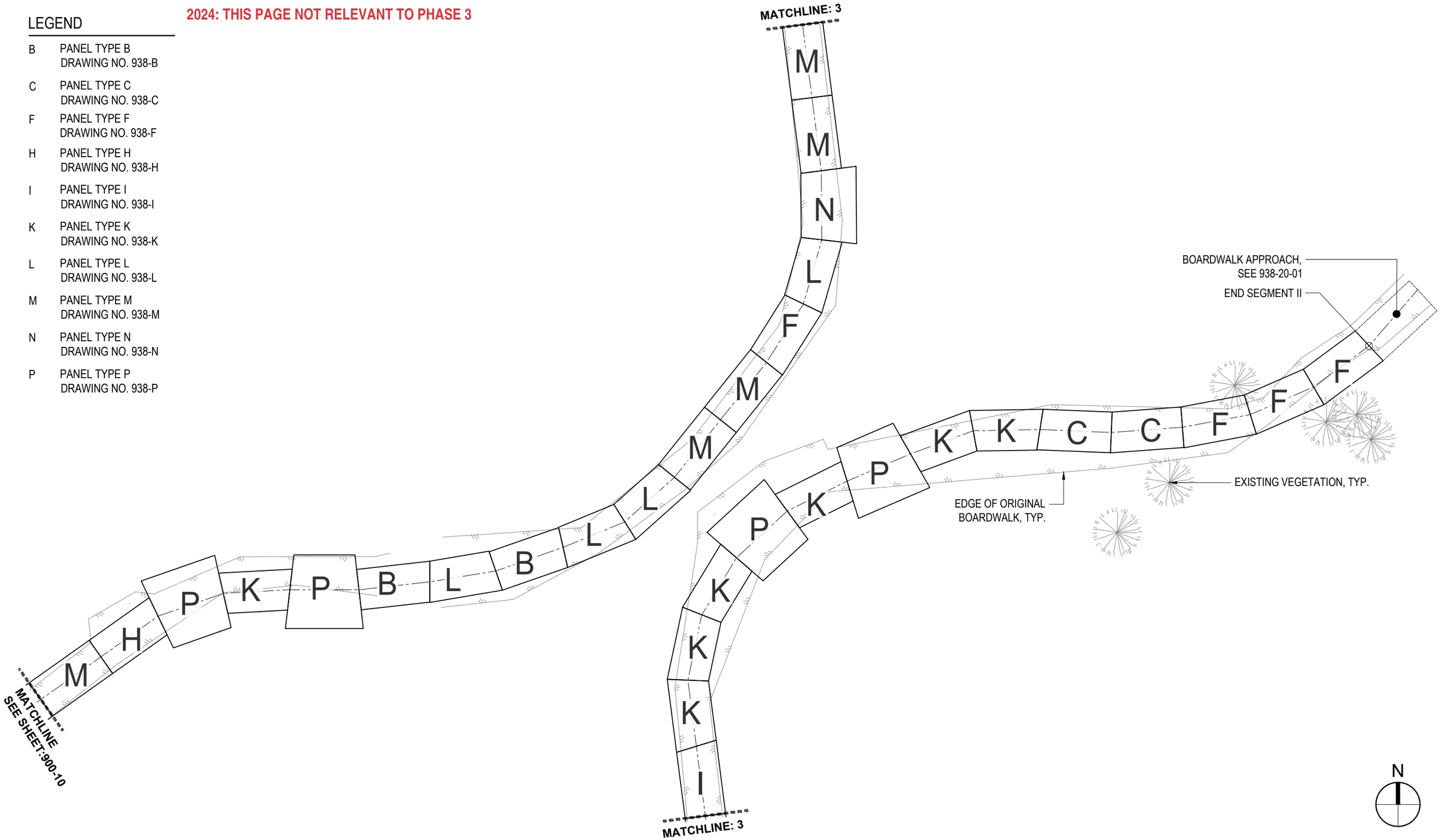
0 5 10 ft

DRAWING NO.
900-10
SHEET **12** OF **46**

LEGEND

- B PANEL TYPE B DRAWING NO. 938-B
- C PANEL TYPE C DRAWING NO. 938-C
- F PANEL TYPE F DRAWING NO. 938-F
- H PANEL TYPE H DRAWING NO. 938-H
- I PANEL TYPE I DRAWING NO. 938-I
- K PANEL TYPE K DRAWING NO. 938-K
- L PANEL TYPE L DRAWING NO. 938-L
- M PANEL TYPE M DRAWING NO. 938-M
- N PANEL TYPE N DRAWING NO. 938-N
- P PANEL TYPE P DRAWING NO. 938-P

2024: THIS PAGE NOT RELEVANT TO PHASE 3



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

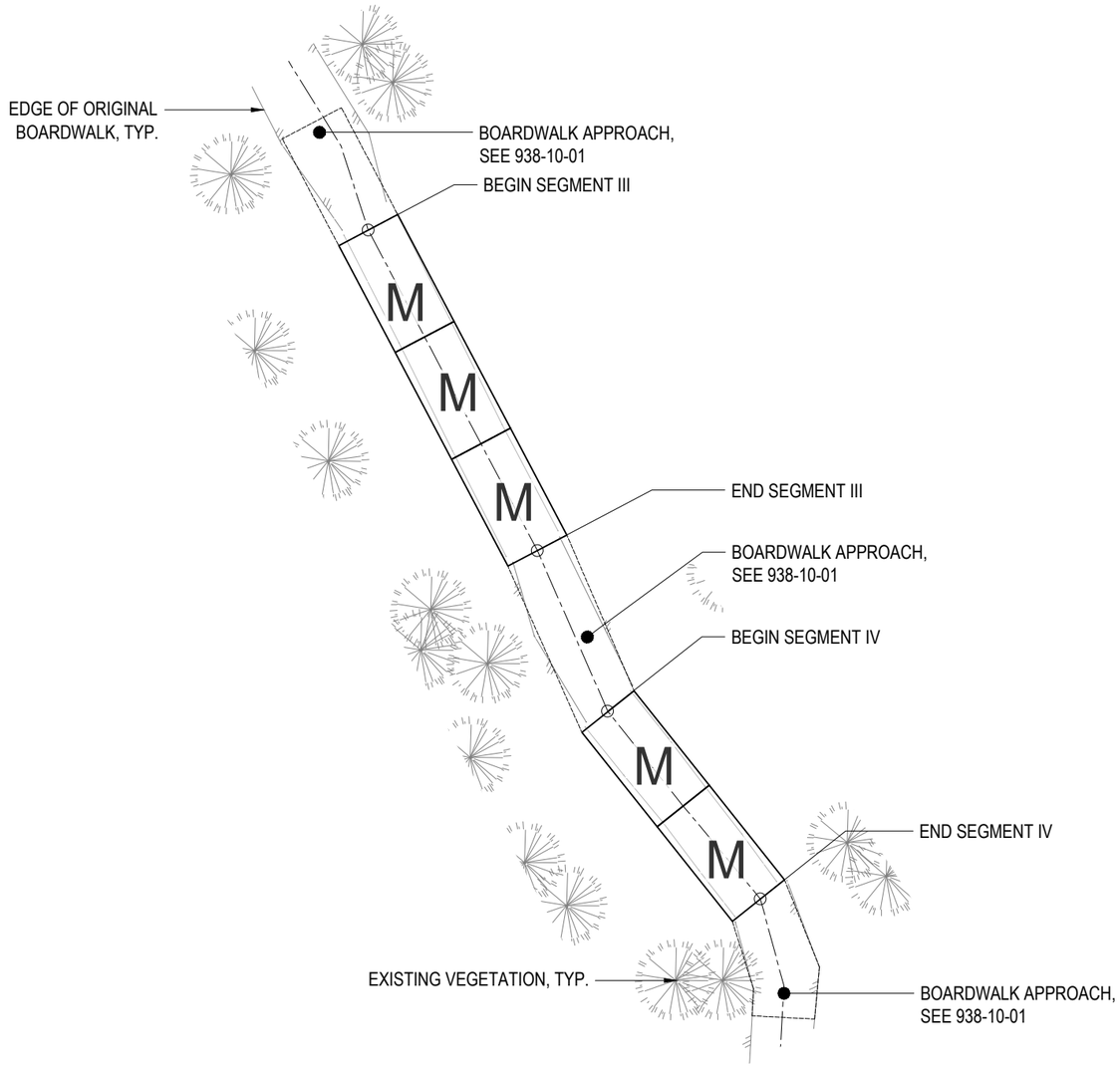
DRAWING NAME
LAYOUT PLAN SEGMENT II
SECTION
900-GENERAL

REVISION DATE

0 5 10 ft

DRAWING NO.
900-11
SHEET **13** OF **46**

2024: THIS PAGE NOT RELEVANT TO PHASE 3



LEGEND

M PANEL TYPE M
DRAWING NO. 938-M

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U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME
LAYOUT PLAN SEGMENTS III & IV

SECTION
900-GENERAL

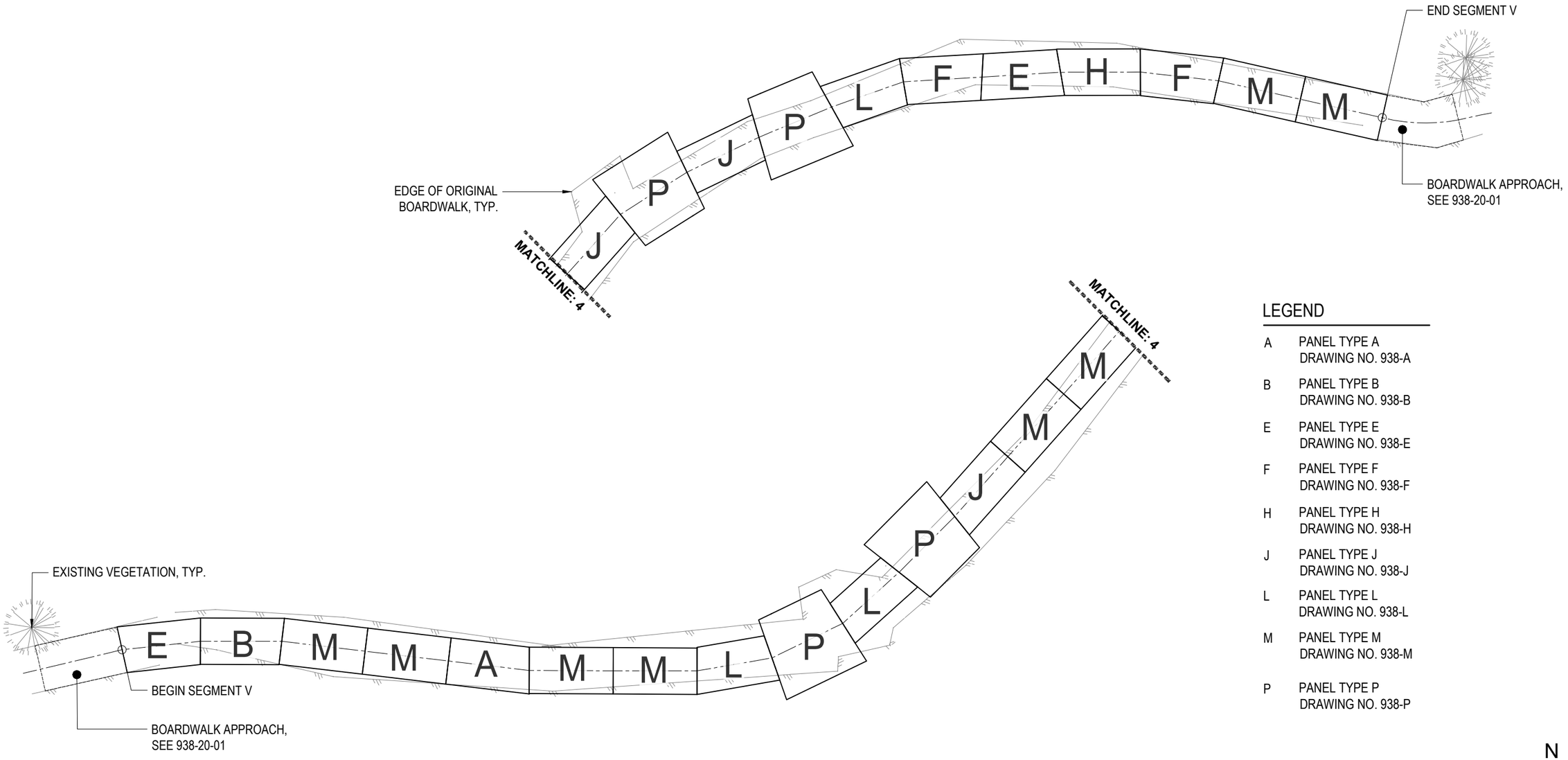
REVISION DATE

0 5 10 ft

DRAWING NO.
900-12

SHEET
14 OF **46**

2024: THIS PAGE NOT RELEVANT TO PHASE 3



LEGEND

A	PANEL TYPE A DRAWING NO. 938-A
B	PANEL TYPE B DRAWING NO. 938-B
E	PANEL TYPE E DRAWING NO. 938-E
F	PANEL TYPE F DRAWING NO. 938-F
H	PANEL TYPE H DRAWING NO. 938-H
J	PANEL TYPE J DRAWING NO. 938-J
L	PANEL TYPE L DRAWING NO. 938-L
M	PANEL TYPE M DRAWING NO. 938-M
P	PANEL TYPE P DRAWING NO. 938-P

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

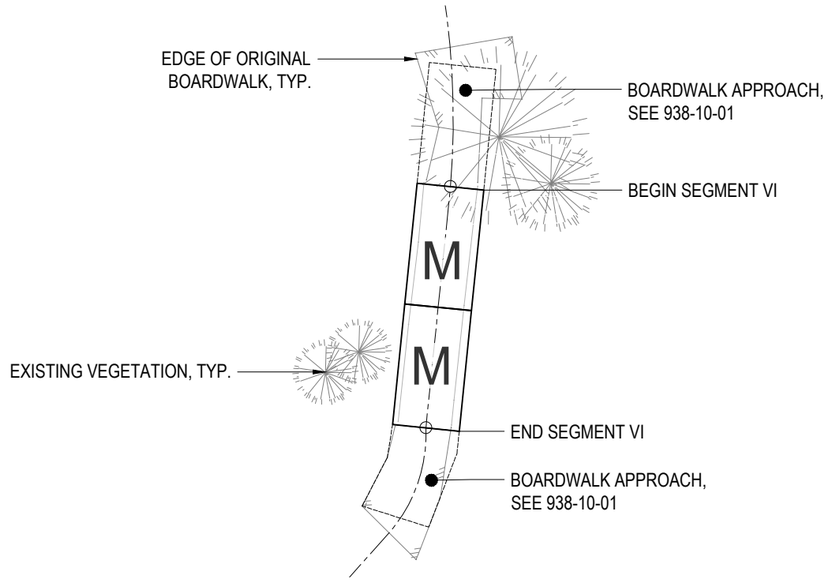
DRAWING NAME
LAYOUT PLAN SEGMENT V
SECTION
900-GENERAL

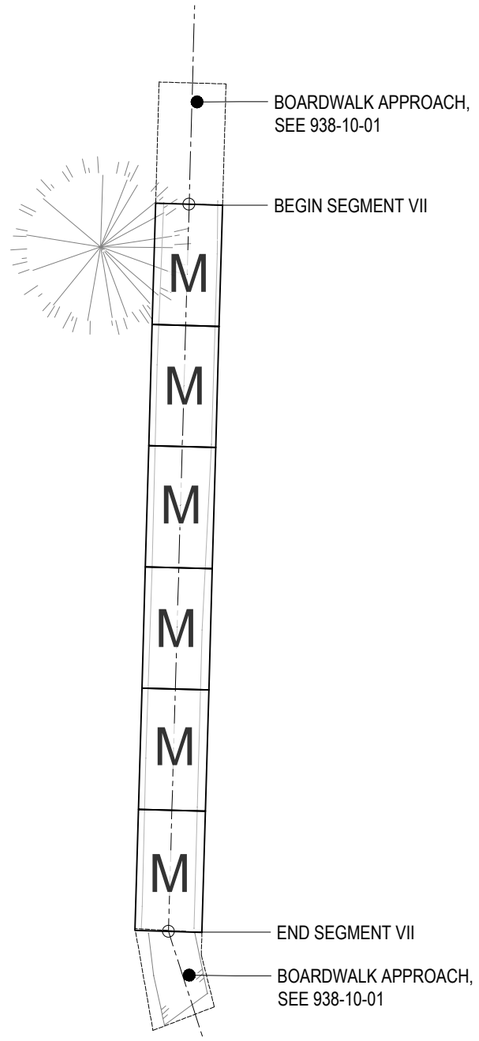
REVISION DATE

0 5 10 ft

DRAWING NO.
900-13
SHEET
15 OF **46**

2024: THIS PAGE NOT RELEVANT TO PHASE 3





LEGEND

M PANEL TYPE M
DRAWING NO. 938-M

N

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

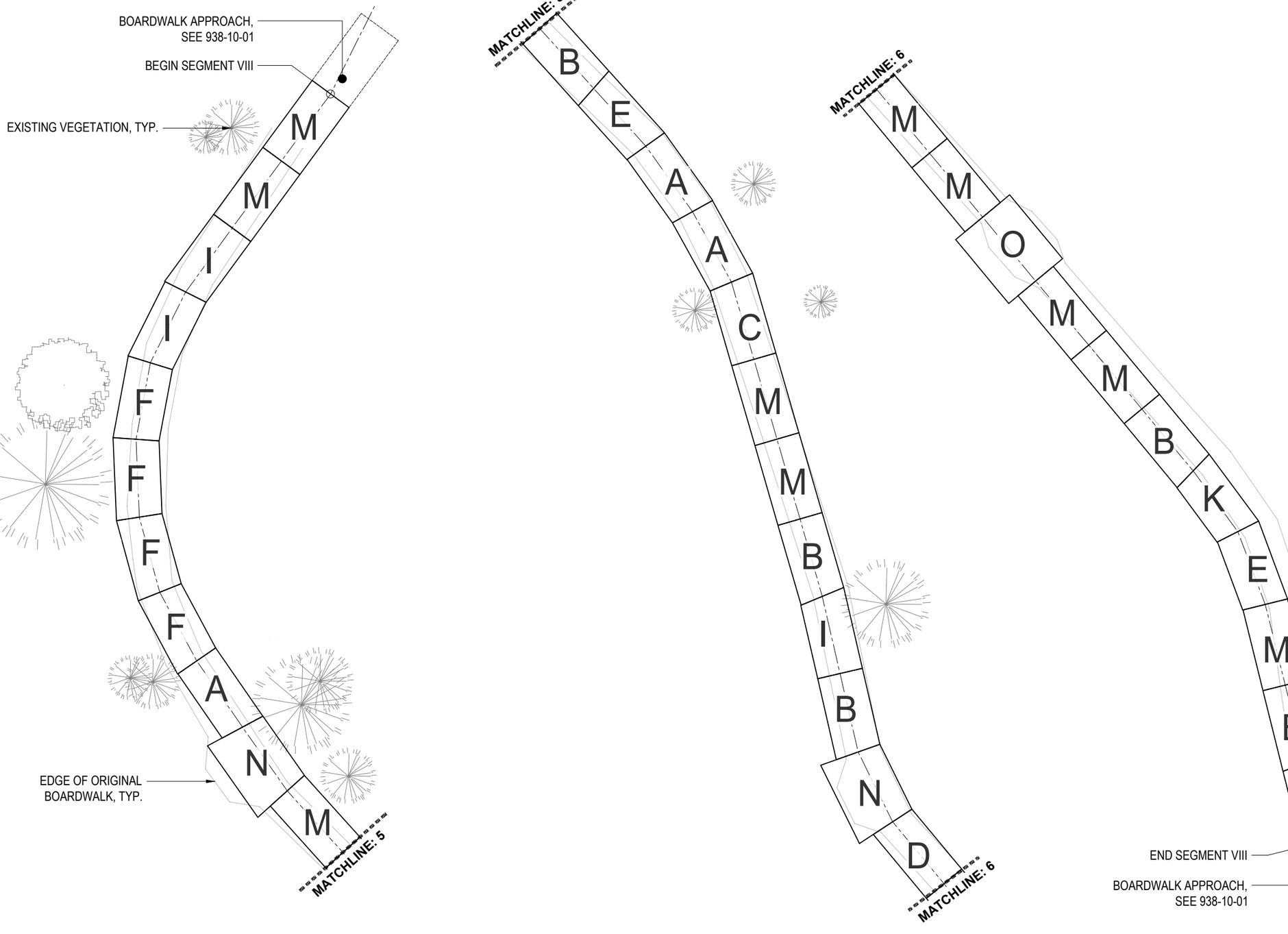
DRAWING NAME
LAYOUT PLAN SEGMENTS VI & VII
SECTION
900-GENARAL

REVISION DATE

0 5 10 ft

DRAWING NO.
900-14
SHEET
16 OF **46**

2024: THIS SEGMENT INCLUDED IN PHASE 3. PREPARE BIDS FOR THIS SEGMENT OF WORK



LEGEND

A	PANEL TYPE A DRAWING NO. 938-A
B	PANEL TYPE B DRAWING NO. 938-B
C	PANEL TYPE C DRAWING NO. 938-C
D	PANEL TYPE D DRAWING NO. 938-D
E	PANEL TYPE E DRAWING NO. 938-E
F	PANEL TYPE F DRAWING NO. 938-F
I	PANEL TYPE I DRAWING NO. 938-I
K	PANEL TYPE K DRAWING NO. 938-K
M	PANEL TYPE M DRAWING NO. 938-M
N	PANEL TYPE N DRAWING NO. 938-N
O	PANEL TYPE O DRAWING NO. 938-O

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

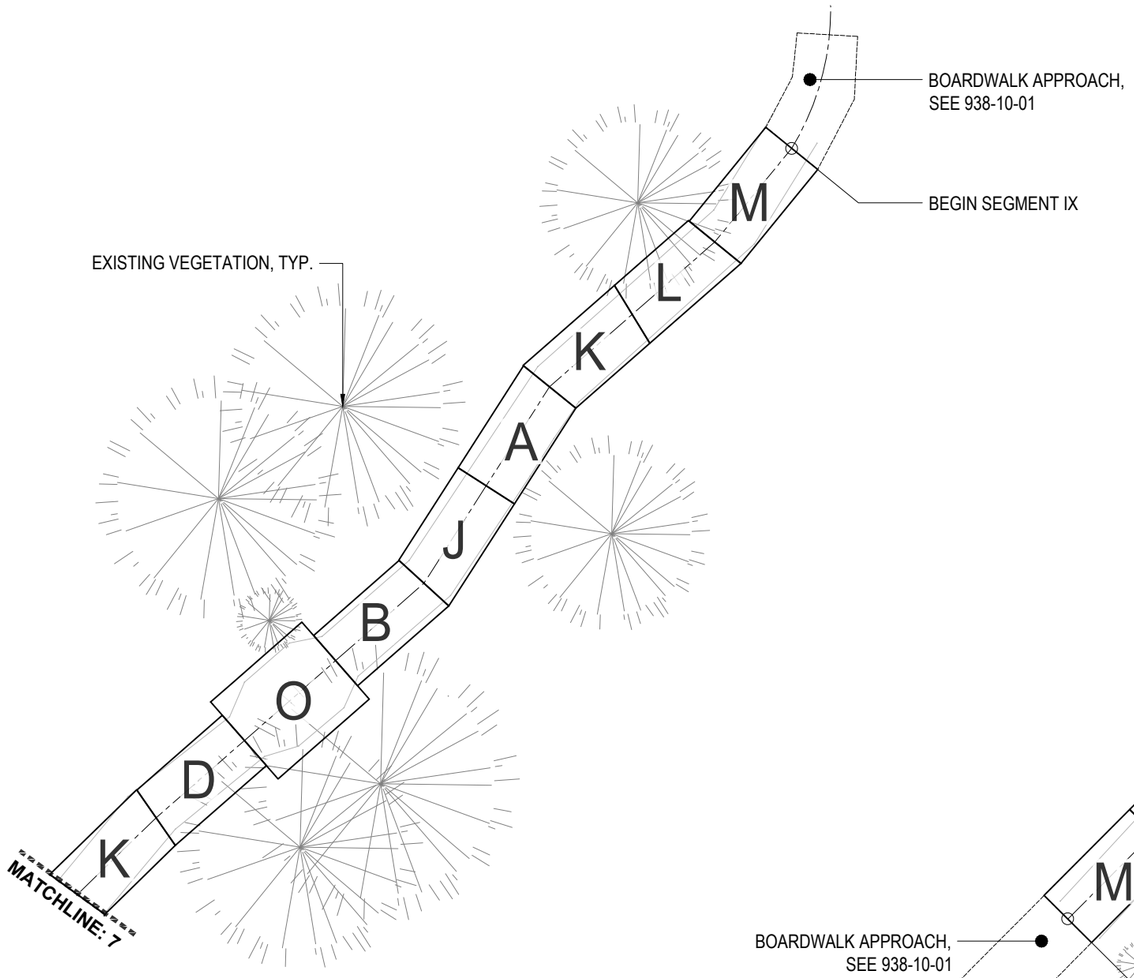
DRAWING NAME
LAYOUT PLAN SEGMENT VIII
SECTION
900-GENERAL

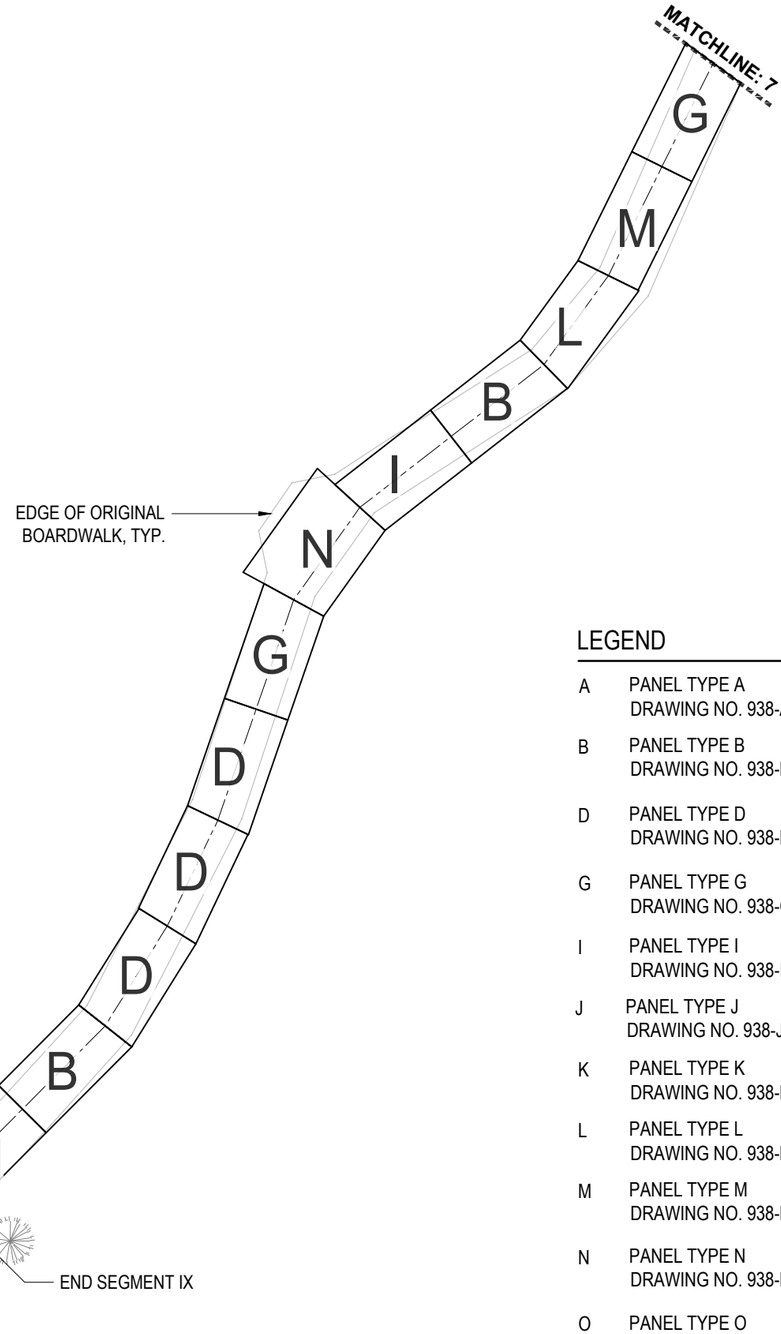
REVISION DATE

0 5 10 ft

DRAWING NO.
900-15
SHEET **17** OF **46**

2024: THIS SEGMENT INCLUDED IN PHASE 3. PREPARE BIDS FOR THIS SEGMENT OF WORK





LEGEND

- A PANEL TYPE A DRAWING NO. 938-A
- B PANEL TYPE B DRAWING NO. 938-B
- D PANEL TYPE D DRAWING NO. 938-D
- G PANEL TYPE G DRAWING NO. 938-G
- I PANEL TYPE I DRAWING NO. 938-I
- J PANEL TYPE J DRAWING NO. 938-J
- K PANEL TYPE K DRAWING NO. 938-K
- L PANEL TYPE L DRAWING NO. 938-L
- M PANEL TYPE M DRAWING NO. 938-M
- N PANEL TYPE N DRAWING NO. 938-N
- O PANEL TYPE O DRAWING NO. 938-O

N

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

LAYOUT PLAN SEGMENT IX

SECTION

900-GENERAL

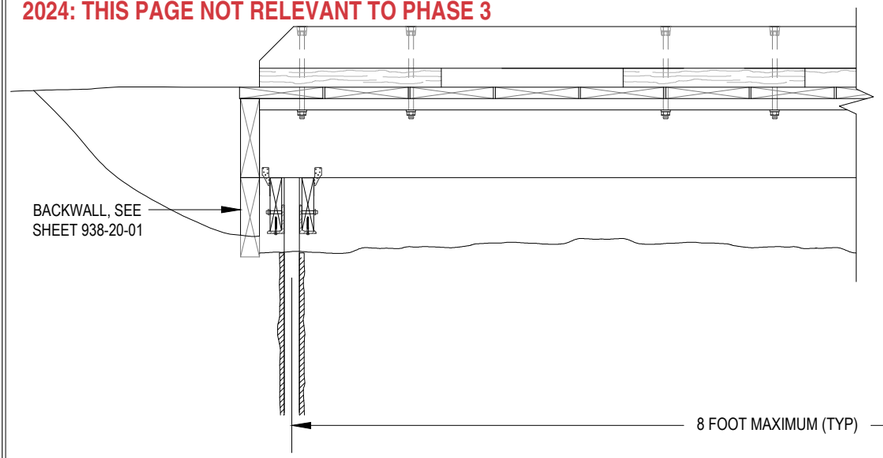
REVISION DATE

0 5 10 ft

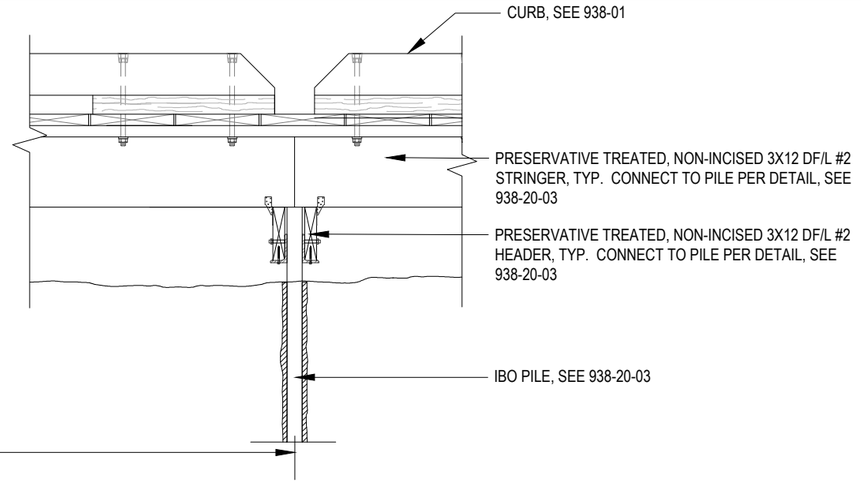
DRAWING NO. **900-16**

SHEET **18** OF **46**

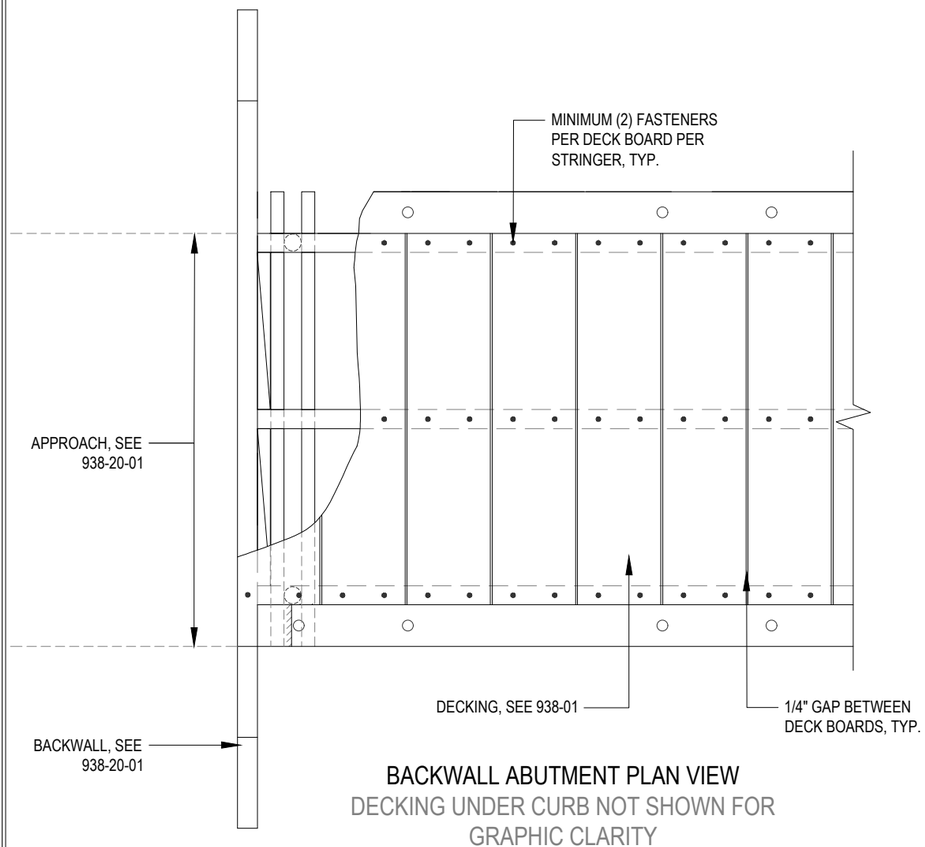
2024: THIS PAGE NOT RELEVANT TO PHASE 3



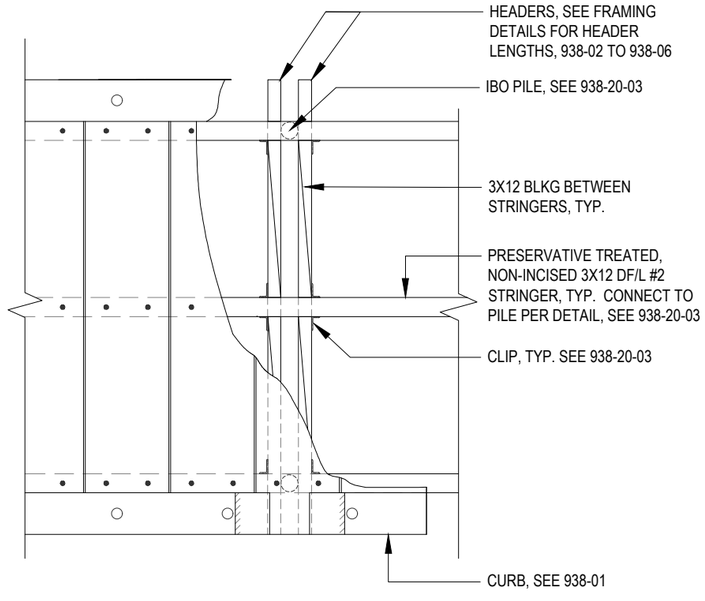
BACKWALL ABUTMENT SECTION ELEVATION



TYPICAL PILE SUPPORT SECTION ELEVATION
BLOCKING NOT SHOWN FOR GRAPHIC CLARITY



BACKWALL ABUTMENT PLAN VIEW
DECKING UNDER CURB NOT SHOWN FOR GRAPHIC CLARITY



TYPICAL PILE SUPPORT PLAN
DECKING UNDER CURB NOT SHOWN FOR GRAPHIC CLARITY

HEADER, BLOCKING AND STRINGER

COMPONENT	SIZE (IN.)	SPECIES	PRESERV. TYPE	LUMBER GRADE
HEADER	3X12	DOUGLAS FIR	P1	NO. 2
BLOCKING	3X12	DOUGLAS FIR	P1	NO. 2
STRINGER	3X12	DOUGLAS FIR	P1	NO. 2

PRESERVATIVE TREATMENT, NON-INCISED (UNDER CODE REPORT ICC-ESR3834,TO EQUAL OR EXCEED AWPA USE CATEGORY SYSTEMS)			
PRESERVATIVE TYPE	TREATMENT TYPE	USE CATEGORY	PRODUCT
P1	WATERBORNE	UC3B	KLEAR-GARD 25

USE CATEGORY
UC3B = ABOVE GROUND - EXPOSED
UC4A = GROUND CONTACT - GENERAL USE
UC4B = GROUND CONTACT - HEAVY USE

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

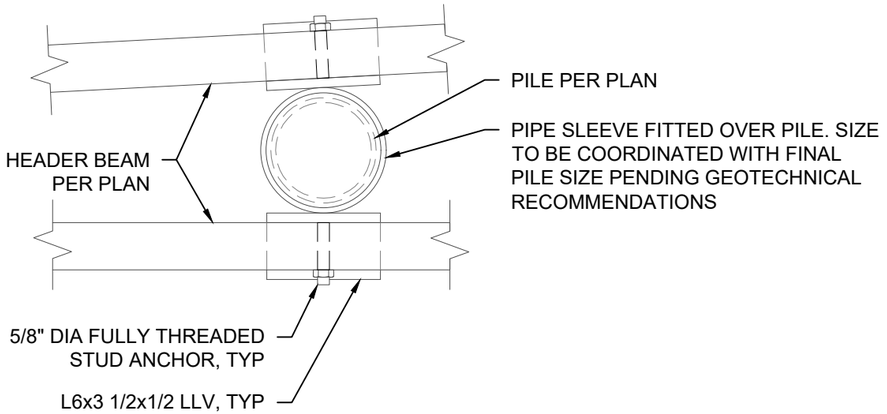
DRAWING NAME
STRUCTURAL SUPPORT TYPE I
SECTION
938-20 - ELEVATED BOARDWALKS

REVISION DATE

NO SCALE

DRAWING NO.
938-20-02
SHEET
19 OF **46**

2024: THIS PAGE NOT RELEVANT TO PHASE 3

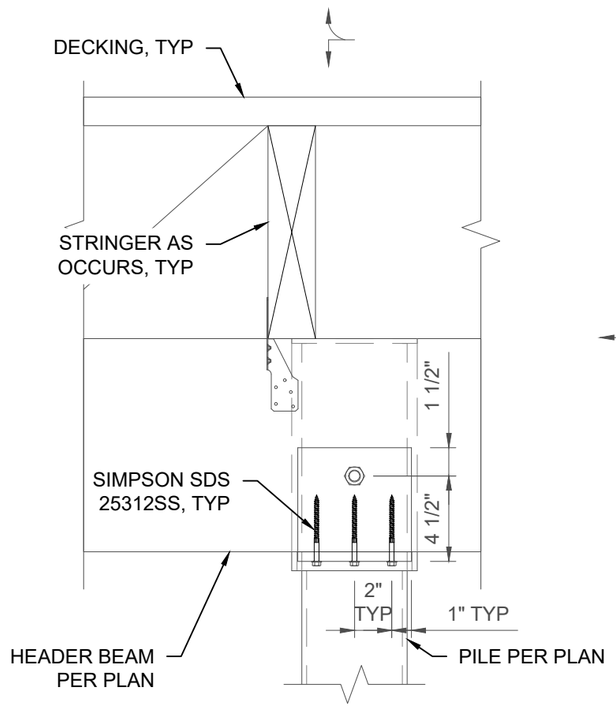


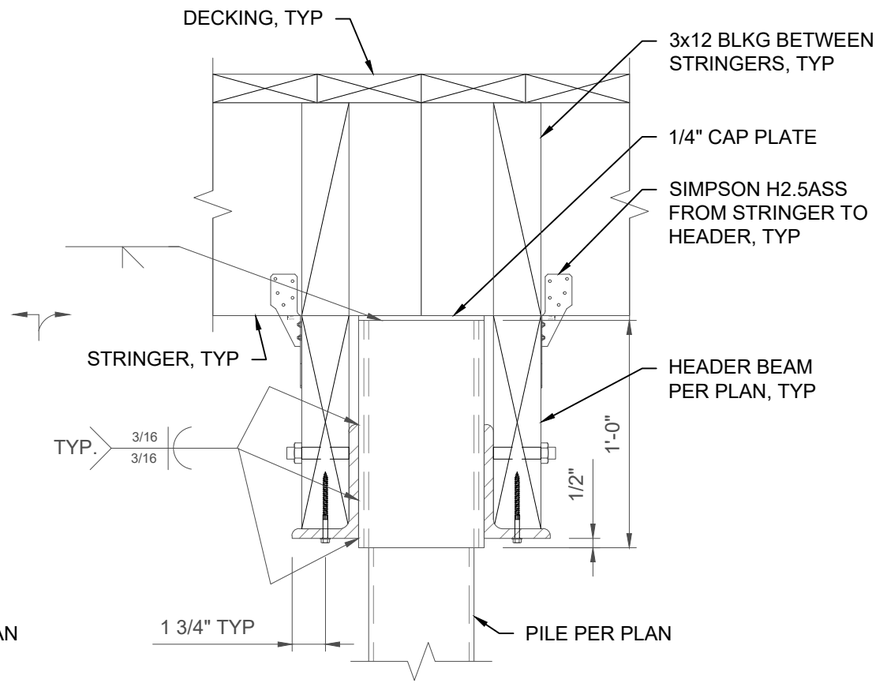
REQUIRED TESTING OF PILING IN ACCORDANCE WITH APPROVED GEOTECHNICAL REPORT

REQUIRED TESTING OF PILING IN ACCORDANCE WITH APPROVED GEOTECHNICAL REPORT

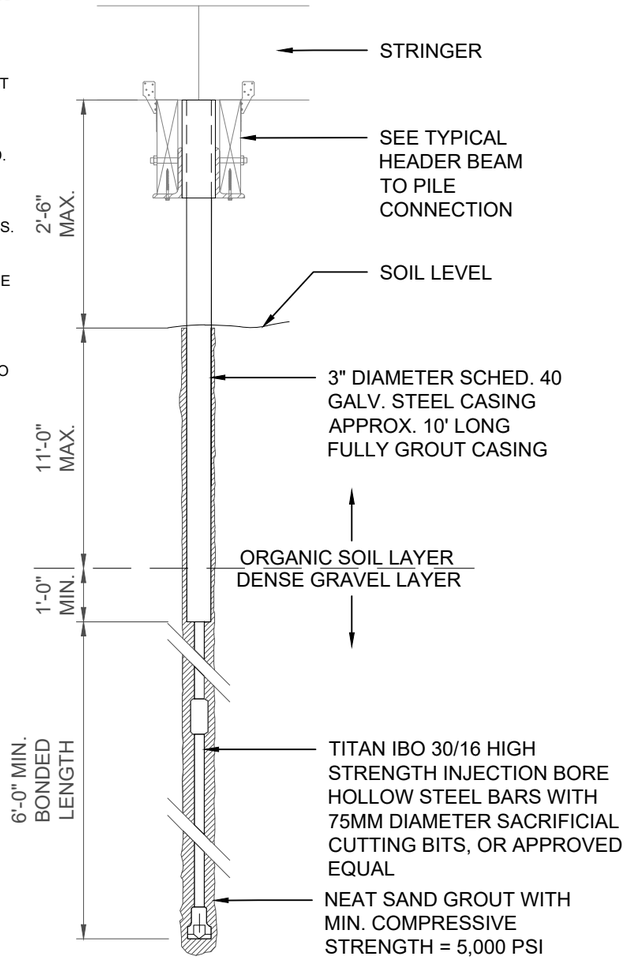
VERIFICATION LOAD TESTING: PRIOR TO BEGINNING THE INSTALLATION OF PRODUCTION MICROPILES FOR THE PROPOSED PROJECT, TWO (2) VERIFICATION LOAD TESTS ARE REQUIRED TO BE PERFORMED ON SACRIFICIAL, NON-PRODUCTION MICROPILES, TO A MINIMUM OF 200 PERCENT OF THE DESIGN LOAD. VERIFICATIONS TESTS ARE GENERALLY PERFORMED ON ONE OR MORE SACRIFICIAL PILES TO INFORM THE CONTRACTORS DESIGN AND PROVIDE GUIDANCE FOR THE PRODUCTION PILE INSTALLATION DEPTHS AND SOIL CONDITIONS. A SUCCESSFUL VERIFICATION TEST WILL SUSTAIN THE MAXIMUM TEST LOAD FOR AT LEAST ONE TIME LOG CYCLE UP TO 10 MINUTES WITH LESS THAN 0.04 INCHES OF CREEP MOVEMENT. IF SUCH A TEST IS NOT SUCCESSFUL, THE CREEP TEST LOAD IS HELD LONGER, FOR UP TO 60 MINUTES, WITH THE REQUIREMENT THAT THE ADDITIONAL CREEP MOVEMENT SHALL NOT EXCEED ANOTHER 0.04 INCHES OVER THAT TIME PERIOD. THE MAXIMUM DEFLECTION AT THE DESIGN LOAD MUST ALSO BE LESS THAN THE MAXIMUM ALLOWABLE DEFLECTION AS DESIGNATED BY THE STRUCTURAL ENGINEER. VERIFICATION LOAD TESTING SCHEDULES SHOULD BE INCLUDED IN THE PROJECT SPECIFICATIONS, AND THE INSTALLATION AND TESTING SHOULD BE WITNESSED BY GCN/TRUE NORTH GEOTECHNICAL SERVICES.

PROOF LOAD TESTING: BASED ON THE LIMITED LOADING OF THE PLANNED MICROPILES AND THE COMPLETION OF SUCCESSFUL SACRIFICIAL VERIFICATION TESTS, PROOF LOAD TESTING WILL NOT BE REQUIRED IF THE CONDITIONS ENCOUNTERED DURING THE INSTALLATION OF THE PRODUCTION PILES ARE SIMILAR TO THOSE ENCOUNTERED DURING THAT OF THE VERIFICATION PILES. IF CONDITIONS DIFFER SIGNIFICANTLY, HOWEVER, PROOF TESTING MAY BE REQUIRED ON A CASE-BY-CASE BASIS. PROOF TESTING, IF REQUIRED, WOULD BE PERFORMED TO A MINIMUM OF 130 PERCENT THE DESIGN LOAD, USING A LOAD SCHEDULE AND CRITERIA SIMILAR TO THOSE APPLIED TO THE VERIFICATION TESTING.





TYPICAL HEADER BEAM TO PILE CONNECTION



NOTE:
FINAL PILE SIZE TO BE CONFIRMED BY STRUCTURAL ENGINEER PENDING GEOTECH REPORT FOR ALLOWABLE LOADS.

IBO PILE DETAIL

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

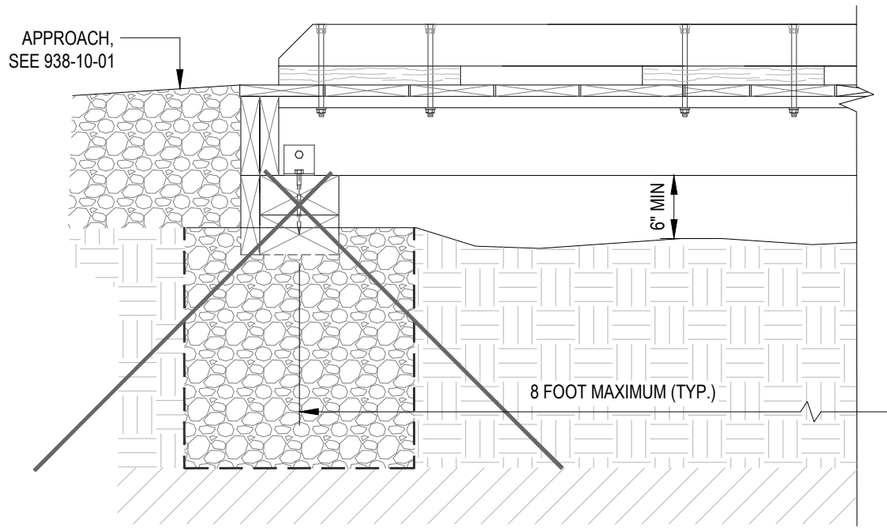
PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME
STRUC. SUPPORT TYPE I FRAMING CONNECTION
SECTION
938-20 - ELEVATED BOARDWALKS

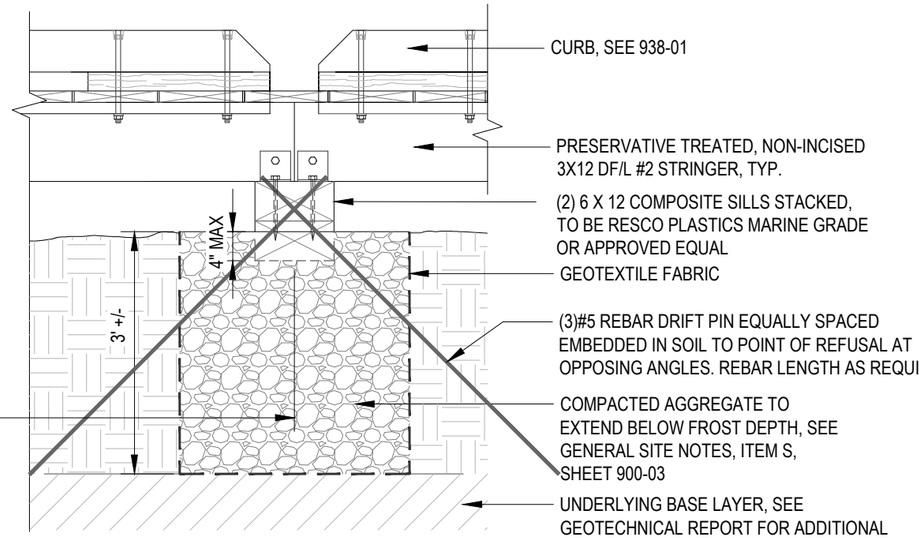
REVISION DATE

NO SCALE

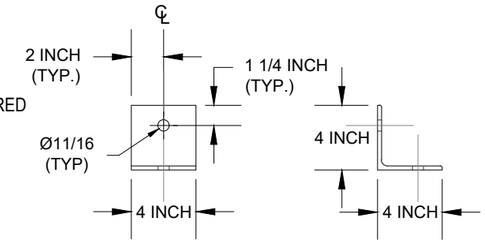
DRAWING NO.
938-20-03
SHEET
20 OF **46**



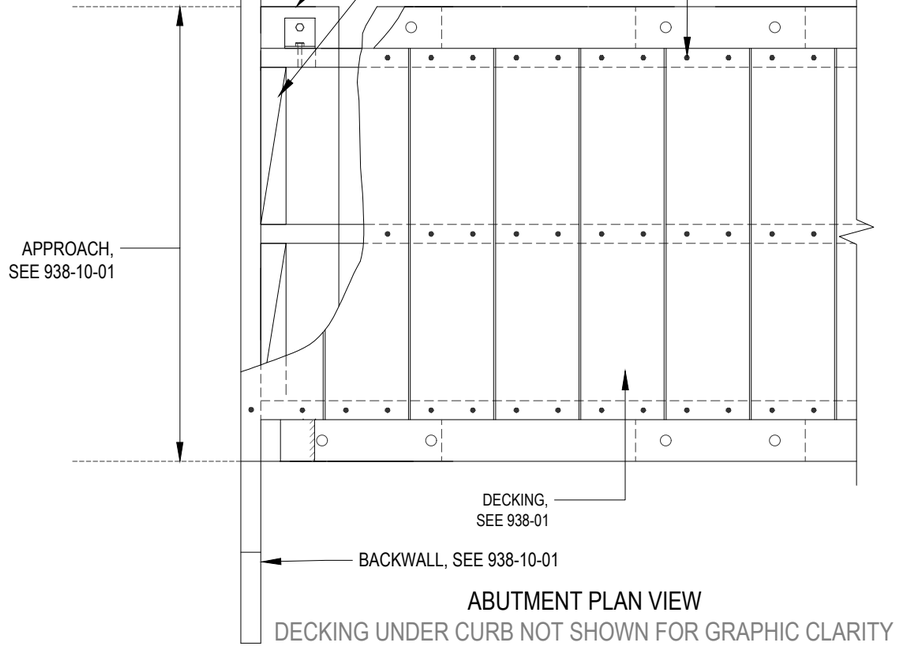
ABUTMENT SECTION ELEVATION



STRINGER SECTION ELEVATION

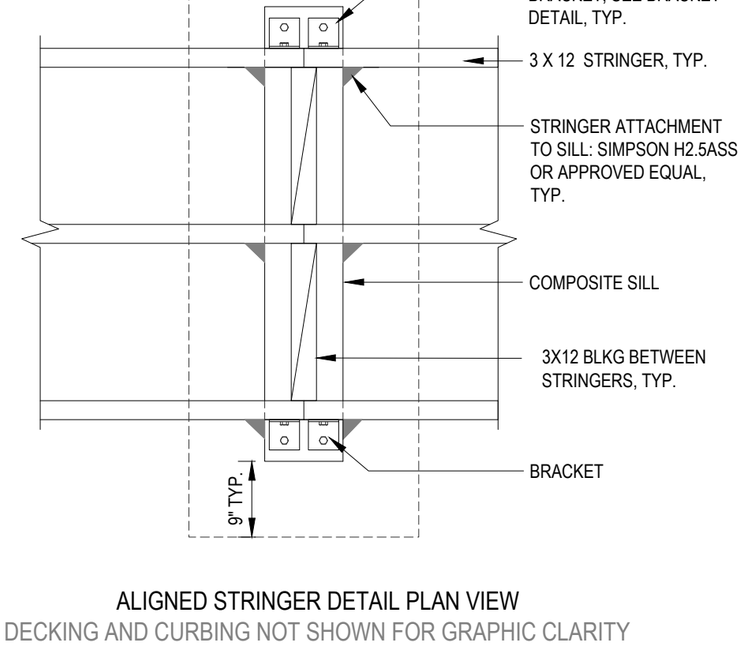


BRACKET DETAIL



ABUTMENT PLAN VIEW

DECKING UNDER CURB NOT SHOWN FOR GRAPHIC CLARITY



ALIGNED STRINGER DETAIL PLAN VIEW

DECKING AND CURBING NOT SHOWN FOR GRAPHIC CLARITY

SILL, BLOCKING AND STRINGER

COMPONENT	SIZE (IN.)	SPECIES	PRESERV. TYPE	LUMBER GRADE
SILL	12X6	COMPOSITE	NA	COLOR: GREY
BLOCKING	3X12	DOUGLAS FIR	P1	NO. 2
STRINGER	3X12	DOUGLAS FIR	P1	NO. 2

PRESERVATIVE TREATMENT, NON-INCISED (UNDER CODE REPORT ICC-ESR3834,TO EQUAL OR EXCEED AWPA USE CATEGORY SYSTEMS)			
PRESERVATIVE TYPE	TREATMENT TYPE	USE CATEGORY	PRODUCT
P1	WATERBORNE	UC3B	KLEAR-GARD 25

USE CATEGORY
UC3B = ABOVE GROUND - EXPOSED
UC4A = GROUND CONTACT - GENERAL USE
UC4B = GROUND CONTACT - HEAVY USE

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME
STRUCTURAL SUPPORT TYPE II
SECTION
938-10 - STANDARD BOARDWALKS

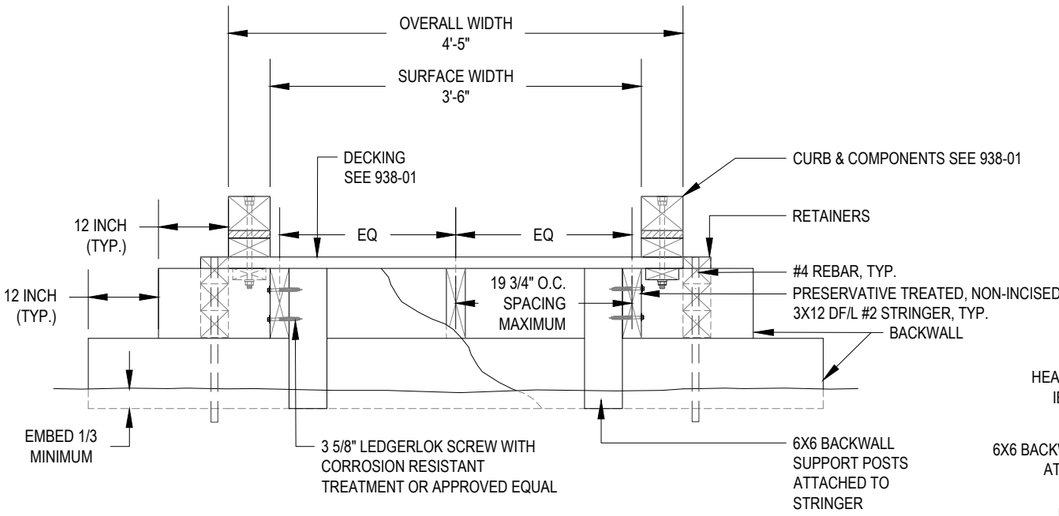
REVISION DATE
NO SCALE

DRAWING NO.
938-10-02
SHEET
21 OF **46**

2024: THIS PAGE NOT RELEVANT TO PHASE 3

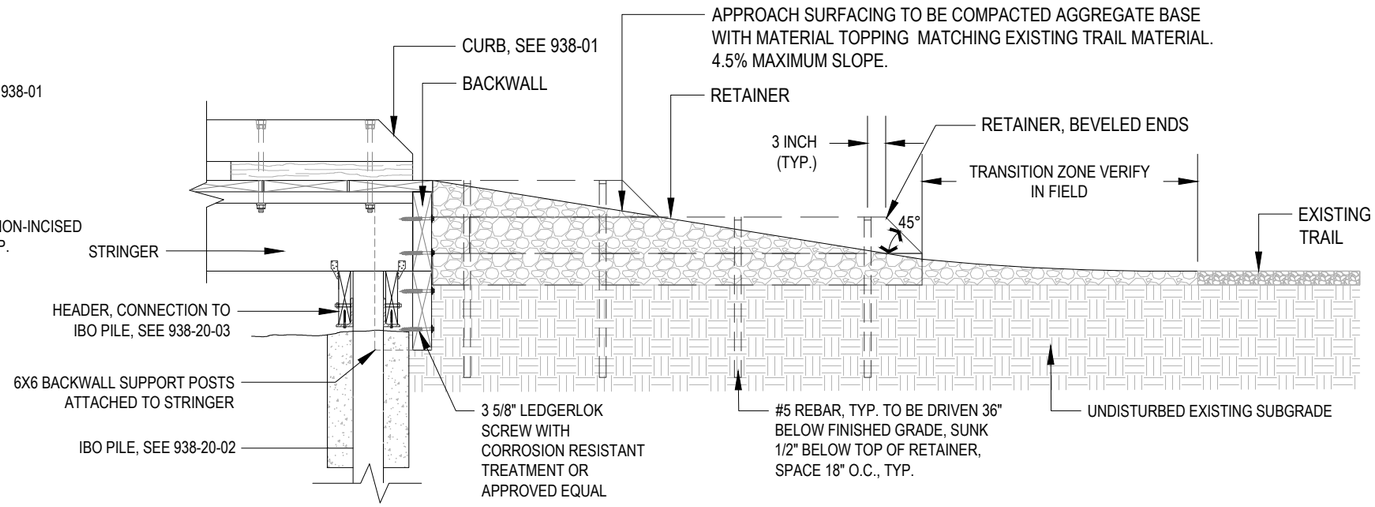
BACKWALL AND RETAINER

COMPONENT	SIZE (IN.)	SPECIES	PRESERV. TYPE	LUMBER GRADE	COMMENT
BACKWALL	2X12	COMPOSITE	N/A	MARINE	
RETAINER	4X4	JUNIPER	P1	NO. 2 ROUGH CUT	VERIFY LENGTH IN FIELD
BACKWALL SUPPORT POST	6X6	COMPOSITE	N/A	MARINE	VERIFY LENGTH IN FIELD



TYPICAL BACKWALL ELEVATED SECTION

BLOCKING AND IBO PILE NOT SHOWN FOR GRAPHIC CLARITY



TYPICAL APPROACH ELEVATED SECTION

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

BACKWALL & APPROACH TYPE I

SECTION

938-20 - ELEVATED BOARDWALKS

REVISION DATE

NO SCALE

DRAWING NO.

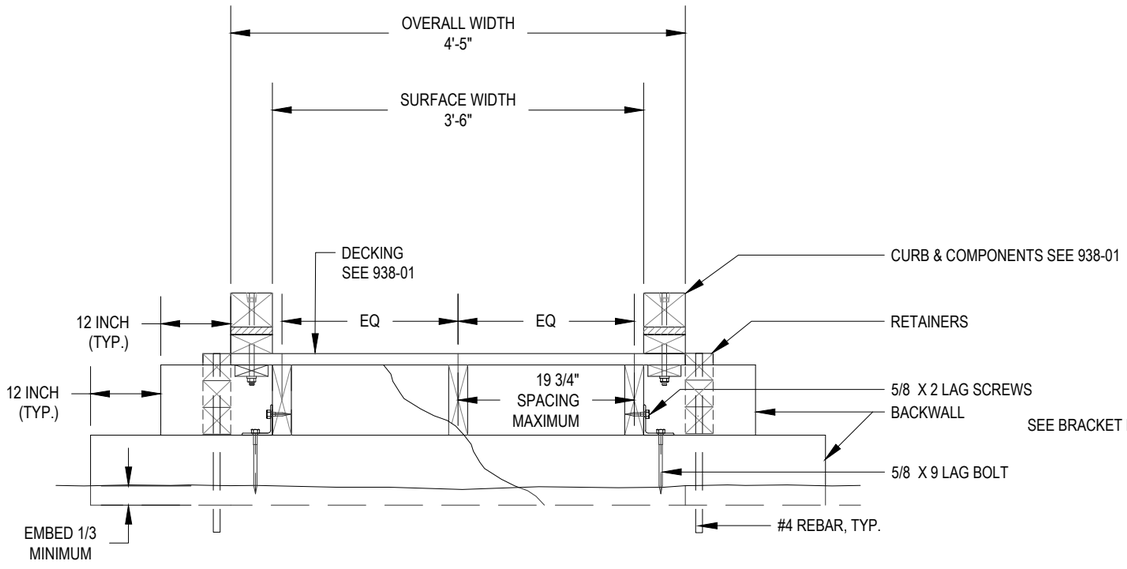
938-20-01

SHEET **22** OF **46**

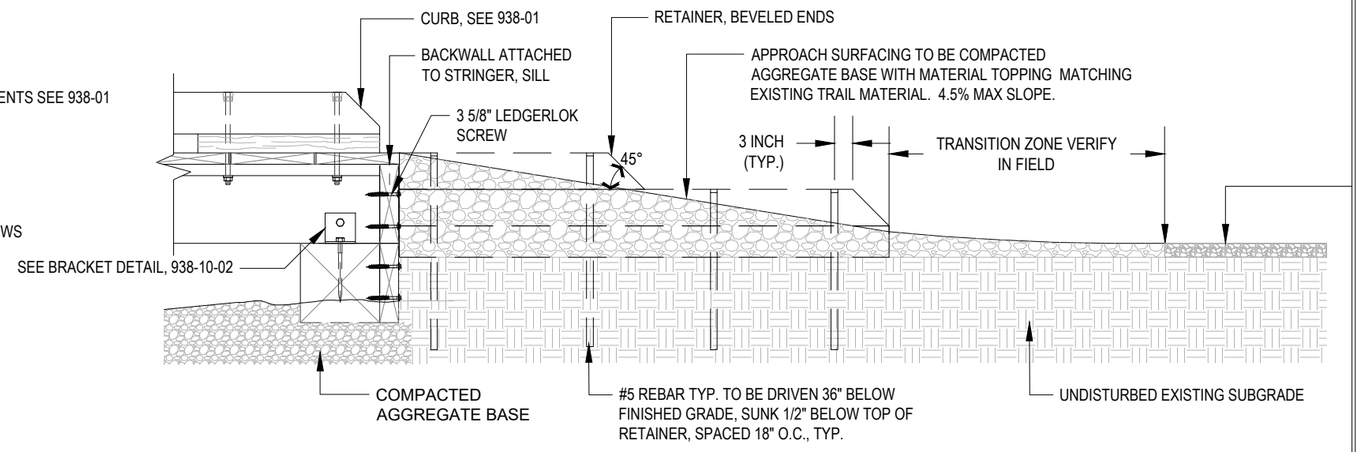
2024: THIS PAGE IS RELEVANT TO SEGMENTS VIII & IX. PREPARE BIDS IN ACCORDANCE WITH THESE PLANS

BACKWALL AND RETAINER

COMPONENT	SIZE (IN.)	SPECIES	PRESERV. TYPE	LUMBER GRADE	COMMENT
BACKWALL	2X12	COMPOSITE	N/A	MARINE	COLOR: GRAY
RETAINER	4X4	JUNIPER	N/A	NO. 2 ROUGH CUT	VERIFY LENGTH IN FIELD



TYPICAL BACKWALL ELEVATED SECTION
BLOCKING NOT SHOWN FOR GRAPHIC CLARITY



TYPICAL APPROACH ELEVATED SECTION

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME
BACKWALL & APPROACH TYPE II
SECTION
938 -10 - STANDARD BOARDWALKS

REVISION DATE

NO SCALE

DRAWING NO.
938-10-01
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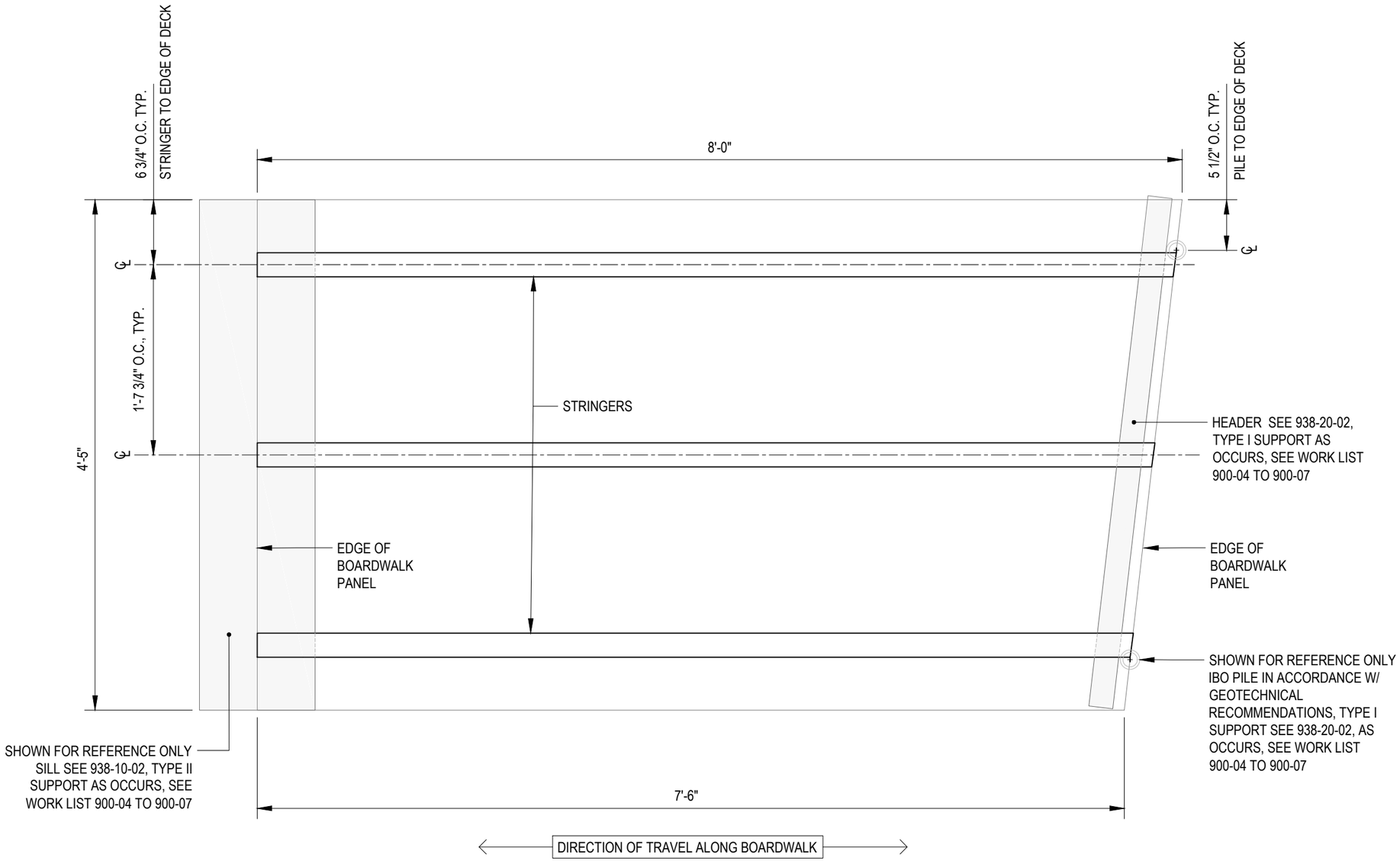
23 OF **46**

2024: THIS PAGE IS RELEVANT TO SEGMENTS VIII & IX. PREPARE BIDS IN ACCORDANCE WITH THESE PLANS



DECKING AND CURBING NOT SHOWN FOR GRAPHIC CLARITY

TYPICAL PANEL FRAMING - PANEL A SHOWN
APPLICABLE TO PANELS: A, B, C, D, E, F, G, H, I, J, K, L, M

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME
FRAMING DETAIL - TYP. PANEL
SECTION
938 - BOARDWALKS

REVISION DATE

0 1/2 1 ft

DRAWING NO.
938-02
SHEET **24** OF **46**

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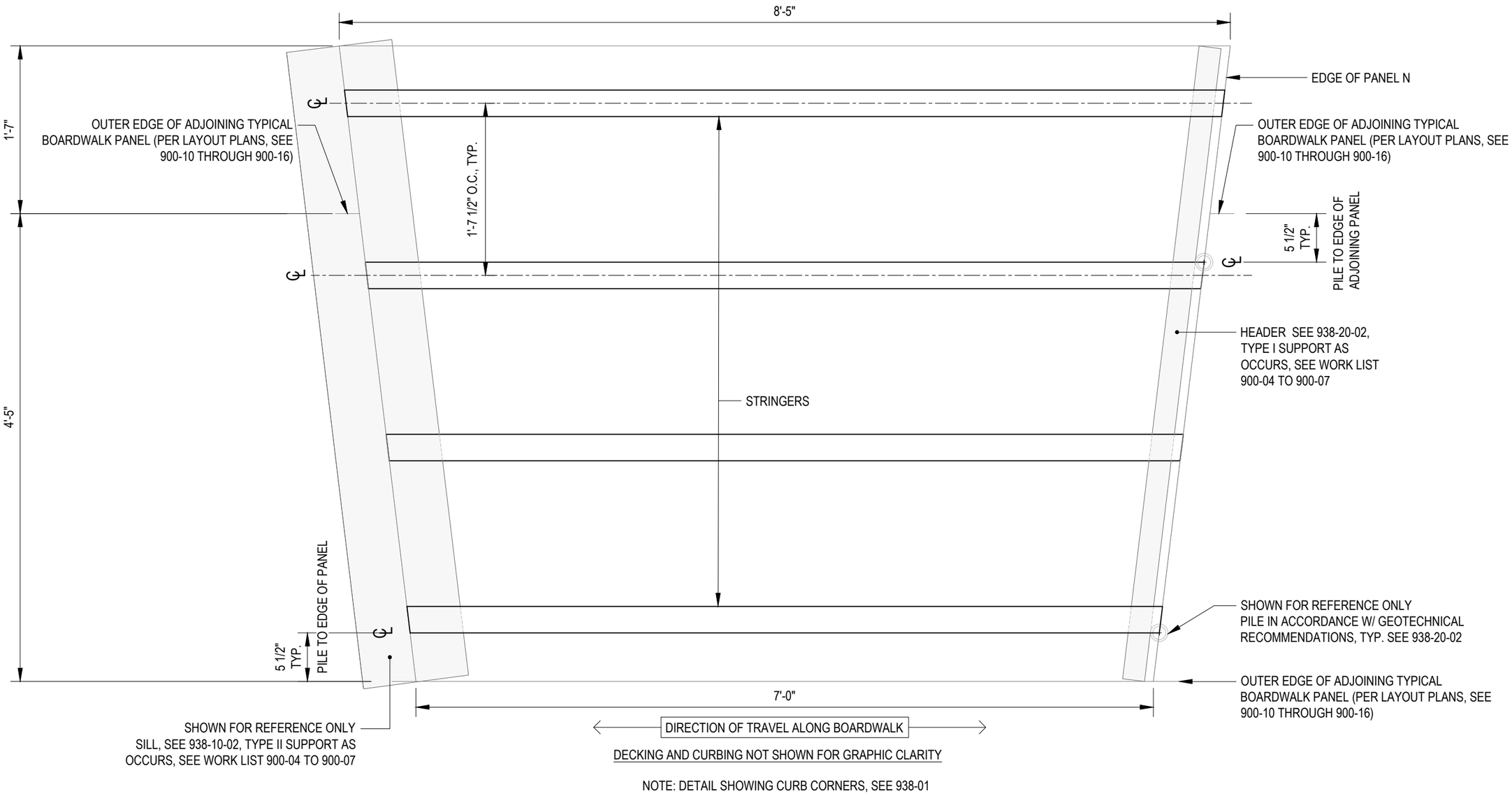

DECKING AND CURBING NOT SHOWN FOR GRAPHIC CLARITY

NOTE: DETAIL SHOWING CURB CORNERS, SEE 938-01

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

FRAMING DETAIL - PANEL N

SECTION

938 - BOARDWALKS

REVISION DATE

0 1/2 1 ft

DRAWING NO.

938-03

SHEET **25** OF **46**

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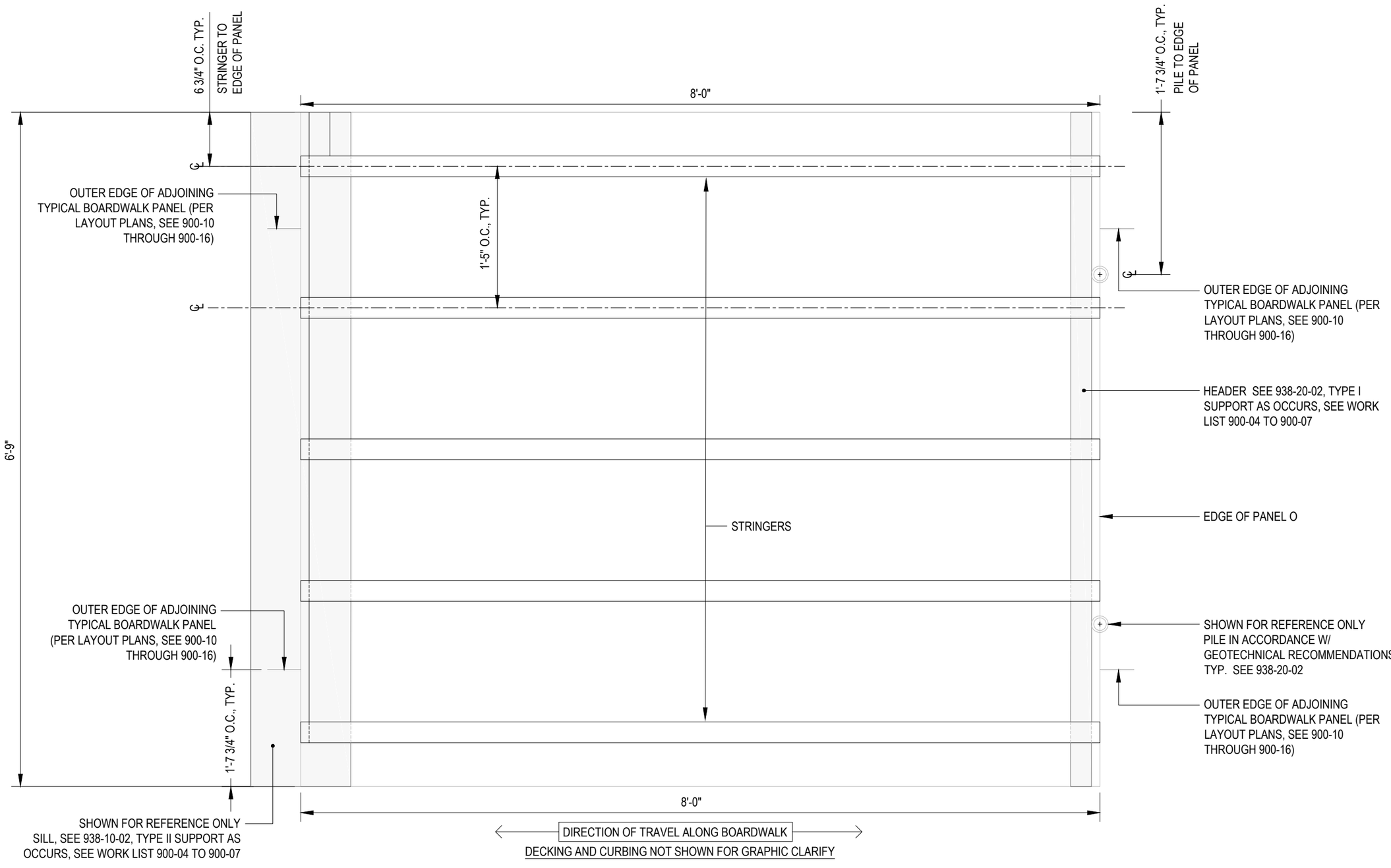

DECKING AND CURBING NOT SHOWN FOR GRAPHIC CLARIFY

NOTE: DETAIL SHOWING CURB CORNERS, SEE 938-01

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

FRAMING DETAIL - PANEL O

SECTION

938 - BOARDWALKS

REVISION DATE

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DRAWING NO.

938-04

SHEET **26** OF **46**

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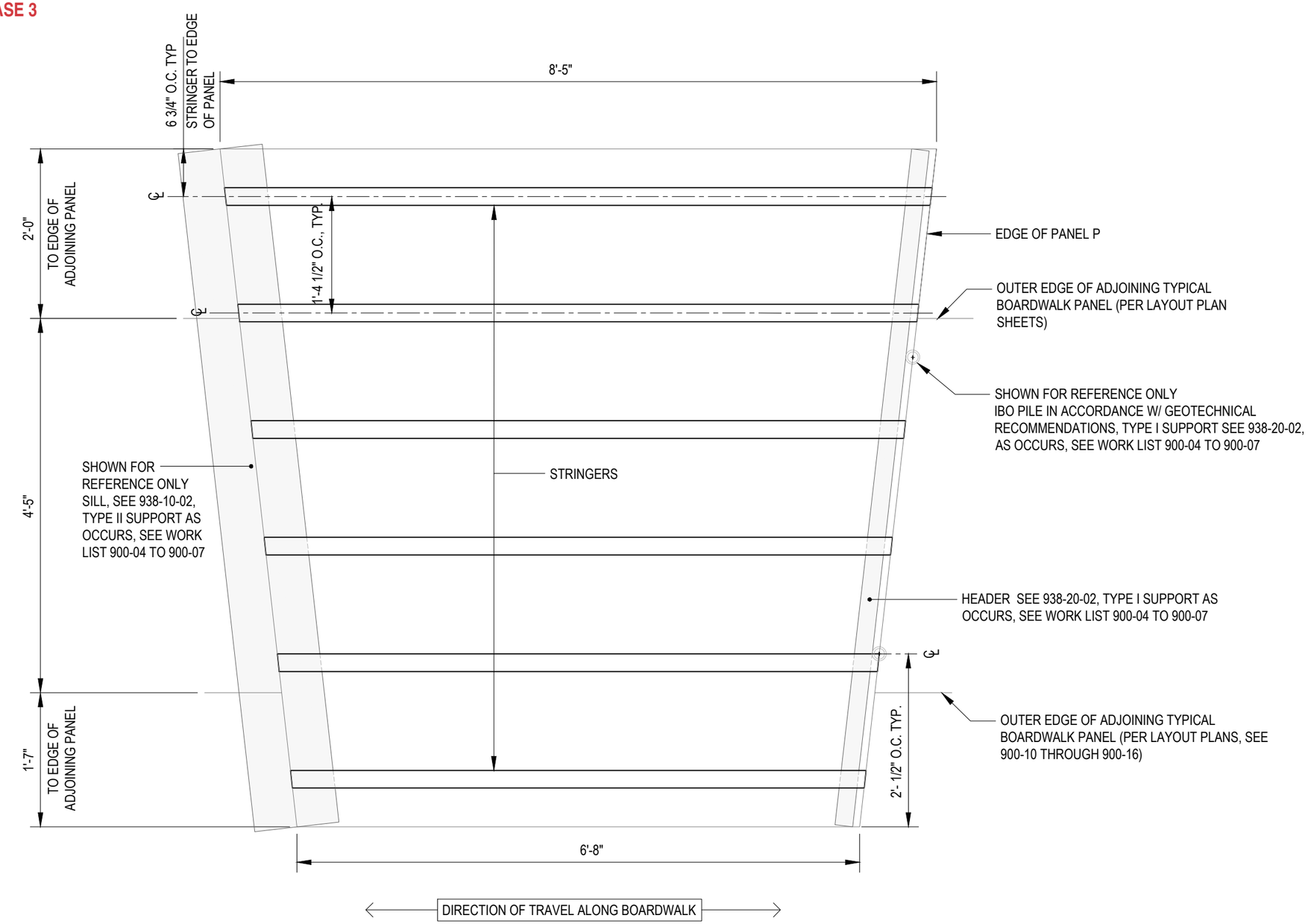

DECKING AND CURBING NOT SHOWN FOR GRAPHIC CLARIFY

NOTE: DETAIL SHOWING CURB CORNERS, SEE 938-01

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

FRAMING DETAIL - PANEL P

SECTION

938 - BOARDWALKS

REVISION DATE

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DRAWING NO.

938-05

SHEET **27** OF **46**

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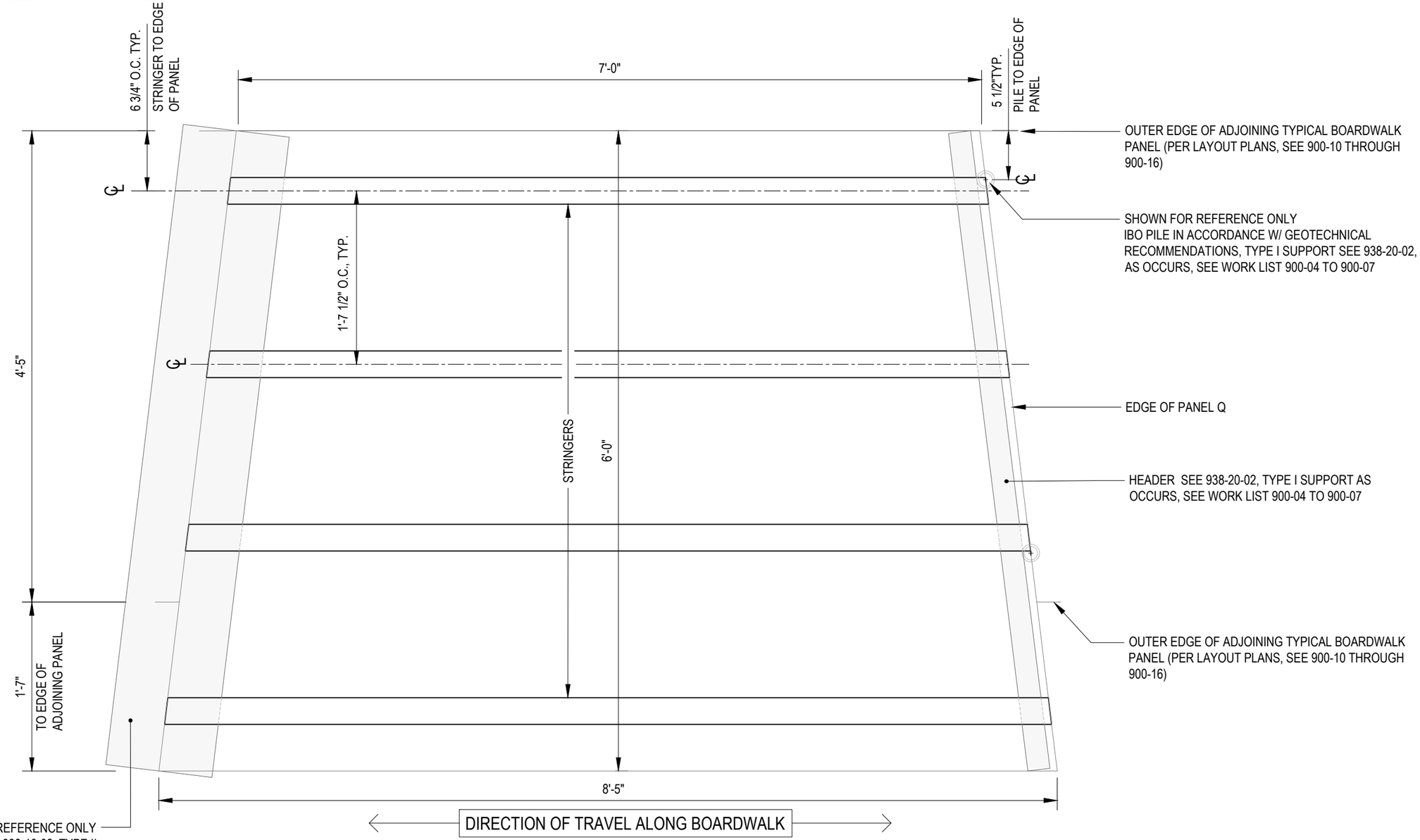

DECKING AND CURBING NOT SHOWN FOR GRAPHIC CLARIFY

NOTE: DETAIL SHOWING CURB CORNERS, SEE 938-01

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME
FRAMING DETAIL - PANEL Q
SECTION
938 - BOARDWALKS

REVISION DATE

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DRAWING NO.
938-06
SHEET **28** OF **46**

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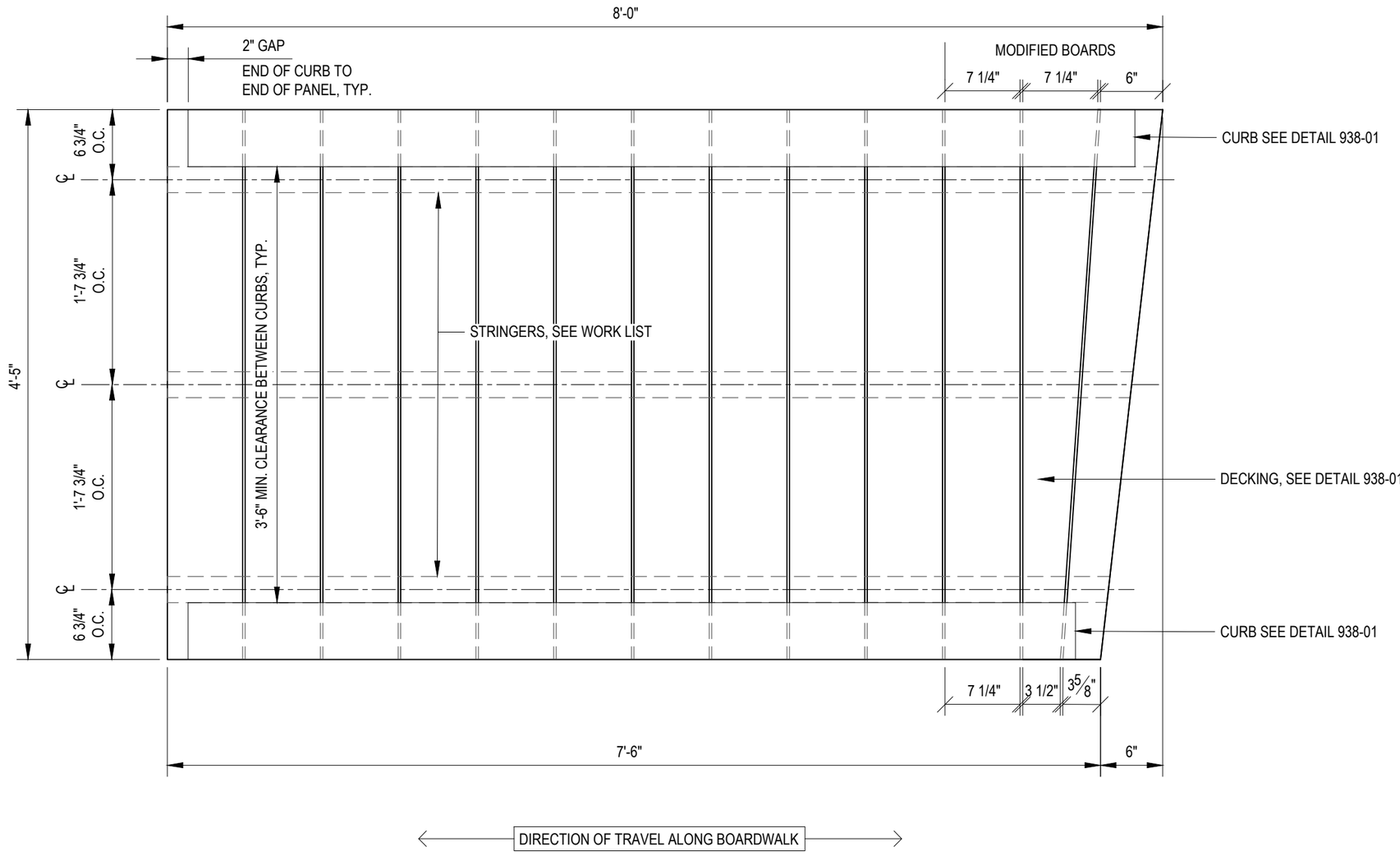

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FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

BOARDWALK PANEL A

SECTION

938 - BOARDWALKS

REVISION DATE

0 1/2 1 ft

DRAWING NO.

938-A

SHEET **29** OF **46**

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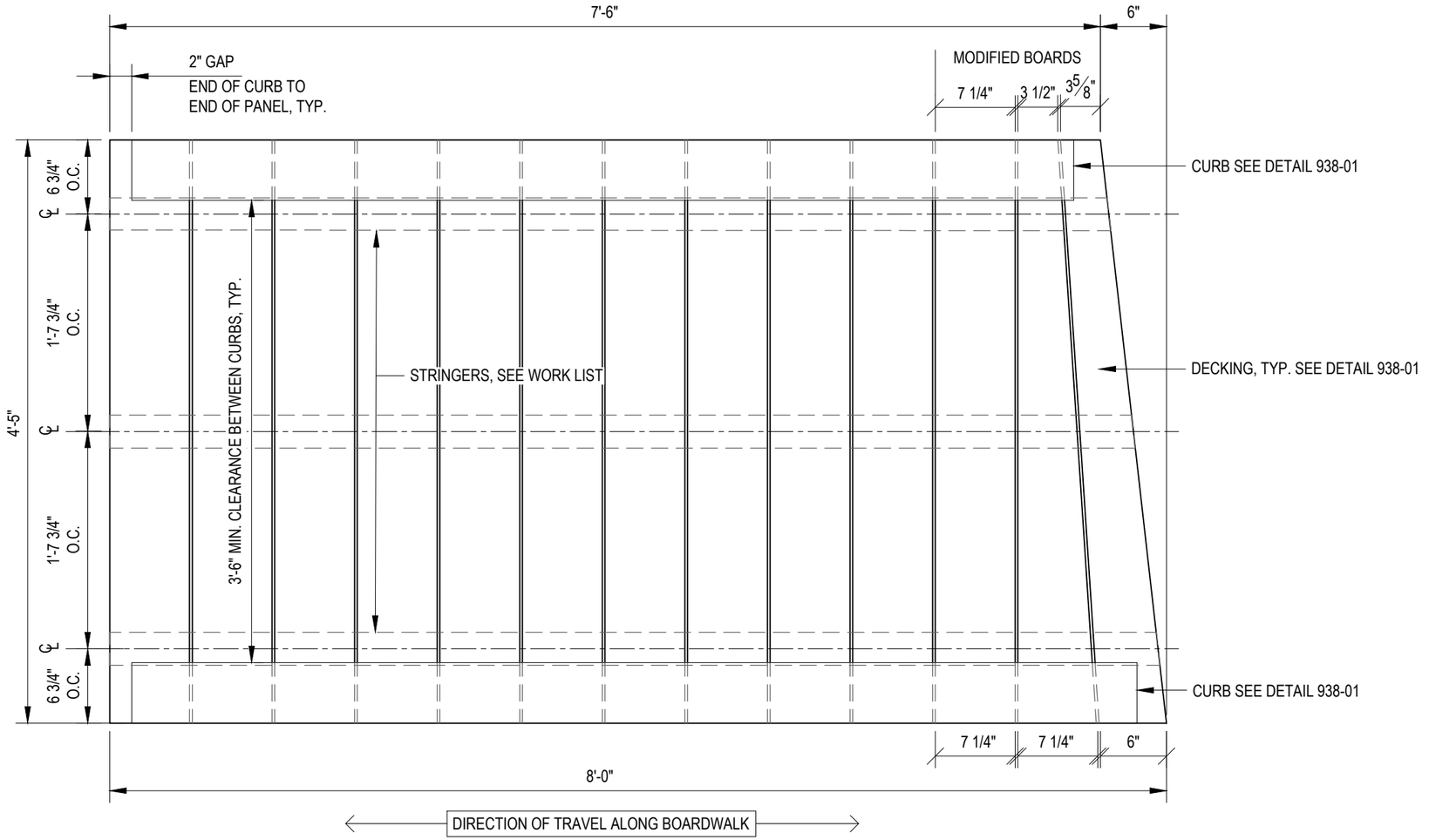

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

BOARDWALK PANEL B

SECTION

938 - BOARDWALKS

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0 1/2 1 ft

DRAWING NO.

938-B

SHEET **30** OF **46**

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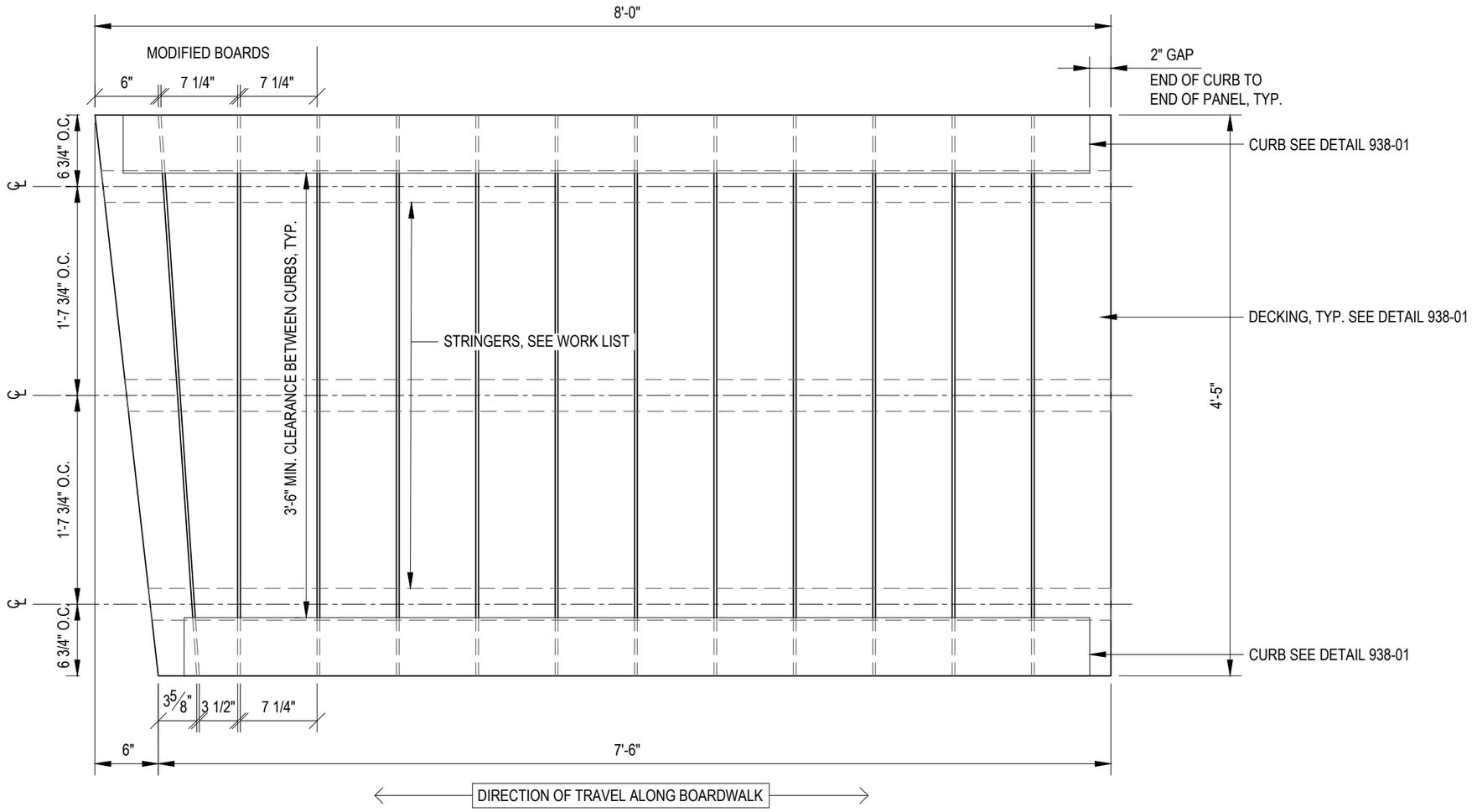

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

BOARDWALK PANEL C

SECTION

938 - BOARDWALKS

REVISION DATE

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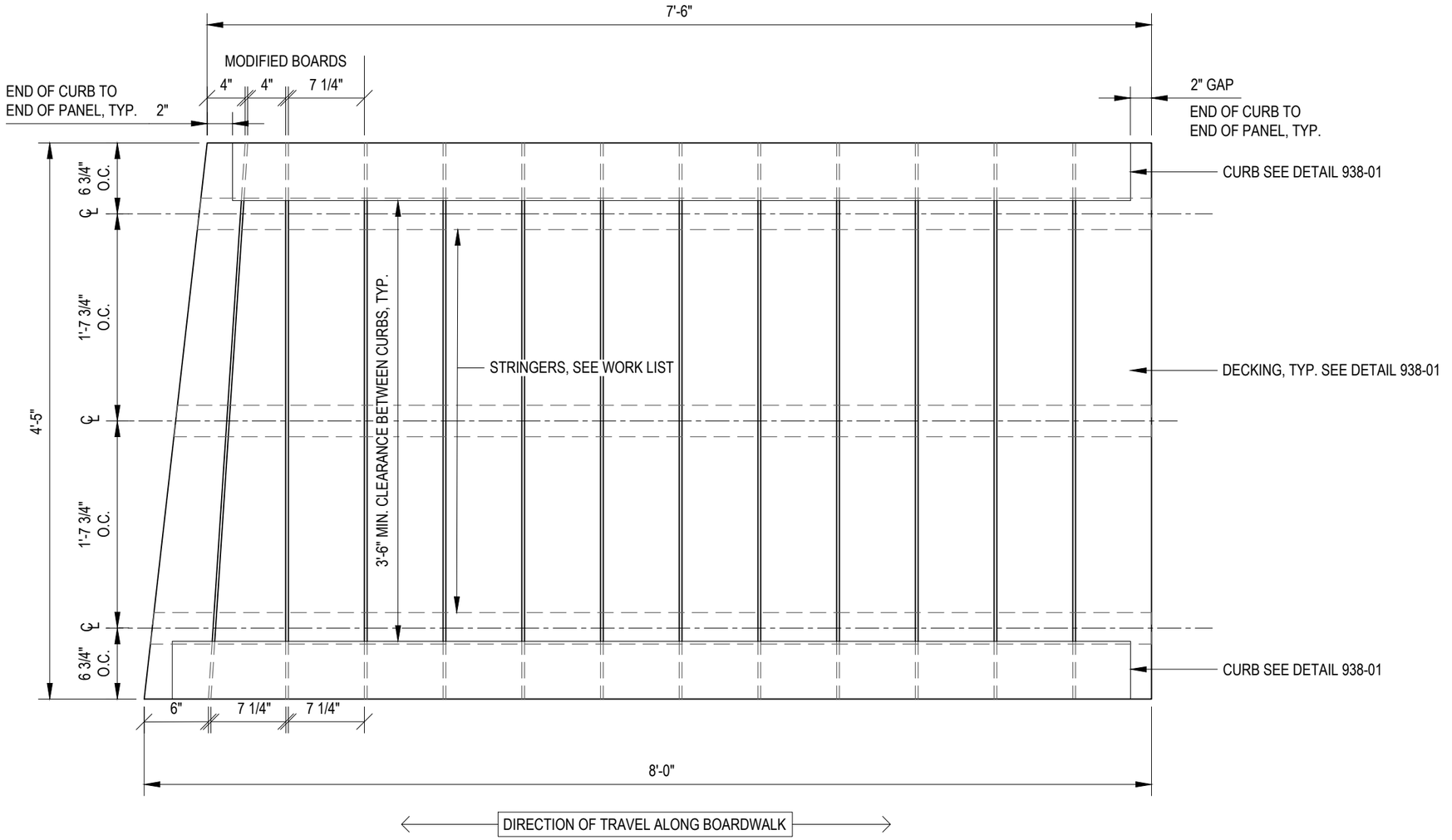
DRAWING NO.

938-C

SHEET **31** OF **46**



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

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BOARDWALK PANEL D

SECTION

938 - BOARDWALKS

REVISION DATE

0 1/2 1 ft

DRAWING NO.

938-D

SHEET **32** OF **46**

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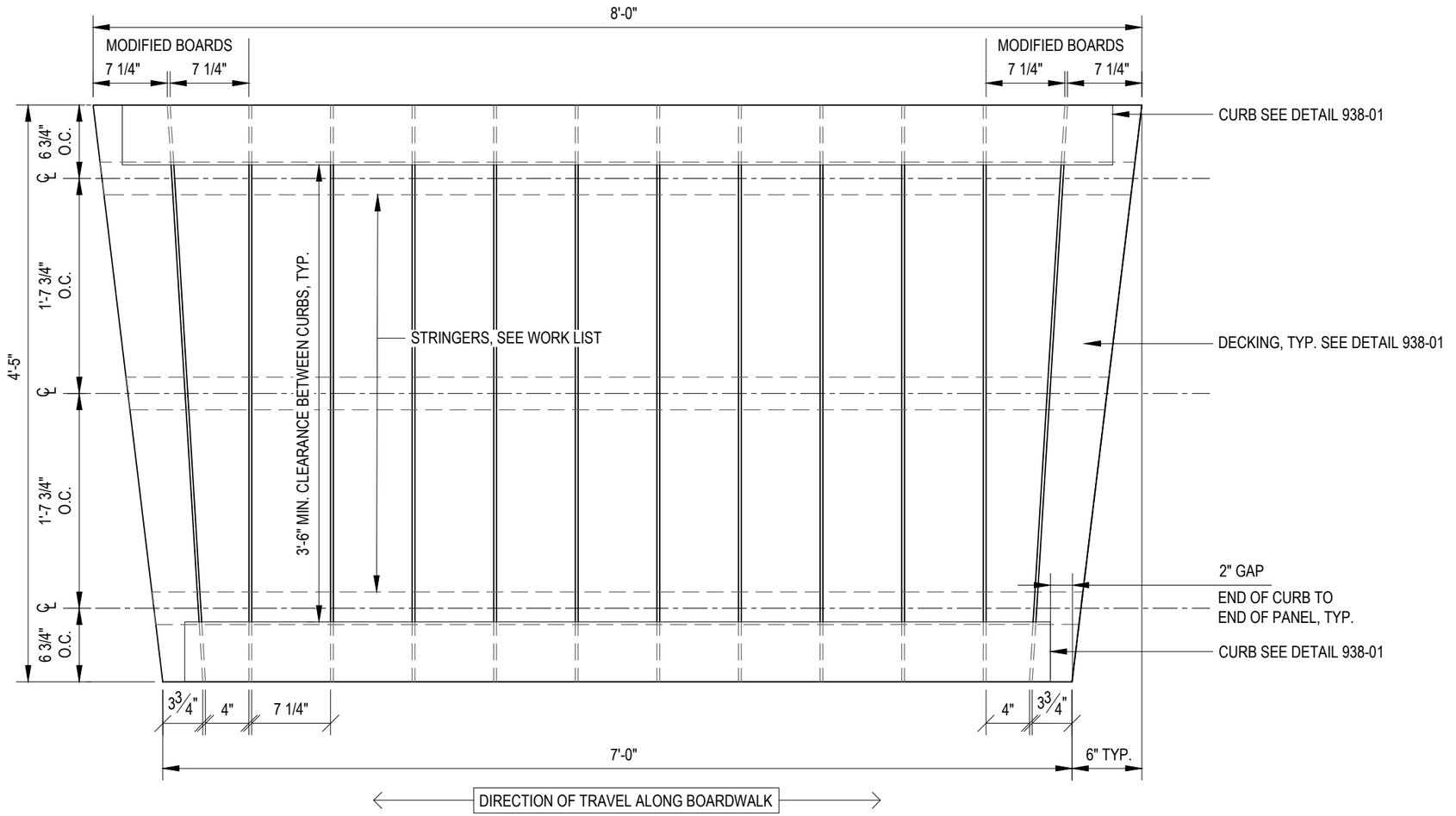

U.S. DEPARTMENT OF AGRICULTURE
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PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
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DRAWING NAME

BOARDWALK PANEL E

SECTION

938 - BOARDWALKS

REVISION DATE

0 1/2 1 ft

DRAWING NO.

938-E

SHEET **33** OF **46**

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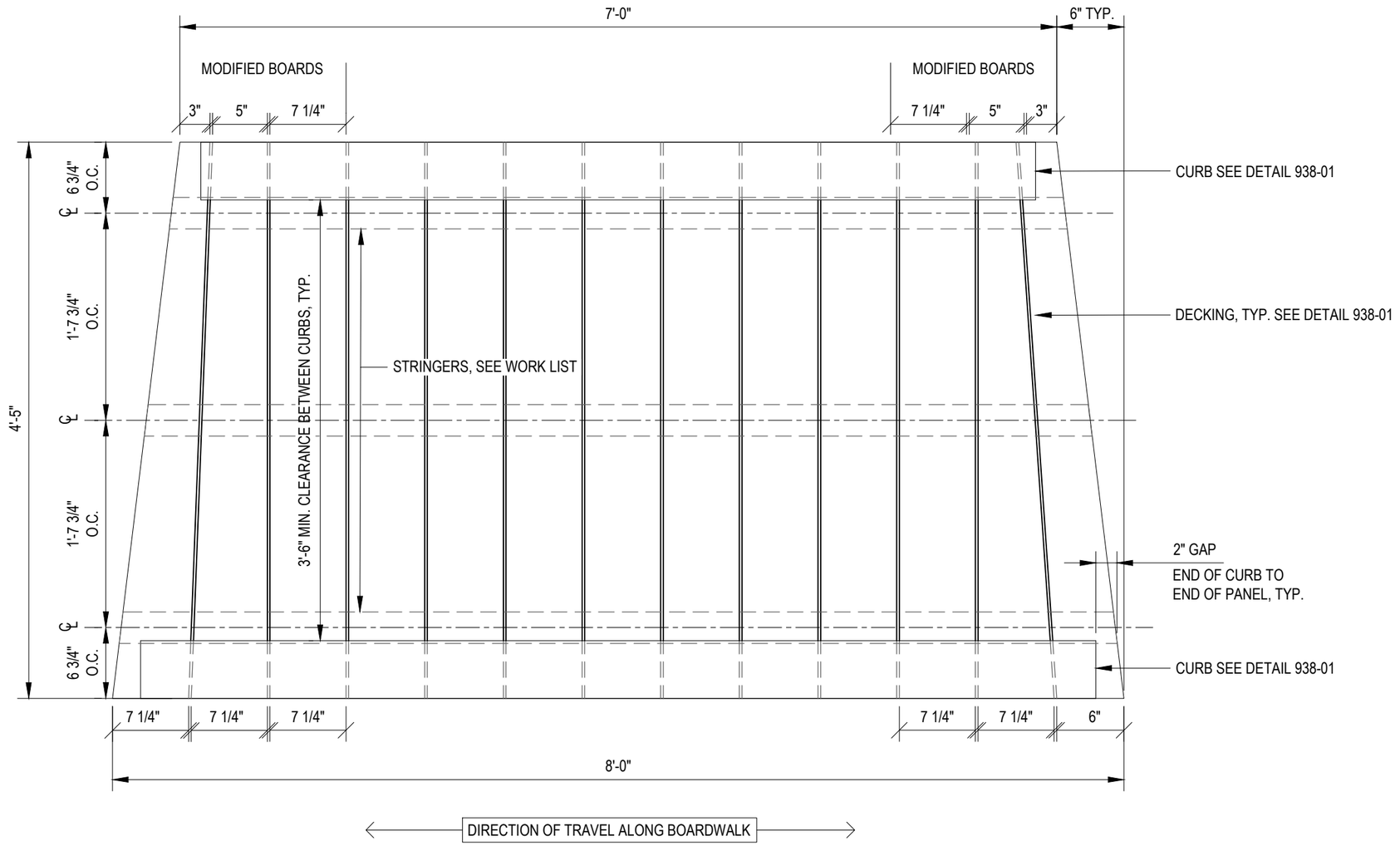

U.S. DEPARTMENT OF AGRICULTURE
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DRAWING NAME

BOARDWALK PANEL F

SECTION

938 - BOARDWALKS

REVISION DATE

0 1/2 1 ft

DRAWING NO.

938-F

SHEET **34** OF **46**

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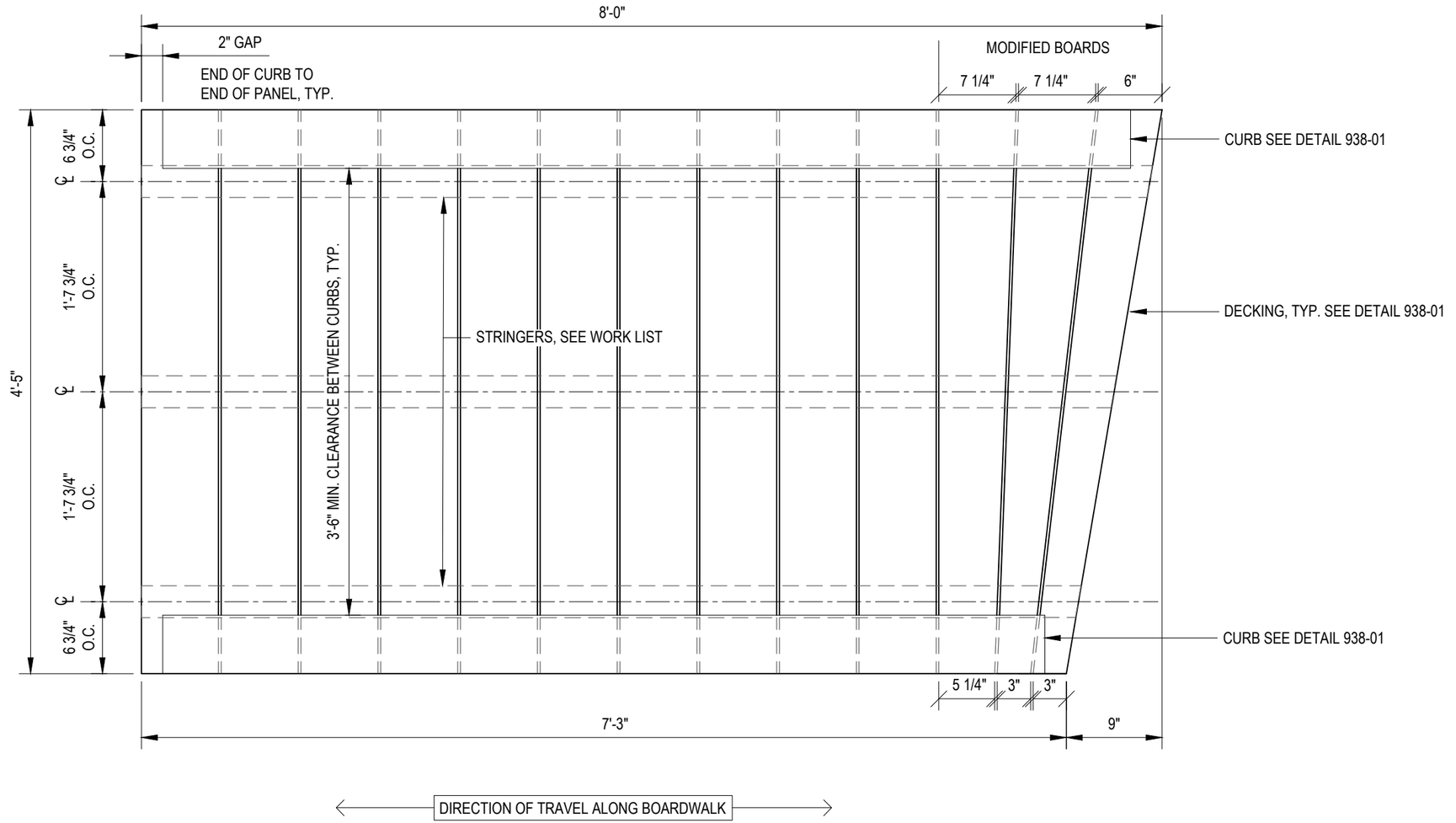

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PROJECT NAME & LOCATION

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MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

BOARDWALK PANEL G

SECTION

938 - BOARDWALKS

REVISION DATE

0 1/2 1 ft

DRAWING NO.

938-G

SHEET **35** OF **46**

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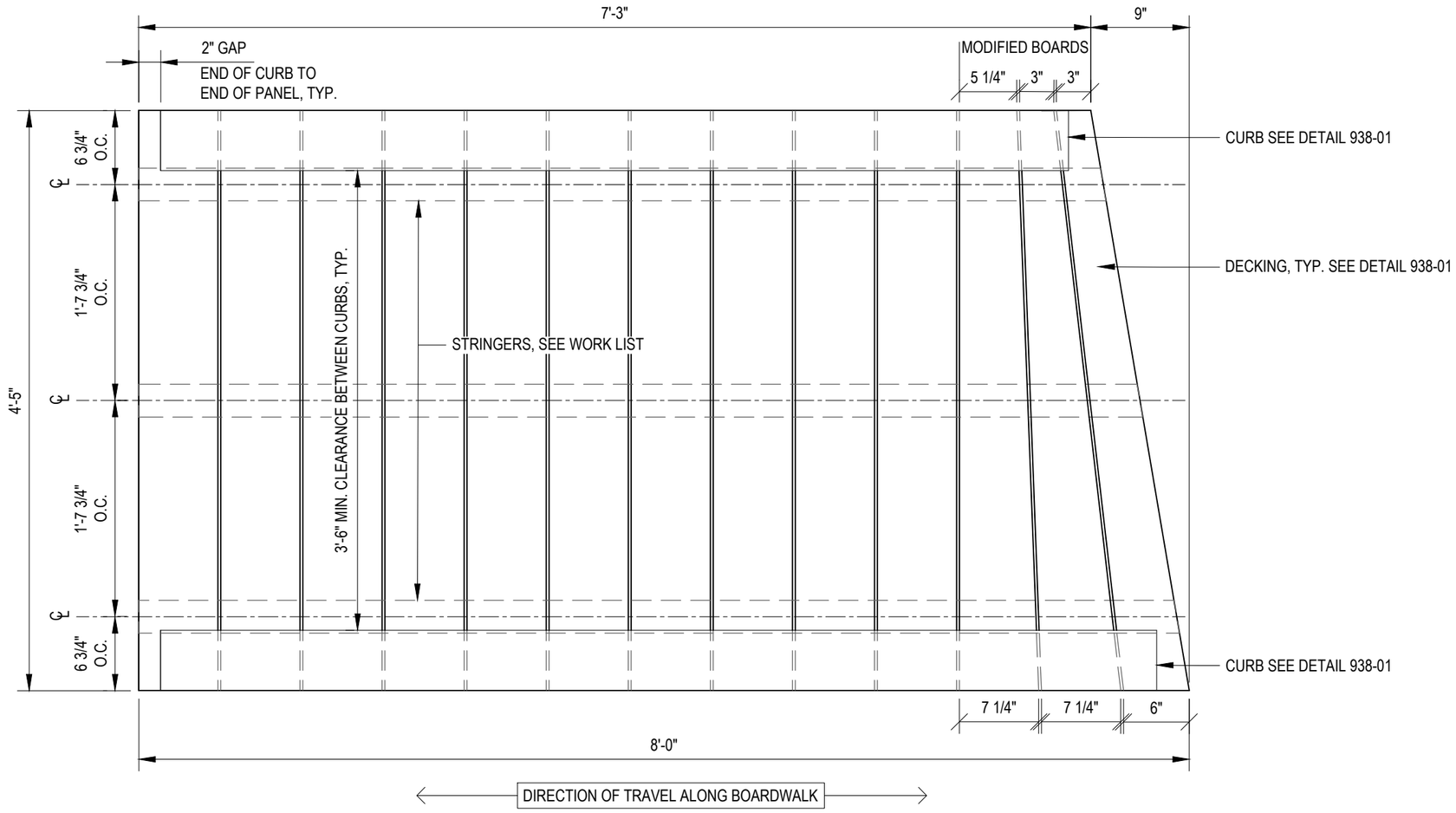

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

BOARDWALK PANEL H

SECTION

938 - BOARDWALKS

REVISION DATE

0 1/2 1 ft

DRAWING NO.

938-H

SHEET **36** OF **46**

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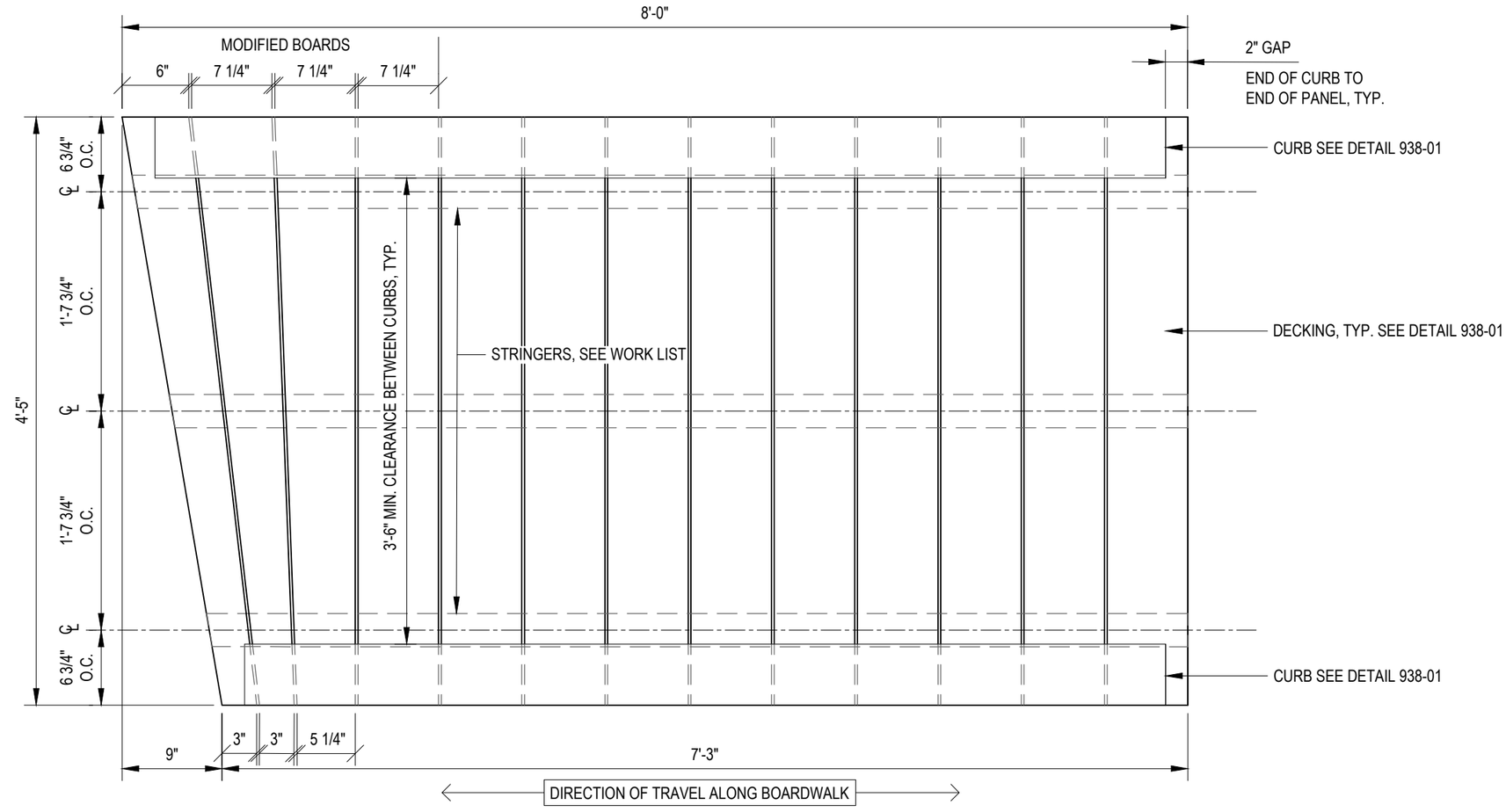

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

BOARDWALK PANEL I

SECTION

938 - BOARDWALKS

REVISION DATE

0 1/2 1 ft

DRAWING NO.

938-I

SHEET **37** OF **46**

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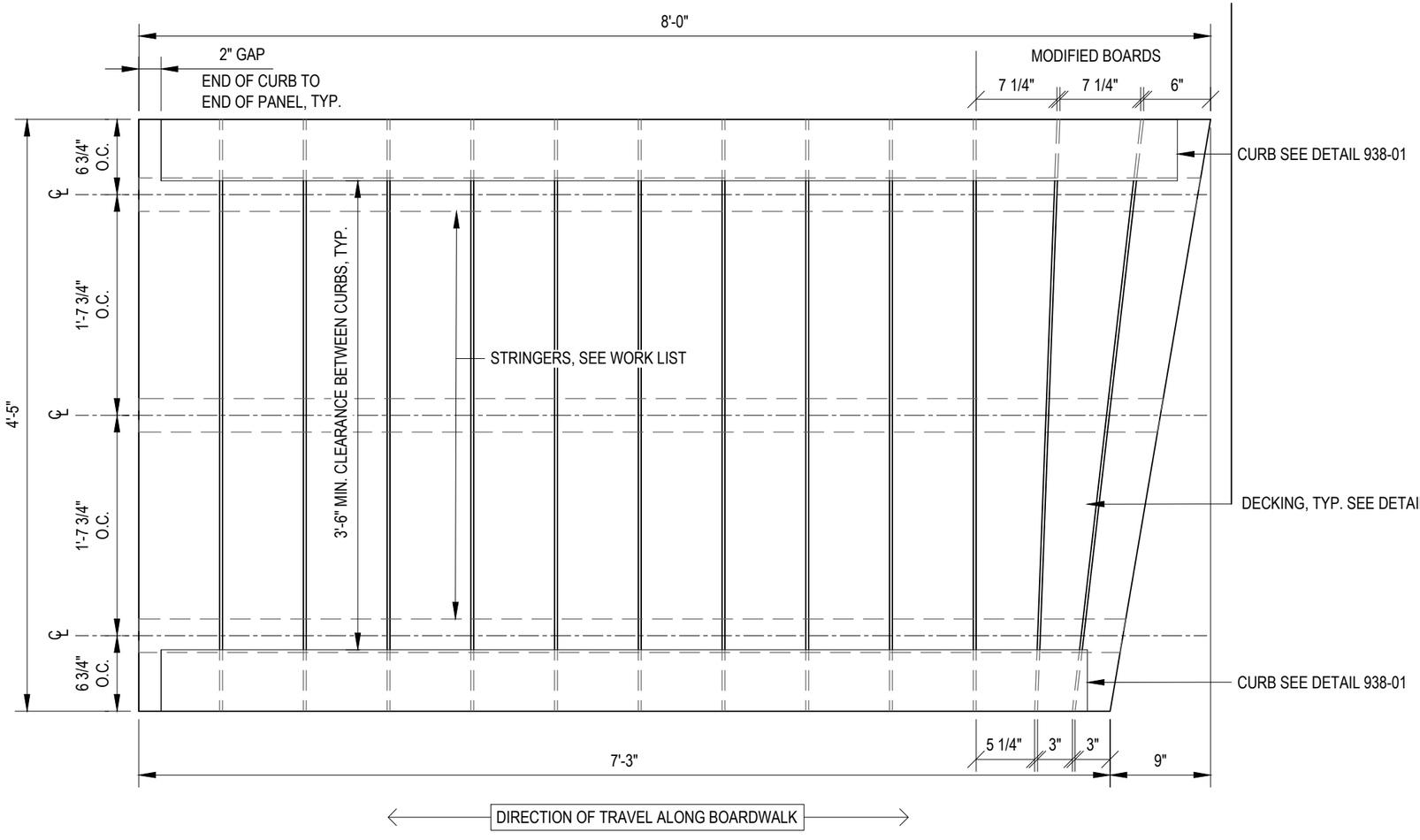

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

BOARDWALK PANEL J

SECTION

938 - BOARDWALKS

REVISION DATE

0 1/2 1 ft

DRAWING NO.

938-J

SHEET **38** OF **46**

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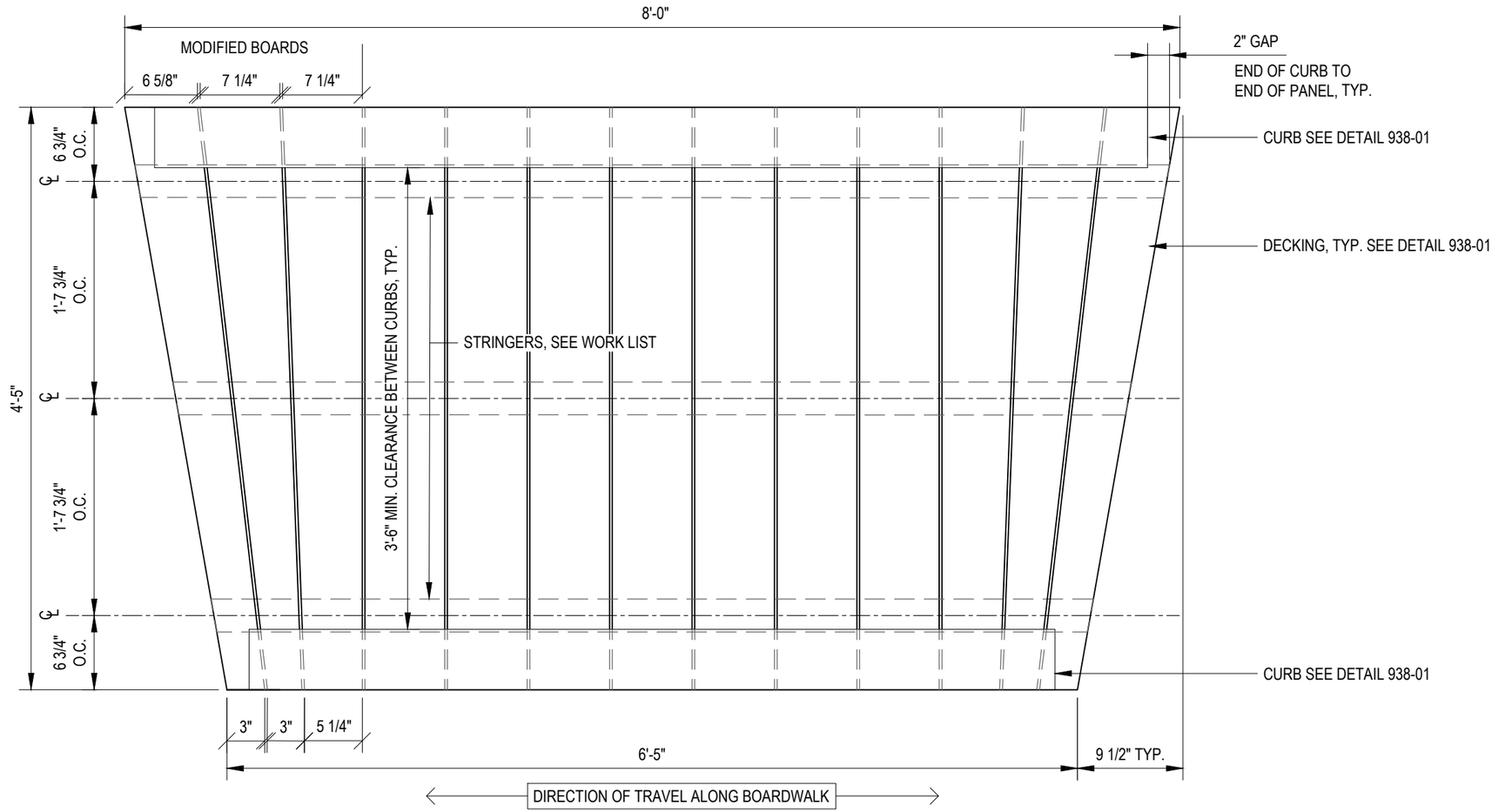

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

BOARDWALK PANEL K

SECTION

938 - BOARDWALKS

REVISION DATE

0 1/2 1 ft

DRAWING NO.

938-K

SHEET **39** OF **46**

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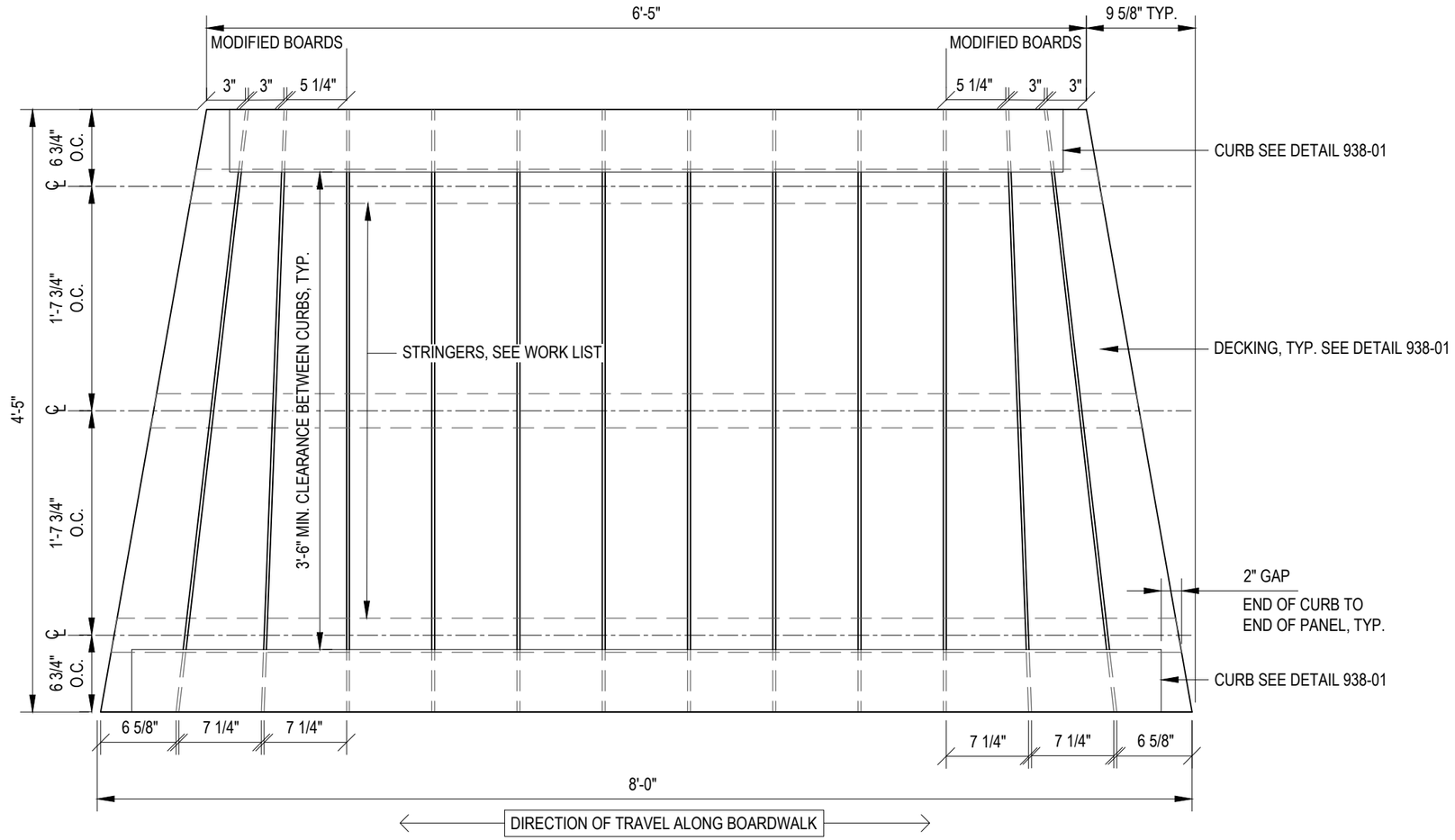

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

BOARDWALK PANEL L

SECTION

938 - BOARDWALKS

REVISION DATE

0 1/2 1 ft

DRAWING NO.

938-L

SHEET **40** OF **46**

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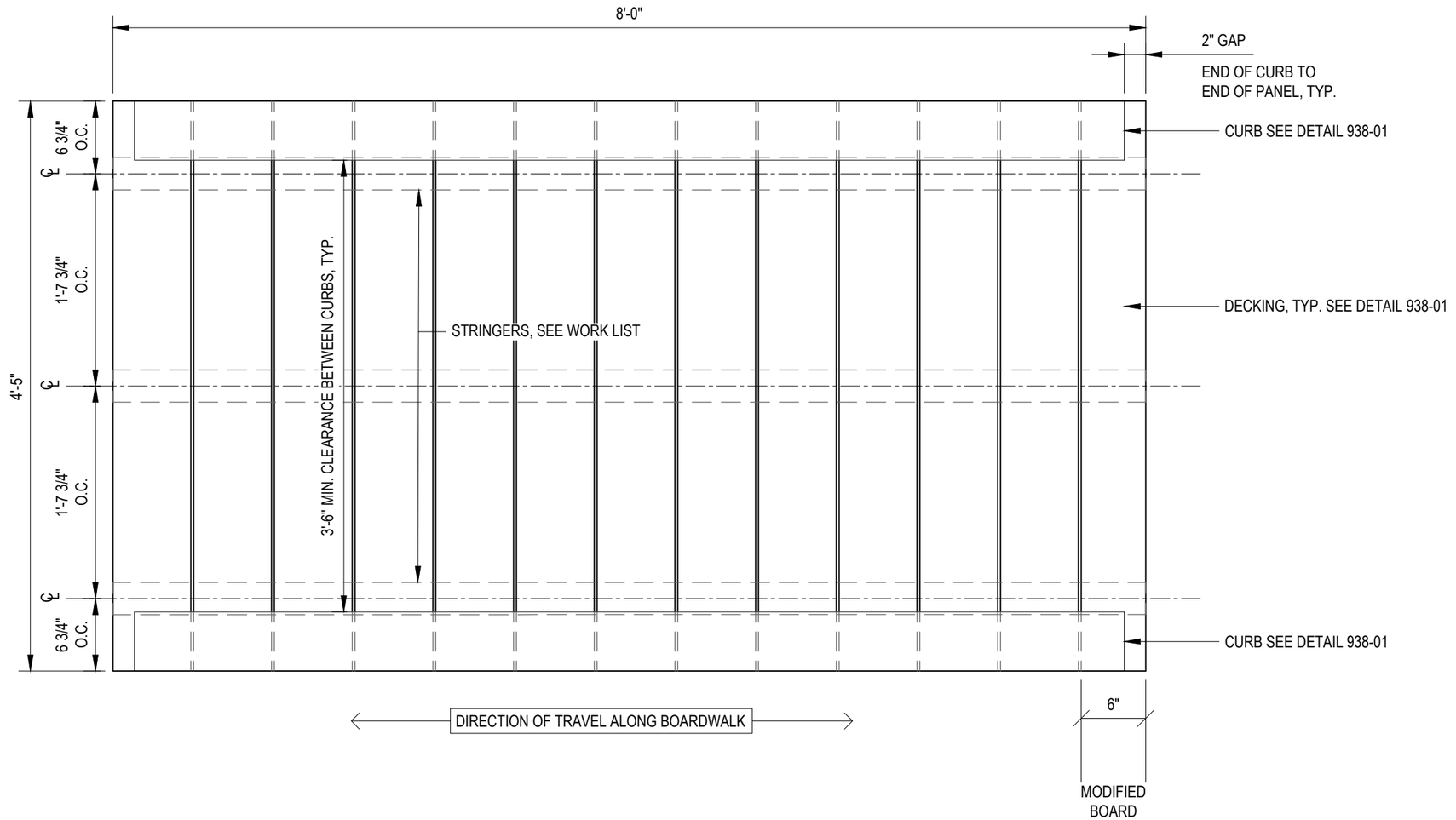

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME
BOARDWALK PANEL M
SECTION
938 - BOARDWALKS

REVISION DATE

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DRAWING NO.
938-M
SHEET **41** OF **46**

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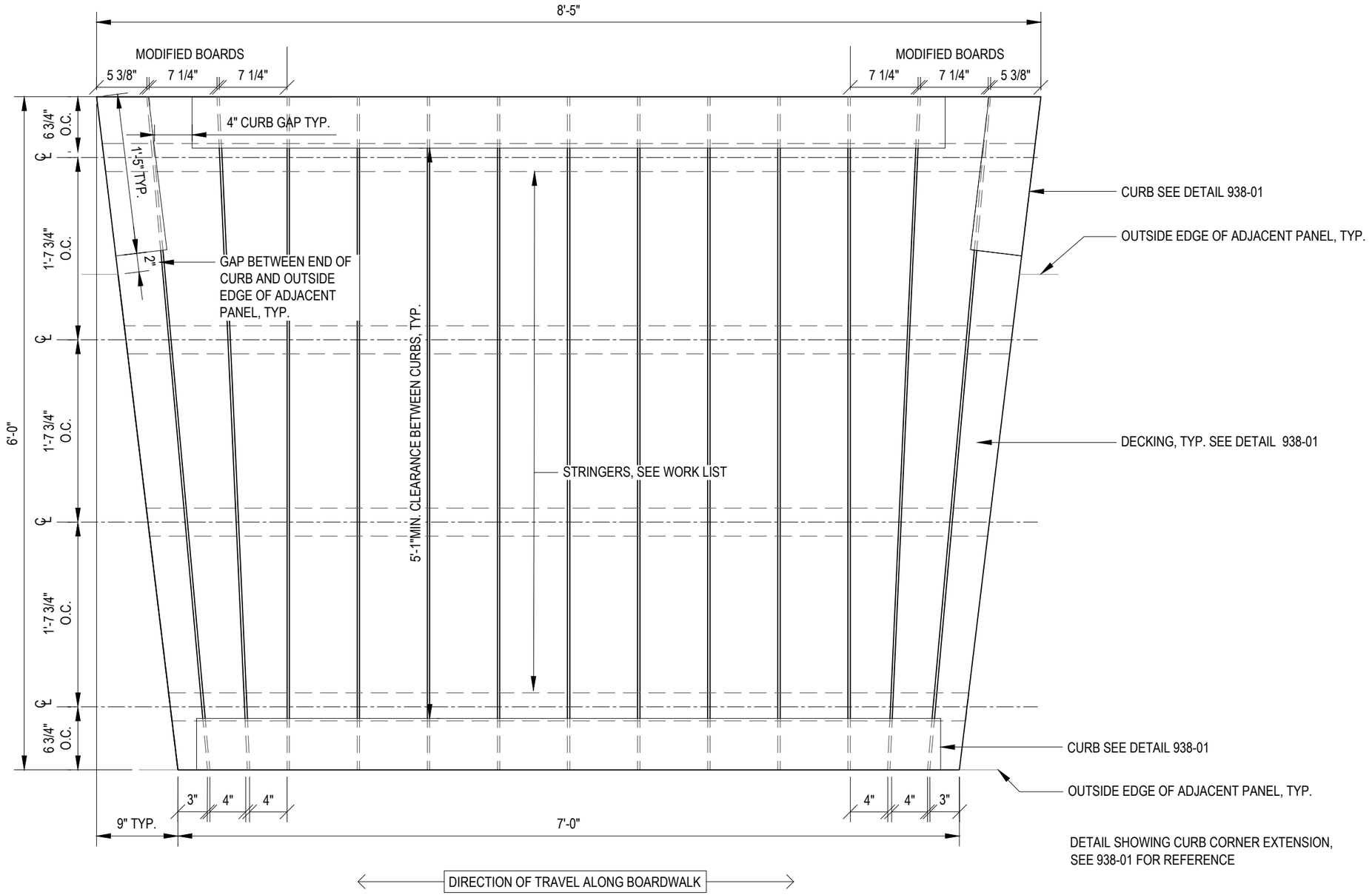

DETAIL SHOWING CURB CORNER EXTENSION, SEE 938-01 FOR REFERENCE

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME
BOARDWALK PANEL N
SECTION
938 - BOARDWALKS

REVISION DATE

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DRAWING NO.
938-N
SHEET **42** OF **46**

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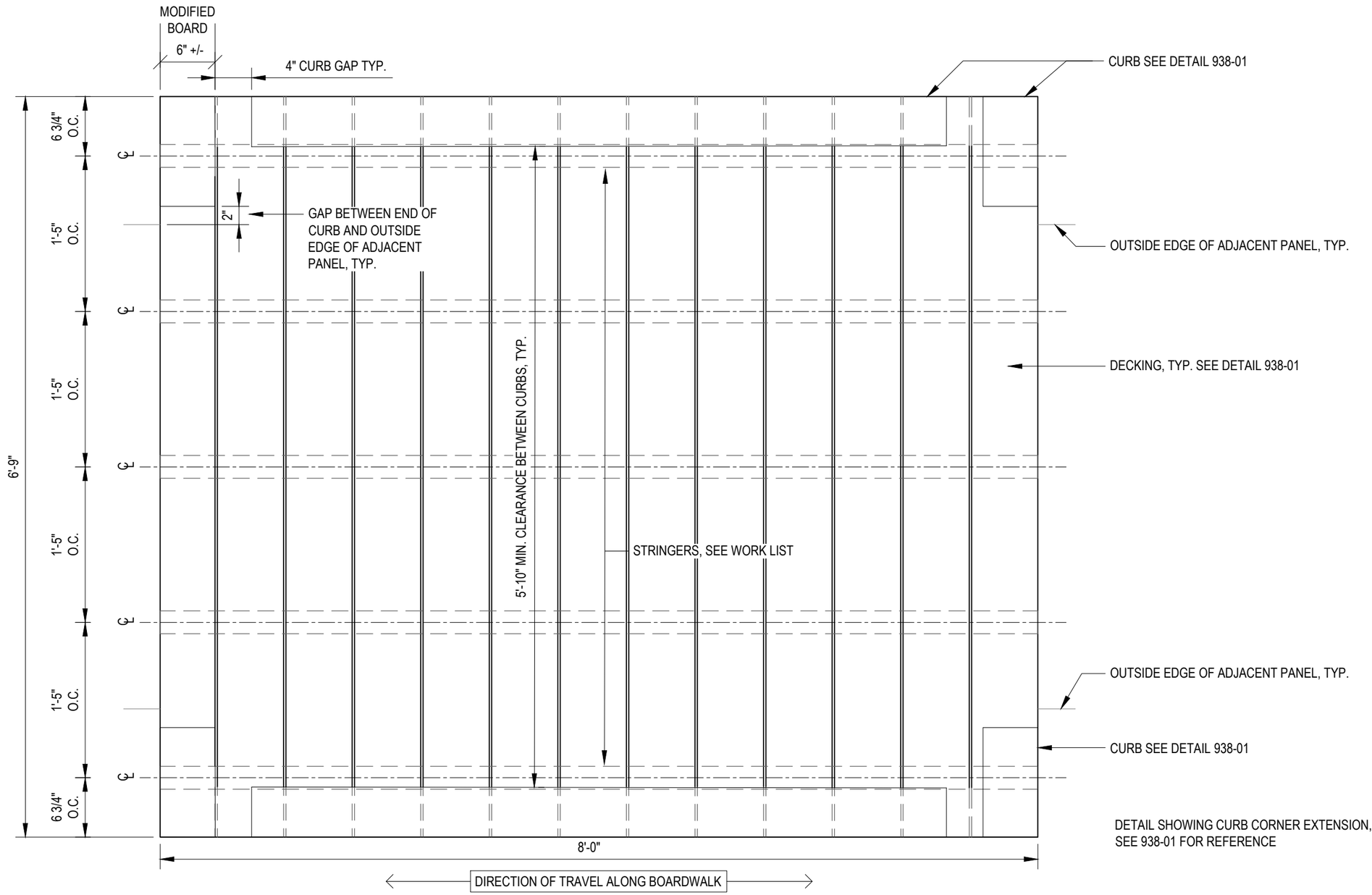

DETAIL SHOWING CURB CORNER EXTENSION, SEE 938-01 FOR REFERENCE

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

BOARDWALK PANEL O

SECTION

938 - BOARDWALKS

REVISION DATE

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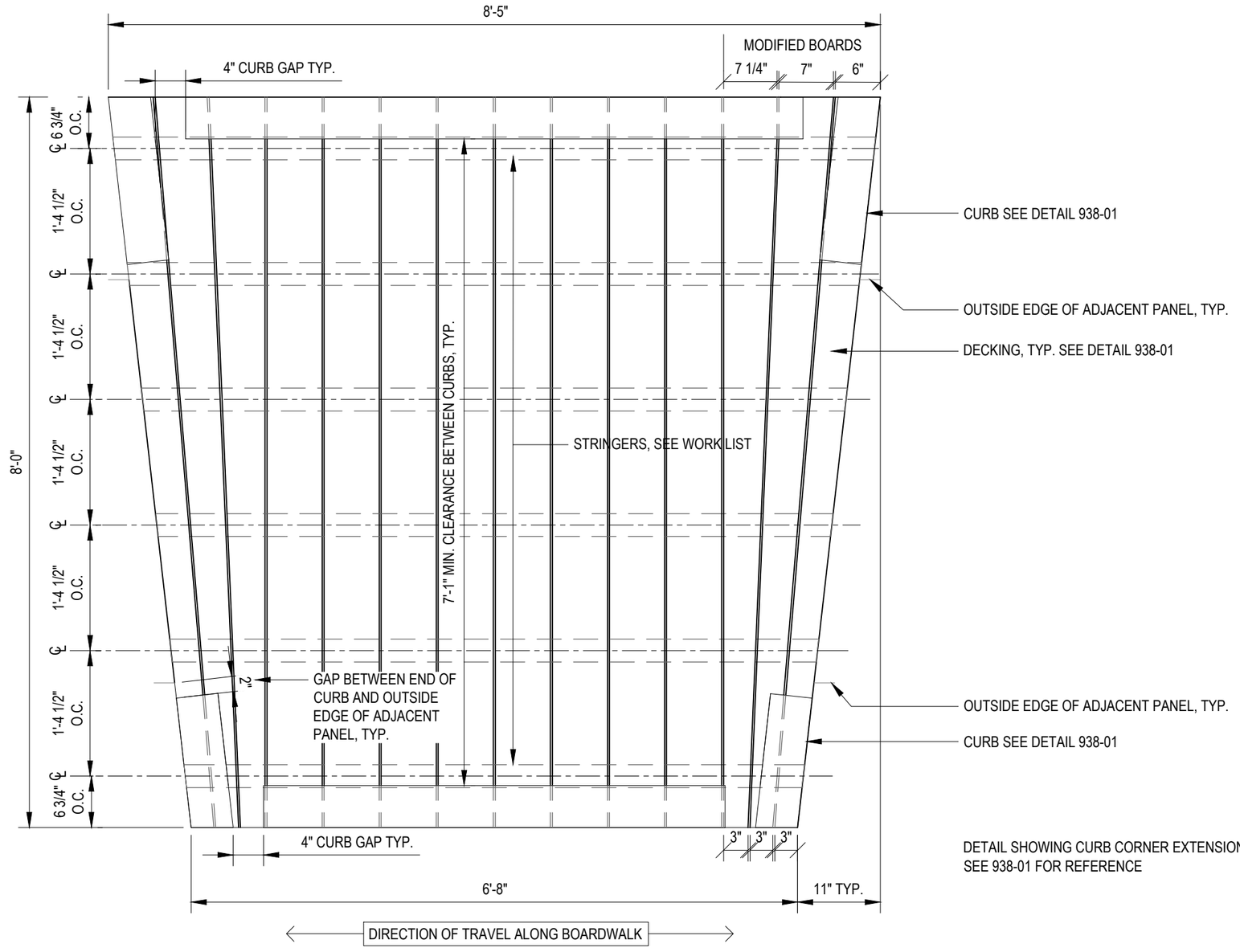
DRAWING NO.

938-O

SHEET **43** OF **46**

2024: THIS PAGE NOT RELEVANT TO PHASE 3



DETAIL SHOWING CURB CORNER EXTENSION, SEE 938-01 FOR REFERENCE

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

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PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME

BOARDWALK PANEL P

SECTION

938 - BOARDWALKS

REVISION DATE

0 3/8 3/4 ft

DRAWING NO.

938-P

SHEET **44** OF **46**

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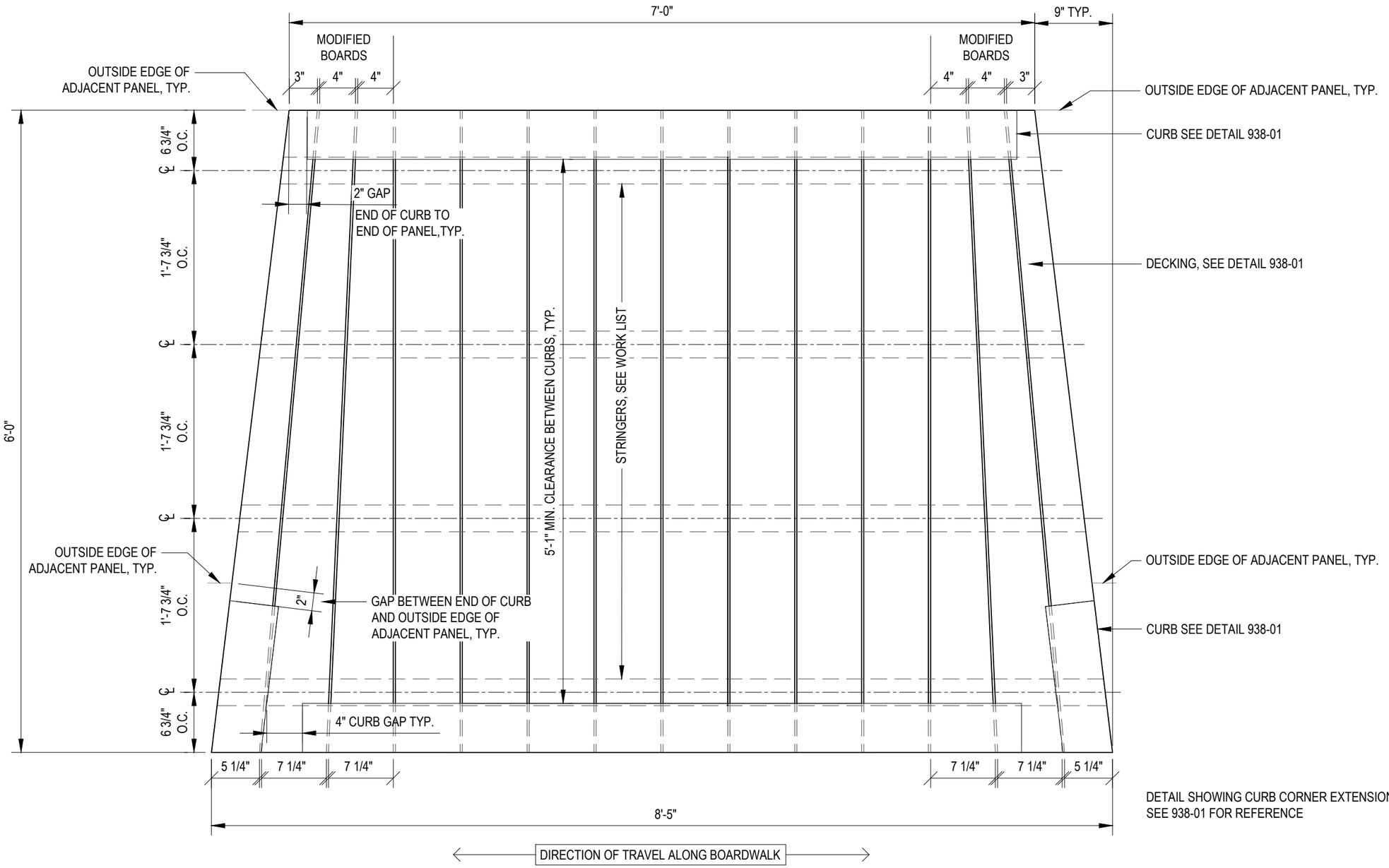

U.S. DEPARTMENT OF AGRICULTURE
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PROJECT NAME & LOCATION

TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
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DRAWING NAME

BOARDWALK PANEL Q

SECTION

938 - BOARDWALKS

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0 1/2 1 ft

DRAWING NO.

938-Q

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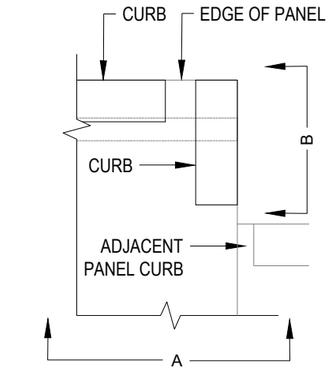
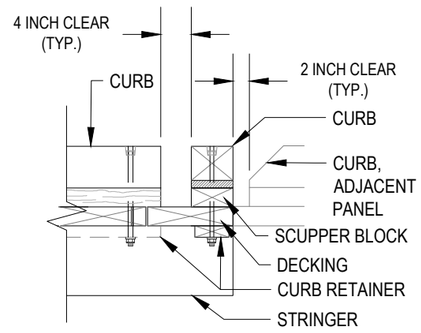
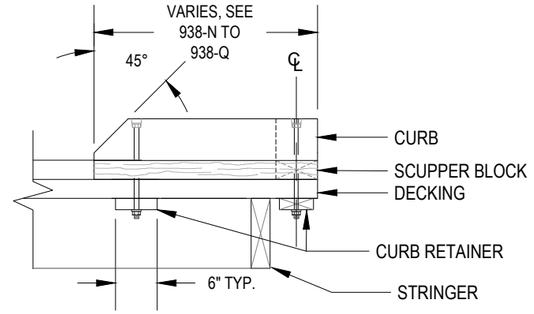


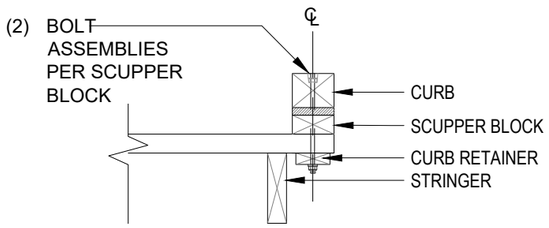
PLAN - CURB CORNER CONDITION
(SEE PANELS N, O, P & Q)



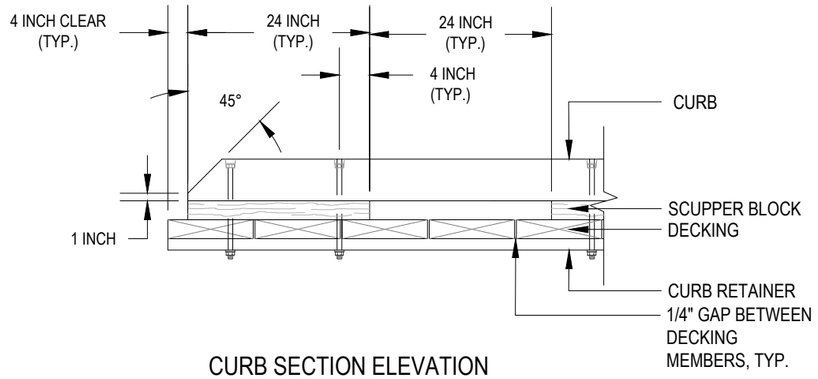
ELEVATION A - CURB CORNER



ELEVATION B - CURB CORNER



CURB SECTION



CURB SECTION ELEVATION

CURB, DECKING AND STRINGER

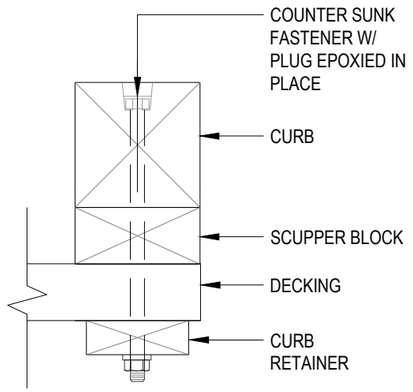
COMPONENT	SIZE (IN.)	SPECIES	PRESERV. TYPE	LUMBER GRADE
CURB	6X6X96	JUNIPER	NA	NO. 2 ROUGH CUT
SCUPPER BLOCK	3X6X24	JUNIPER	NA	NO. 2 ROUGH CUT
CURB RETAINER	2X4	DOUGLAS FIR	P1	NO. 2
DECKING	2X8	JUNIPER	NA	NO. 1 S4S (SURFACED ON 4 SIDES)
STRINGER	3X12	DOUGLAS FIR	P1	NO. 2

NOTES:

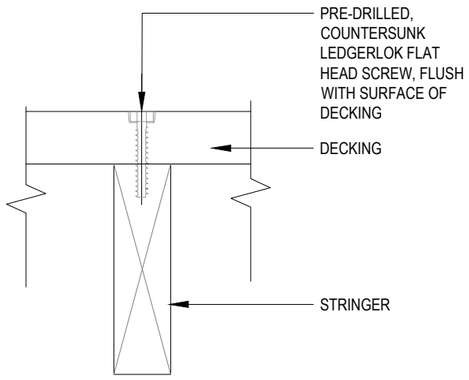
1. DESIGN LOAD:
   DEAD LOAD = 10 PSF
   LIVE LOAD = 100 PSF
   SNOW LOAD = 324 PSF
   SEISMIC LOADS:
   SITE CLASS: B
   RISK CATEGORY: II
   SS = 0.609
   SDS = 0.533
   R = 1.5 - CANTILEVERED COLUMN SYSTEMS DETAILED FOR TIMBER FRAMES
   EFFECTIVE SEISMIC WEIGHT = 25 PSF
   CS = 0.244

2. MATERIALS:
   ALL MATERIAL SHALL BE JUNIPER NO. 1 S4S OR DOUGLAS FIR NO. 2 OR BETTER AS SPECIFIED IN THE TABLE ABOVE.

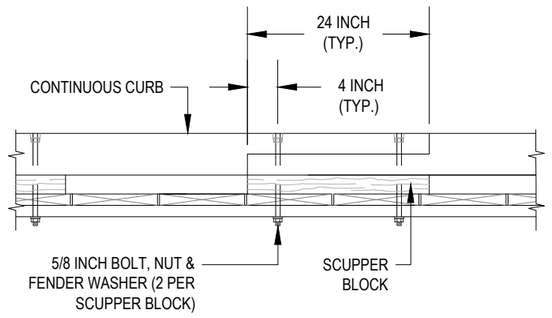
3. FASTENERS:
   ALL FASTENERS TO BE STAINLESS STEEL UNLESS OTHERWISE NOTED.
   - DECKING: LEDGERLOK 3 5/8" FLAT HEAD STRUCTURAL SCREWS WITH CORROSION RESISTANT TREATMENT OR APPROVED EQUAL.
   - CURB: 5/8 INCH BOLT, NUT, AND FENDER WASHER.
   - STRINGER AND BACKWALLS: LEDGERLOK 5" FLAT HEAD STRUCTURAL SCREWS OR APPROVED EQUAL.



CURB HIDDEN FASTENER DETAIL



DECKING HIDDEN FASTENER DETAIL



CURB SPLICING DETAIL

PRESERVATIVE TREATMENT, NON-INCISED (UNDER CODE REPORT ICC-ESR3834,TO EQUAL OR EXCEED AWPA USE CATEGORY SYSTEMS)			
PRESERVATIVE TYPE	TREATMENT TYPE	USE CATEGORY	PRODUCT
P1	WATERBORNE	UC3B	KLEAR-GARD 25 OR APPROVED EQUAL

USE CATEGORY
UC3B = ABOVE GROUND - EXPOSED
UC4A = GROUND CONTACT - GENERAL USE
UC4B = GROUND CONTACT - HEAVY USE

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION
TRILLIUM LAKE TRAIL BOARDWALK DESIGN
MT. HOOD NATIONAL FOREST
ZIGZAG RANGER DISTRICT

DRAWING NAME
CURBING & DECKING DETAILS
SECTION
938 - BOARDWALKS

REVISION DATE
NO SCALE

DRAWING NO.
938-01
SHEET
46 OF **46**

APPENDIX B

STANDARD SPECIFICATIONS FOR THE TRILLIUM LAKE TRAIL BOARDWALK RECONSTRUCTION PROJECT

U.S. Customary Units

Mount Hood National Forest
16400 Champion Way
Sandy, Oregon 97055

02/25/2022

Supersedes the 1996 Standard Specification for Construction and Maintenance of Trails

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Section 900
General Specifications

Section 901—Terms, Format, Abbreviations and Definitions

901.01 Meaning of Terms. These specifications are generally written in the imperative mood. In sentences using the imperative mood, the subject "the Contractor," is implied. Also implied in this language is "shall," "shall be," or similar words or phrases. In material specifications, the subject may also be the supplier, fabricator, or manufacturer supplying material, products, or equipment for use on the project.

Wherever *"directed," "required," "prescribed,"* or similar words are used, the *"direction," "requirement,"* or *"order"* of the Contracting Officer is intended. Similarly, wherever *"approved," "acceptable," suitable," "satisfactory,"* or similar words are used, they mean *"approved by," "acceptable to,"* or *"satisfactory to"* the Contracting Officer.

The word *"will"* generally pertains to decisions or actions of the Contracting Officer.

Whenever in these specifications, or in other contract documents, the following terms (or pronouns in place of them) are used, the intent and meaning shall be interpreted as follows: reference to a specific standard, test, testing method, or specification shall mean the latest published edition or amendment that is in effect at the solicitation issue date for the public works contracts.

901.02 Specification Format These specifications are divided into Sections.

Sections 900 through 906, 908 and 909 consist of general contract requirements for which no direct payment is made. The requirements contained in Sections 900 through 906 are applicable to all contracts.

Sections 907, 908, 909 and 910 through 989 consist of construction contract requirements for specific items of work. Work under these Sections is paid for directly or indirectly according to Subsection 906.04 and the Section ordering the work. When there is no pay item in the bid schedule, no direct payment is made.

Sections 990 through 995 contain the material requirements for Sections 910 through 989. No direct payment is made in Sections 990 through 995. Payment for material is included as part of the work required in Sections 910 through 989.

The first three digits of the pay item number identify the Section under which the work is performed.

901.03 Abbreviations. Whenever these abbreviations are used in the specifications, they represent the following:

(a) Acronyms

AASHTO	American Association Of State Highway And Transportation Officials
ABS	Acrylonitrile-Butadiene-Styrene
AITC	American Institute of Timber Construction
ANSI	American National Standards Institute
AQ	Actual Quantities
APA	American Plywood Association
ASTM	American Society For Testing And Material
AWPA	American Wood Protection Association
CO	Contracting Officer
C.F.	Cubic Feet
C.Y.	Cubic Yard
DQ	Design Quantities
EA	Each
FAR	Federal Acquisition Regulation
HDPE	High-Density Polyethylene
hr	Hour
lb	Pound
L.F.	Linear Feet
LS	Lump Sum
LSQ	Lump Sum Quantities
mi	Mile
MSE	Mechanically Stabilized Earth
NBS	National Bureau Of Standards
NCMA	National Concrete Masonry Association
OSHA	Occupational Safety & Health Administration
PE	Polyethylene
PS	Product Standard Issued By The U.S. Department Of Commerce
psi	Pounds Per Square Inch
PVC	Polyvinyl Chloride
S.F.	Square Feet
SQ	Staked Quantities
S.Y.	Square Yard
WCLIB	West Coast Lumber Inspection Bureau
WWPA	Western Wood Products Association
WWPI	Western Wood Preservers Institute

(b) Slope notation (vertical: horizontal). For slopes flatter than 1:1, express the slope as the ratio of one unit vertical to a number of units horizontal. For slopes steeper than 1:1, express the slope as the ratio of a number of units vertical to one unit horizontal.

901.04 Definitions The following terms, or pronouns in place of them, are used in these specifications or in other contract documents, the intent and meaning are as follows:

Barriers. A fence or other obstacle that prevents movement or access.

Base Course. The layer or layers of specified material of designed thickness placed on a trailbed to support surfacing.

Batter. A backward and upward slope of the face of a wall.

Berm. The ridge of material formed on the outer edge of the trail that projects higher than the tread.

Borrow. Suitable materials taken from approved sources designated on the plans or on the ground, to be used for embankments and backfilling.

Bridge. A trail structure, including supports, erected over a depression or obstruction such as a body of water, a road, a trail, or a railroad that provides a continuous pathway and that has a deck for carrying traffic or other loads.

Cap Rock. Rock placed in the top or uppermost layer in a constructed rock structure, such as a talus or rubble rock section or rock retaining wall.

Catch Point. The outer limits of a trailway where the excavation and/or embankment intersect with the ground line.

Clearing Limit. The area over and beside the trail that is cleared of trees, limbs, and other obstructions.

Compacted. Consolidation that is obtained by tamping or rolling suitable material until no noticeable displacement of material is observed.

Contracting Officer (CO). An official of the Government with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the CO acting within the limits of their authority as delegated by the CO.

Culvert. Any structure with a bottom, regardless of the fill depth, the depth of invert, or the presence of a horizontal driving surface, or any bottomless (natural channel) structure with footings that does not have wheel loads in direct contact with the top of the structure.

Curb. A border defining the edge of the trail or boardwalk.

Designated on the Ground. The location of materials, work areas, and construction items, including lines and grades, marked on the ground with stakes, flagging, tags, or paint.

Drawings. Design sheets or fabrication, erection, or construction details submitted to the Government by the Contractor according to FAR Clause 52.236-21 Specifications and Drawings for Construction. Also refers to submissions and submittals.

Duff. Organic material overlying rock or mineral soil.

Falsework. Temporary construction work on which a main work is wholly or partly built and supported until the main work is strong enough to support itself.

Full Bench. Trailbed constructed entirely on undisturbed material.

Grade. The vertical distance of ascent or descent of the trail expressed as a percentage of the horizontal distance.

Hazard Tree. An unstable tree that is likely to fall across the trail.

Header Rock. Rock laid with the narrow end towards the face of the wall.

Inslope. Where the trails tread is sloped downward toward the backslope.

Leave Tree. Trees designated to be left or to remain undisturbed after trail construction.

Mineral Soil. Soil or aggregate that is free from organic substances and contains no particles larger than 2 inches at their greatest dimension.

Outslope. Where the trail tread is sloped downward toward the embankment or daylight side of the trailway.

Plans. The contract plans furnished by the Government showing the location, type, dimensions, and details of work.

Sideslope. The natural slope of the ground, usually expressed as a percentage.

Slough. That material from the backslope or the area of the backslope that has raveled onto the trailbed.

Slump. Where the trailbed material has moved downward, causing a dip in the trail grade.

Special Contract Requirements. Specifications that detail the conditions and requirements peculiar to an individual project, including additions and revisions to the standard specifications.

Standard Plans. Detailed plans approved for repetitive use and included as part of the plans.

Standard Specifications. The Standard Specifications for Construction of Trails on Federal Projects approved for general application and repetitive use.

Surfacing. Material placed on top of the trailbed or base course that provides the desired tread.

Suitable Material. Rock that can be accommodated in the trail structure, and soil free of duff with a recognizable granular texture.

Trailbed. The finished surface on which base course or surfacing may be constructed. For trails without surfacing the trailbed is the tread.

Trailway. The portion of the trail within the limits of the excavation and embankment.

Tread. The surface portion of the trail upon which traffic moves.

Water Courses. Any natural or constructed channel where water naturally flows or will collect and flow during spring runoff, rainstorms, etc.

Section 902—Intent of Contract

902.01 Intent of Contract. The intent of the contract is to provide for the construction and completion of the work described. The precise details of performing the work are not stipulated except as considered essential for the successful completion of the work. Furnish all labor, material, equipment, tools, transportation, and supplies necessary to complete the work according to the contract.

Section 903—Control of Work

903.01 Specifications and Drawings. Follow the requirements of FAR Clause 52.236-21 Specifications and Drawings for Construction.

(a) General. Prepare drawings as necessary to construct the work. Drawings include, but are not limited to, layouts that show the relative position (vertical and horizontal as appropriate) of work to be performed, fabrication details for manufactured items and assemblies, installation and erection procedures, details of post-tensioning and other systems, detailed trench and excavation procedures that conform to OSHA requirements, traffic control implementation drawings, and methods for performing work near existing structures or other areas to be protected. Show all the drawing dimensions in United States customary units.

Section 904—Control of Materials

904.01 Handling Materials. Transport and handle all materials to preserve their quality and fitness for the work. Stockpile, load, and transport aggregates in a manner that will preserve specified gradation and avoid contamination.

Store materials to assure the preservation of their quality and fitness for the work. Locate stored materials to facilitate their prompt inspection. Sites on Government-administered land that are not already designated may be used for storage purposes and for placing of equipment only when approved in advance by the CO. Restore all storage sites in accordance with requirements SHOWN ON THE PLANS or as otherwise specified. Arrangements for storage on other than designated sites are the responsibility of the contractor.

904.02 Material Sources

(a) Designated Sources. Sources for materials such as, but not limited to, soil, rock, or logs that are not available from trailway excavation or clearing operations will be designated. Sources of local materials SHOWN ON THE PLANS are guaranteed by the Government for the quality and quantity of material in the source.

Use all needed suitable material from the source. The designation of a source includes the right to use areas SHOWN ON THE PLANS for the purposes

designated (such as plant sites, stockpiles, and haul roads). Operations are restricted to the confines of the area(s) designated.

Comply with the requirements of 30 CFR 56, subparts B and H.

(b) Contractor-Furnished Sources. Furnish material that produces an end product equivalent in performance to that specified.

904.03 Restoration. Shape and grade areas on Government-administered land to make them stable and to minimize future erosion. Dispose of debris resulting from development of material sources by scattering, unless otherwise specified. Do not scatter debris within the clearing limits of trails or within roadsides. Cut off stumps to less than 12 inches above the ground as measured on the uphill side of the stump.

Section 905—Quality Assurance and Quantity Measurement

Description

905.01 This work consists of providing certification that the quality and quantity of construction conform to the plans, specifications, and requirements of the contract.

Construction

905.02 Certification and Measurements

(a) Offsite-Produced Materials. Furnish signed certificates executed by the manufacturer, supplier, or vendor, stipulating that all offsite-produced materials incorporated in the work meet applicable requirements SHOWN ON THE PLANS or stated in the specifications. Furnish a certificate for each commodity or invoice.

(b) Quantity Measurements. Submit quantities to the CO for periodic progress payments, and the CO will compute payments. Quantities are subject to verification.

905.03 Records. Maintain a set of contract plans depicting as-built conditions resulting from approved changes. Maintain the plans in a current condition and indicate changes from the original contract plans in red. Give the plans to the CO upon the completion of the contract work.

Measurement

905.04 Method. There will be no separate measurement for this item.

Payment

905.05 Payment will be considered incidental to other pay items in this contract.

Section 906—Measurement and Payment

906.01 General. Measurement and payment for contract work will be made only for and under those pay items included in the SCHEDULE OF ITEMS. All other work and materials will be considered incidental and included in the payment of the PAY ITEMS in the SCHEDULE OF ITEMS.

When more than one class, size, or thickness is specified in the SCHEDULE OF ITEMS for any PAY ITEM, suffixes will be added to the item number to differentiate between the items.

906.02 Determination of Quantities. The following measurements and calculations are to be used to determine contract quantities for payment:

Make measurements for geotextiles, and erosion control blankets along slope lines.

Measure structures according to neat lines SHOWN ON THE PLANS or as altered by the CO in writing to fit field conditions. Make measurements along the centerline and parallel to the specified grade or foundation or as SHOWN ON THE PLANS.

Deduct lengths for boardwalk, elevated boardwalks, and approaches from the measurement of excavation in Section 911 unless these items are specified as incidental to excavation in Section 911.

For standard manufactured items, identified by gage, weight, section dimensions, and the like, such identification shall be considered the nominal weights or dimensions. Manufacturer's tolerances will be accepted unless controlled by tolerances in the cited specifications.

906.03 Units of Measurement. Payment will be made by units defined and determined according to U.S. Customary measure and by the following:

(a) Cubic Yard. A measurement computed by one of the following methods:

> (3) Material in the Delivery Vehicle. The measurement computed using measurements of material in the hauling vehicles at the point of delivery. Vehicles shall be loaded to at least their water-level capacity. Leveling of the loads may be required when vehicles arrive at the delivery point.

(b) Each (EA). One complete unit, which may consist of one or more parts.

(c) Lump Sum (LS). The quantities that denote one complete unit of work as required by or described in the contract, including necessary materials, equipment, and labor to complete the job.

906.04 Methods of Measurement. One of the following methods of measurement for determining final payment is DESIGNATED ON THE SCHEDULE OF ITEMS for each PAY ITEM:

(a) Designed Quantities. These quantities denote the final number of units to be paid for under the terms of the contract. They are based upon the original design data available prior to advertising the project. Original design data include the preliminary survey information, design assumptions, calculations, and plans. Changes in the number of units DESIGNATED IN THE SCHEDULE OF ITEMS may be authorized under the following conditions:

(1) As a result of changes in the work approved by the CO.

(2) As a result of the CO determining that errors exist in the original design that cause a PAY ITEM quantity to change by 15 percent or more.

(3) As a result of the contractor submitting to the CO a written request showing evidence of errors in the original design that cause a PAY ITEM quantity to change by 15 percent or more. The evidence must be verifiable and consist of calculations, plans, or other data that show how the designed quantity is believed to be in error.

(b) Staked Quantities (SQ). These quantities are determined from staked measurements prior to the construction.

(c) Actual Quantities (AQ). These quantities are determined from measurement of completed work.

(d) Vehicle Quantities. These quantities are measured or weighed in hauling vehicles.

(e) Lump Sum Quantities (LSQ). These quantities denote one complete unit of work as required by or described in the contract, including necessary materials, equipment, and labor to complete the job.

906.05 Government-Furnished Materials. When materials are furnished by the Forest Service, the note "Government-Furnished Materials" will be added to the description of the PAY ITEM.

Section 907—Mobilization

Description

907.01 This work consists of moving personnel, equipment, material, and incidentals to the project and performing all work necessary before beginning work at the project site. Mobilization includes the costs associated with obtaining permits, insurance, and bonds. Mobilization is not intended to pay for the costs of materials before they are used on the project site.

Payment

907.02 The accepted quantity, measured as provided in Subsection 906.02, will be paid at the contract price per unit of measurement for the Section 907 pay item shown in the bid schedule. Payment will be full compensation for the work prescribed in this Section.

Progress payments for mobilization lump sum will be paid as follows:

(a) Bond premiums will be reimbursed according to FAR Clause 52.232-5, Payments Under Fixed-Price Construction Contracts, after receipt of the evidence of payment. Reimburse for bond premiums before issuing the Notice to Proceed if evidence of payment is received.

(b) When 5 percent of the original contract amount is earned from other bid items, 50 percent of the mobilization item, or 5 percent of the original contract amount, whichever is less, will be paid.

(c) When 10 percent of the original contract amount is earned from other bid items, 100 percent of the mobilization item, or 10 percent of the original contract amount, whichever is less, will be paid.

(d) Any portion of the mobilization item in excess of 10 percent of the original contract amount will be paid after final acceptance. Pay any unpaid amount for mobilization upon final acceptance of all work items.

Section 908—Construction Staking, Flagging, and Cleanup

Description

908.01 This work consists of establishing any control points needed in addition to existing staking, and removing and disposing of all construction stakes, tags, flagging, and plastic ribbon from the project area.

Construction

908.02 General. Furnish and maintain additional stakes, flagging, templates, batter boards, and other materials and supplies necessary for marking and maintaining points and lines established. Do not perform work in the absence of control points. If any construction control points are destroyed, displaced, or erroneous, notify the CO. Uniformly contour alignment and construct grade from control point to control point.

Remove all construction stakes, tags, flagging, and plastic ribbon from the project area within 7 days after the final inspection of all other work on the project. Dispose of all stakes, tags, flagging, and plastic ribbon off Government-administered lands unless otherwise designated.

Measurement

908.03 There will be no separate measurement for this item.

Payment

908.04 Trail staking, flagging, and cleanup will be considered incidental to other pay items in this contract, and additional payment will not be made.

Section 909— Maintenance for Traffic and Temporary Construction Access

Description

909.00.01 Trail and boardwalk sections undergoing improvements will not be required to remain open unless otherwise determined by the CO**.** Maintaining the trail for traffic and temporary access Additional temporary construction access is included in subsection:

909.10	Maintenance for Traffic
909.20	Temporary Construction Access

Measurement

909.00.02 There will be no separate measurement for these items.

Payment

909.00.03 Temporary construction access will be considered incidental to other pay items in this contract, and additional payment will not be made.

909.10 - Maintenance for Traffic

Description

909.10.01 Ensure existing trails that are NOT undergoing improvements are not impacted by construction activity so that they may remain open and maintained in such a condition as to safely accommodate traffic. Provide temporary closure signage at entrances into closed trails, boardwalks, and camp sites, to prevent public access into closed areas. No road closures shall occur as a result of this project, unless otherwise approved by the CO. Perform no work that interferes or conflicts with traffic until a plan for handling traffic has been submitted and approved. Specific requirements for detours or closures are SHOWN ON THE PLANS.

Before any suspension of work, take precautions necessary to prevent damage to the project, such as temporary detours, approaches, crossings, or intersections, and make provisions for normal drainage and to minimize erosion. Leave all trailways in a condition suitable for traffic unless otherwise specified.

The Government may permit use of portions of the project during periods when operations are shut down. All maintenance attributable to permitted use during periods of work suspension will be provided by the Government. The contractor is responsible for any maintenance that is not attributable to use or that is necessary during suspensions resulting from fault or negligence of the contractor.

909.20 - Temporary Construction Access

Description

909.20.01 The government may provide temporary access for the contractor from another route or trail other than the trail being constructed. The contractor will be responsible for maintaining the temporary access, removing and rehabilitating the temporary access route and any damaged area after construction is completed. The contractor shall submit all proposed vehicular and pedestrian access points into the project site to staging areas and to locations of work being performed for CO approval.

Section 910—Trailways

Section 911 - Trail and Prism

Description

911.00.01 This work consists of constructing trails, restoration of existing trails or obliteration of abandoned trails. The earthwork and associated trail tread and prism work may be covered by one or more of the following subsections:

911.10.	Excavation and Embankment
911.30.	Existing Trail Restoration
911.40.	Slide Maintenance
911.50.	Slough and Berm Removal
911.60.	Obliteration of Abandoned Trails
911.70.	Retainers

Measurement

911.00.02 Measure the section 911 items listed in the bid schedule according to subsection 906.

Payment

911.00.03 The accepted quantities will be paid at the contract price per unit of measurement for the section 911 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 906.04.

911.10 - Excavation and Embankment

Description

911.10.01 This work consists of the excavation and placement of excavated material, regardless of its nature, from within the trailway or from other sources, except for material included under other pay items SHOWN IN THE SCHEDULE OF ITEMS.

Includes excavation, embankment, and backfill construction required to shape and finish the trailbed, ditches, backslopes, fill slopes, drainage dips, trail passing sections, and turnouts..

Materials

911.10.02 Materials. Use materials meeting the requirements of the following sections:

Rock, and Aggregate	991
Geosynthetics	994
Material for Timber Structures	995

Construction

911.10.03 Use and Disposal of Excavated Material. Conserve and use all suitable material for specified work. Conserve excess excavated rock suitable for specified project work and use in place of materials from designated sources.

Remove all duff and debris from within trailway limits and uniformly spread outside the clearing limits, not more than 4 inches in depth (unless otherwise SHOWN ON THE PLANS). Do not obstruct drainage or create piles, berms, or windrows of debris.

Place excess and unsuitable excavation beyond the downslope edge of the trailbed. Do not obstruct drainage and spread to a depth not exceeding 4 inches. This includes any material removed in the grubbing operation and deposited in the same area.

Place rocks over 4 inches in greatest dimension not used in construction beyond the hinge point on the downslope side. Place rocks so that the tops are at least 6 inches lower than the trailbed surface. Ensure that no blockage of drainage or creation of a windrow effect occurs.

911.10.04 Trailway Excavation and Embankment. Minor deviations of ± 12 inches in vertical alignment and 36 inches in horizontal alignment with smooth transitions of at least 30 feet on each side of the deviation are acceptable unless otherwise SHOWN ON THE PLANS.

Construct embankments with suitable compacted material. Compact all disturbed soil within the trailbed area.

Remove any rock within or above the backslopes that is unstable. Use or dispose of rock in accordance with Subsection 912.03.

Leave the finished slope in a uniform and roughened condition.

Make necessary adjustments of horizontal or vertical alignment, within the tolerances specified in this subsection, to produce the designed trailway section and balance earthwork. Such adjustments shall not be considered as changes.

911.10.05 Trailbed Finish. Fill holes with suitable material, compact, and cut high points to provide a uniform trailbed finish.

911.10.07 Ditches. Construct ditches to be free of loose rocks, roots, sticks, and other obstructions.

911.10.08 Geosynthetics. Where SHOWN ON THE PLANS, place geosynthetics flat and parallel to centerline of the trail before placing embankment. Overlap geosynthetics a minimum of 24 inches. Install anchors or fasteners as recommended by the geosynthetic manufacturer.

911.30-Existing Trail Restoration

Description

911.30.01 This work consists of restoring the original trail template, including clearing, removing slough and berm,, filling ruts and troughs, reshaping backslopes, excavation, reshaping trail tread, restoring drainage and other trail structures, constructing check dams, and removing protruding rocks, roots, stumps, slough, and berms.

Construction

911.30.03 Clearing and Grubbing. Clear and grub in accordance with the requirements of section 912 and as SHOWN ON THE PLANS.

911.30.04 Excavation and Embankment. Excavate and place all excavated material in accordance with the requirements of section 911.10.04 and as SHOWN ON THE PLANS.

911.30.05 Rock and Root Removal. Uniformly scatter the removed rocks and roots below the trailway and distribute to ensure no blockage of watercourses or creation of a windrow. Fill holes with suitable material and compact.

911.30.06 Slough and Berm Removal and Excess Material. Use suitable slough and berm material within the trailway to restore the trailbed as SHOWN ON THE PLANS. Place all unsuitable and excess material beyond the downslope edge of the trailbed and uniformly spread to a depth not exceeding 4 inches and so as not to obstruct drainage or interfere with the drainage of outsloped tread.

Remove berm when daylight can be obtained within a distance of 5 feet from the outslope edge of finished tread unless otherwise DESIGNATED ON THE GROUND or SHOWN ON THE PLANS.

911.30.07 Fill Material. Use suitable material to fill ruts, troughs, and potholes in the tread that cannot be leveled and outsloped through performance of work in Subsection 915.06. Compact and shape as SHOWN ON THE PLANS.

911.30.08 Drainage. Restore drainage dips and ditches to reestablish drainage as SHOWN ON THE PLANS by removing obstructions such as rocks, roots, and sticks to make ditches and culverts free draining.

Restore rock spillways in accordance with section 923 and as SHOWN ON THE PLANS.

911.30.14 Trail Structures. Restore all trail structures at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

911.30.15 Reshaping and Finishing Trailbed and Backslopes. Provide a firm and uniformly finished trailbed in accordance with cross-sections SHOWN ON THE PLANS.

Provide a uniform and roughened surface on disturbed backslopes in accordance with cross-sections SHOWN ON THE PLANS. Cut all roots flush.

911.50 - Slough and Berm Removal

Description

911.50.01 This work consists of the removal and disposal of slough and berm material that has accumulated on the trailway.

Construction

911.50.02 Slough and Berm Removal and Excess Material. Remove all slough material within the trailway. Remove all material from the trailbed when daylight can be obtained within a distance of 4 feet from the outsloped edge of the finished tread unless otherwise DESIGNATED ON THE GROUND or SHOWN ON THE PLANS. Conserve and use suitable material to restore the trail tread as SHOWN ON THE PLANS.

Place all excess and unsuitable material beyond the downslope edge of the trailbed. Uniformly spread to a depth not exceeding 4 inches and do not obstruct drainage or interfere with the drainage of outsloped tread.

911.60 - Obliteration of Abandoned Trails

Description

911.60.01 This work consists of removal and disposal of existing structures, including turnpikes, walkways, bridges, culverts, signs and posts, and other material within the trailway, above or below ground. Work also includes salvaging DESIGNATED materials and backfilling the resulting trenches, holes, and pits.

Construction

.

911.60.04 Removal of Other Obstructions. Remove other obstructions at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

911.60.05 Disposal. Dispose of native log and rock material by scattering below the trailway and outside clearing limits. Do not place debris in water courses, snow ponds, lakes, meadows, or locations where it could impede the flow to, through, or from the drainage structures. Dispose of metal, treated timber, and other manufactured products by removing from Government-administered lands and placing in approved waste disposal sites.

911.70 - Retainers

Description

911.70.01 This work consists of furnishing and installing log, sawn timber and, including excavation and backfill, and/or metal anchors and selecting and hauling of retainer materials.

Materials

911.70.02 Materials. Use materials meeting the requirements of the following sections:

Rock, and Aggregate	991
Material for Timber Structures	995

Construction

911.70.03 General. Place timber in continuous rows. Bed retainers along their entire length and so they are stable.

Section 912 - Clearing Limits

Description

912.00.01 This work consists of clearing, grubbing, trimming, removing, and treating trees, logs, limbs, branches, brush, plants, and other vegetation along with removal of rocks, undermined roots and hazard trees within the clearing limits. Clearing and removal of trees, vegetation and rocks may be covered by one or more of the following subsections:

912.10.	Clearing and Grubbing
912.20.	Brush Cutting
912.30.	Logging Out
912.40.	Hazard Tree Removal
912.50.	Loose Rock Removal
912.60.	Rock and Root Removal

Measurement

912.00.02 Measure the section 912 items listed in the bid schedule according to subsection 906.

Payment

912.00.03 The accepted quantities will be paid at the contract price per unit of measurement for the section 911 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 906.04.

912.10 - Clearing and Grubbing

Description

912.10.01 This work consists of clearing, grubbing, trimming, removing, and treating trees, logs, limbs, branches, brush, plants, and other vegetation within the clearing limits. Work includes the felling and treatment of

designated trees outside the clearing limits. Also, included are the protection from injury or defacement of trees and other objects not designated for removal and treatment of damaged trees.

Construction

912.10.02 Clearing Limits. Clear to the dimensions SHOWN ON THE PLANS or 12 inches beyond the fill and backslope catch points, whichever is greater.

912.10.03 Material to Be Cleared. Remove and dispose of trees, logs, limbs, branches, brush, herbaceous plants, and other vegetation within the clearing limits, except for the following:

a) Live, sound, and firmly rooted trees of the size SHOWN ON THE PLANS.

b) Live brush, herbaceous plants, and trees between the trailway and the clearing limits that are less than 12 inches in height and less than ½ inch in diameter at ground line.

Except as provided above, cut all limbs and branches more than ½ inch in diameter that extend into the clearing limits. Cut limbs flush with the tree trunks or stems or cut at the ground surface as SHOWN ON THE PLANS.

Fall and limb designated trees.

912.10.04 Damaged Trees. When felling, cutting, or trimming, do not cause bark damage to standing timber. If damage does occur to standing trees, treat the injured trees as directed by the CO. Remove and dispose of trees with major roots exposed by construction that are rendered unstable.

912.10.05 Removal of Stumps. Remove all stumps within the trailbed. Remove stumps located between the edge of the trailbed and the edge of the trailway that cannot be cut flush with the finished slope or that are not tightly rooted.

912.20 - Brush Cutting

Description

912.20.01 This work consists of removing brush, trees less than 4 inches in diameter, and shrubs within the clearing limits.

Construction

912.20.02 General. Remove all limbs of shrubs and trees that extend across or into the clearing limits as SHOWN ON THE PLANS. Saw or cut limbs flush with the tree trunk. Make cuts in a manner that will not tear or strip bark from the trees.

Cut and remove from the clearing limits all woody plants exceeding ½ inch in stem diameter or 12 inches in height. The maximum size material to be cut under this specification is 4 inches in diameter when measured at a height of 6 inches above the ground on the uphill side of the stump.

Cut all brush and small, woody plants as near flush to the ground surface as possible. When impractical to cut plants flush, the maximum stem length shall be 2 inches.

Remove all woody material for a minimum of 3 inches below the trail tread surface. Fill holes in the trail tread caused by removing woody material with suitable material.

Scatter the clearing debris removed from the clearing limits outside and below the clearing limits. Do not place materials in stream channels, drainage ways, ditches, culvert inlets, or other locations where they would prevent the free flow of water away from the trailbed.

912.30 - Logging Out

Description

912.30.01 This work consists of removing brush, logs, and down trees from the clearing limits.

Construction

912.30.02 Clearing Out. Cut and remove all logs that extend across or into the clearing limits. The portions of cut logs that remain on the upper side of the trail shall be either firmly anchored to prevent sliding or rolling onto the trailway or moved across the trail to the lower side and scattered outside the clearing limits.
Fell all trees over 4 inches in diameter that are leaning into the clearing limits and that are within 10 feet above the trailbed. Stump height of leaning trees that are cut outside the clearing limits shall not exceed 12 inches as measured on the uphill side of the stump. Disposal and payment for the leaning trees described above will be the same as for down logs and trees. Remove roots and stumps from trees within the trailway that have been uprooted.

Rerouting the trail around windfalls, uprooted trees, and other obstacles will not be permitted. Ramp or reroute sections of the trail tread that have been damaged by uprooted stumps as necessary to provide safe passage on the trail. Payment for such work will be incidental to the specified work item, and no extra payment will be made.

Remove sticks or wood chunks exceeding 2 inches in diameter and 12 inches in length that have fallen onto the trailbed.

Scatter the down trees on the lower side of the trailway outside the clearing limits. Do not place such materials in stream channels, drainage ways, ditches, culvert catch basins or other locations where they would prevent the free flow of water away from the trailbed.

912.40 - Hazard Tree Removal

Description

912.40.01 This work consists of felling, bucking, and limbing trees and scattering slash.

Construction

912.40.02 Hazard Trees. Remove trees and snags that are broken off or that are in a leaning, unstable position over the trailway to designated areas as SHOWN ON THE PLANS. Cut designated danger trees so that stump heights do not exceed 12 inches as measured on the uphill side of the stump. Maximum stump height of designated trees within 4 feet of the trail centerline is 4 inches. Do not leave felled trees parallel with the trail unless there are sufficient barriers to keep them from rolling or sliding onto the trail. Lop limbs to reduce slash concentration and scatter the clearing debris outside and below the clearing limits. If the trunk or a portion thereof, falls within the trailway, remove that portion within 4 feet of either side of the trail centerline and scatter a minimum distance of 4 feet beyond and below the trail centerline.

912.50 - Loose Rock Removal

Description

912.50.01 This work consists of removal and disposal of loose rock from the trail tread.

Construction

912.50.02 General. Remove loose rocks that are larger than 2 inches at their greatest dimension from the trailbed. Remove any loose rock in drainage dips or ditches that may impede water flow off the trail. Loose rocks are rocks that are not firmly embedded in the trail and can be removed by hand. Where the trailbed consists predominantly of rock with little or no soil present, remove all loose rock larger than 3 inches.

Fill any holes remaining from rock removal with suitable material and compact. If the rock removed is not needed for other items of maintenance work, scatter the rock by side-casting to the lower side of trailway beyond the clearing limits, and distribute rock to ensure that no blockage of drainage or creation of a windrow occurs. Do not dispose of waste materials in water courses.

912.60 - Rock and Root Removal

Description

912.60.01 This work consists of removal and disposal of rocks and roots from the tread.

Construction

912.60.02 Rock Removal. Remove surface rocks that are larger than 2 inches at their greatest dimension, and rocks that project more than 2 inches above the surface of the trail tread, when removal can be accomplished by hand or when rocks can be pried out with a pick mattock, shovel, pry bar, or similar tool. Where the trailbed consists predominantly of rock with little or no soil present, remove loose rock in excess of 3 inches.

Shatter any protruding rocks in trail tread that are too large to be pried out with a pick and bar by using either a rock sledge or explosives. Remove the protrusion down to the level of the tread surface. Fill any resulting depressions with suitable material and compact by tamping. If rock removed is not needed for other items of maintenance work, scatter the rock by side-casting to the lower side of the trailway and beyond the clearing limits and distribute rock to ensure that no blockage of drainage or creation of windrow occurs. Do not dispose any waste material in water courses.

912.60.03 Root Removal. Remove exposed tree roots on or in the trail tread that are greater than 1 inch in diameter. Cut embedded roots that project more than 2 inches above the trail tread flush with the trail tread. Scatter removed roots on the lower side of the trailway beyond the clearing limits and outside of water courses.

Fill holes caused by rock and root removal with suitable material and compact to form a smooth trail tread.

Maintain trail tread to the width as SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Section 913 – Surfacing

Description

913.00.01 This work consists of furnishing, hauling, watering, placing, and compacting surfacing and other associated work. Trail surfacing may be covered by one or more of the following subsections:

913.10. Aggregate Surfacing and Base Course

Materials

913.00.02 Materials. Use materials meeting the requirements of the following sections:

Rock, and Aggregate	991
Material for Timber Structures	995

Construction

913.00.02 Preparation of Subgrade. Prepare and finish trailbed as required under section 911. Obtain written approval of the CO before placing aggregate.

913.00.03 Retainers. Construct retainers in accordance with Section 911.70 and as SHOWN ON THE PLANS.

Measurement

913.00.04 Measure the section 913 items listed in the bid schedule according to subsection 906.

Payment

913.00.05 The accepted quantities will be paid at the contract price per unit of measurement for the section 913 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 906.04.

913.10 - Aggregate Surfacing and Base Course

Description

913.10.01 This work consists of furnishing, hauling, watering, placing, and compacting aggregate surfacing or base course; furnishing and installing retainers; and geosynthetics.

Materials

913.10.02 Materials. Produce aggregate by pit run, screening, or crushing. Obtain materials from sources SHOWN ON THE PLANS or other sources approved by the CO in writing.

913.10.03 Handling Materials. Stockpile, remove, transport, and spread aggregates in a manner that will preserve specified gradation and avoid contamination. Do not intermingle stockpiles of aggregate having different gradations.

913.10.04 Sampling Aggregate. Submit test results and a Certificate of Compliance verifying that aggregate gradation meets contract requirements.

Sample the material before incorporation into the work as follows:

(a) for onsite-produced materials at crushing or screening plants, after additions of any necessary blending material.

(b) for commercially produced aggregates, at the producer's plant or stockpile.

The sampling will not be considered a final acceptance and will not preclude later sampling and testing after final processing of the material. Such sampling does not relieve the contractor of responsibility of providing quality control measures to ensure compliance with contract requirements.

Construction

913.10.05 Preparation of Subgrade. Prepare and finish trailbed as required under section 912. Obtain written approval of the CO before placing aggregate.

913.10.06 Spreading and Compacting. Use aggregate that is uniformly mixed at optimum moisture content and spread and compact in layers to the final thickness and width SHOWN ON THE PLANS. The maximum thickness of any one layer shall be 3 inches. Obtain compaction by one of the following methods as SHOWN IN THE SCHEDULE OF ITEMS:

(a) by hand, using non-mechanized compaction tools over the full area of each layer until visual displacement ceases;

(b) by mechanical vibratory compactors over the full area of each layer until visual displacement ceases, but not fewer than three complete passes;

(c) by using a roller or mechanical hand tamper until the density is at least 90 percent of the maximum density, as determined by AASHTO T 99, Method C or D.

Immediately following final spreading, smoothing, and compacting, correct any irregularities or depressions that develop by adding or removing material until the surface is smooth, uniform, and compacted.

913.10.07 Acceptance, Testing, Sampling, and Tolerances. Do not vary the total compacted thickness of the aggregate by more or less than ¾ inch from the specified thickness or place it consistently below or above the specified depth.

Do not vary the aggregate width by more than ± 3 inches from the specified width or place it consistently narrower or wider than the specified width.

913.90 – Surface Maintenance

Description

913.90.01 This work consists of maintenance of surfacing, including excavation, furnishing, hauling, and placing rock, aggregate and other surfacing, compacting surfacing, and associated barriers, to bring surface up to good condition.

Maintenance

913.90.02 Perform maintenance of surfacing as required under the construction section of 913.00. and/or as SHOWN ON THE PLANS.

Section 938—Boardwalks

Description

938.00.01 This work consists of construction and maintenance of boardwalks, including excavation, embankment, backfill, curbs and railing systems. Construction and maintenance of boardwalks may be covered by one or more of the following subsections:

938.10.	Standard Boardwalk
938.20.	Elevated Boardwalk
938.30.	Step and Run
938.40.	Boardwalk Maintenance

Materials

938.00.02 Materials. Conform to the following Sections and Subsections:

Material for Timber Structures	995

Construction

938.00.03 General. Construct boardwalks of the type and at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

938.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with the requirements of Section 911 and as SHOWN ON THE PLANS.

938.00.05 Mud Sills. Bury mud sills to a depth that provides a uniform walking surface as SHOWN ON THE PLANS.

938.00.06 Piers. Construct piers as SHOWN ON THE PLANS.

938.00.06 Approach Fills. Construct the approach fills with compacted suitable material.

Measurement

938.00.07 Measure the Section 938 items listed in the bid schedule according to section 906.

Payment

938.00.08 The accepted quantities will be paid at the contract price per unit of measurement for the Section 938 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 906.04.

938.10.—Standard Boardwalk

Description

938.10.01 This work consists of construction of standard boardwalks, including excavation, embankment, backfill, curbs and/or railing system.

Construction

938.10.02 Construct standard boardwalks as required under construction section 938.00 and/or as SHOWN ON THE PLANS.

938.10.04 Finished Walkway. Construct abutting ends of sections of boardwalk flush with each other. Do not slope the surface of the completed walkway to either side. Construct the boardwalk with a grade that does not exceed 5 percent and where no change in grade exceeds 5 percent unless otherwise SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Construct the finished walking surface of the boardwalk flush with the trail grade at each end of the structure.

938.10.05 Decking. Lay sawn deck planks on the stringer to provide bearing for the full width of the plank. Fasten decking evenly at right angles to each stringer. Trim protruding ends of the decking to give a straight-line appearance to the edges of the structure or as SHOWN ON THE PLANS.

938.10.06 Curbs. Construct curbs as SHOWN ON THE PLANS. Use lengths greater than or equal to 8 feet and splice with a 6 inch half-lap joint at a spacer location as required. Finish curbs smooth and free from splinters and sharp projections.

938.20.—Elevated Boardwalk

Description

938.20.01 This work consists of construction of elevated boardwalks, including excavation, embankment, backfill, curbs.

Construction

938.20.02 Construct elevated boardwalks as required under construction section 938.00 and/or as SHOWN ON THE PLANS.

938.20.04 Finished Walkway. Construct abutting ends of sections of boardwalk flush with each other. Do not slope the surface of the completed walkway to either side. Construct the boardwalk with a grade that does not exceed 5 percent and where no change in grade exceeds 5 percent unless otherwise SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Construct the finished walking surface of the boardwalk flush with the trail grade at each end of the structure.

938.20.05 Decking. Lay sawn deck planks on the stringer to provide bearing for the full width of the plank. Fasten decking evenly at right angles to each stringer. Trim protruding ends of the decking to give a straight-line appearance to the edges of the structure or as SHOWN ON THE PLANS.

938.20.06 Curbs. Construct as SHOWN ON THE PLANS. Use lengths greater than or equal to 8 feet and splice with a 6 inch half-lap joint at a spacer location as required. Finish curbs and railing systems smooth and free from splinters and sharp projections.

980. Incidentals

Section 982 – Erosion Control Blankets

Description

982.01 This work consists of furnishing and installing erosion control blankets.

Material

982.02 Erosion Control Blanket. Use erosion control materials of the type and within the limit of work locations SHOWN ON THE PLANS.

(a) Burlap. Use burlap of standard weave with a weight of 4, ±1/2 oz/SY.

(b) Excelsior Blanket. Use excelsior blanket consisting of a machine-produced mat or curled wood excelsior of 80-percent, 8 inches or longer fiber length with consistent thickness and the fiber evenly distributed over the entire area of the blanket. Use blanket with mesh dimensions of 1 inch by 2 inches ±25 percent. Provide blanket with average weight of 8 oz/SY ±10 percent at time of manufacture.

Construction

982.03 General. Install erosion control blankets in accordance with manufacturer's recommendations.

Make the soil surface stable, firm, and free of rocks and other obstructions. Install erosion control blankets to the following minimum guidelines.

(a) Slope Installations. At the top of slope, anchor the erosion control blankets by one of the following methods:

(1) Staples. Install the erosion control blankets 3 feet over the shoulder of the slope onto flat final grade. Secure with a single row of staples on 1 foot centers.

(2) Anchor trench. Construct a 6 inch by 6 inch trench. Extend the upslope terminal end of the erosion control blankets 10 feet past the trench. Use staples on 1 foot centers to fasten the erosion control blankets into the trench. Backfill the trench and compact the soil. Secure the terminal end with a single row of staples on 1 foot centers and cover the end with soil. Apply turf establishment.

(3) Check slot. Install two rows of staples 4 inch apart on 4 inch centers across the top edge of the erosion control blankets. Drive all

staple heads flush with soil surface.

Securely fasten all erosion control blankets to the soil by installing staples at a minimum rate of 1.5 per square yard.

(b) Channel Installations. At the beginning of the channel, construct a full width anchor trench according to paragraph (a)(2) above. Construct additional anchor trenches or check slots at intervals along the channel reach and at the channel end according to paragraph (a)(2) or (a)(3) and the manufacturer's installation guidelines.

Securely fasten all erosion control blankets to the soil by installing staples at a minimum rate of 2.0 per square yard. Significantly higher anchor rates may be necessary in sandy, loose, or wet soils and in severe applications.

Repair all damaged areas immediately by restoring soil to finished grade, re-applying turf establishment, and replacing the erosion control blankets.

Measurement

982.04 Measure the section 982 items listed in the bid schedule according to subsection 906.

Payment

982.05 The accepted quantities will be paid at the contract price per unit of measurement for the Section 982 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 906.04.

Section 983 – Removal of Structures and Obstructions

Description

983.01 Work. Work consists of removal and disposal of existing structures, including walkways and other material within the trailway, above or below ground.

Construction

983.04 Removal of Other Obstructions. Remove other obstructions at locations DESIGNATED ON THE GROUND.

983.05 Disposal. Dispose of native log and rock material by scattering below the trailway and outside clearing limits. Do not place debris in water courses, snow ponds, lakes, meadows, or locations where it could impede the flow to, through, or from the drainage structures. Dispose of metal, treated timber, and other manufactured products by removing from Government-administered lands and placing in approved waste disposal sites.

Measurement

983.06 Measure the section 983 items listed in the bid schedule according to subsection 906.

Payment

983.07 The accepted quantities will be paid at the contract price per unit of measurement for the Section 983 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 906.04.

990. Materials

Section 990 - Materials

990.01 General. Materials specification not found in this section will be covered by the most current version of *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects*, U.S. Department of Transportation, Federal Highway Administration.

Section 991 - Rock and Aggregate

991.01 Rock. Use sound, durable rock free of rifts, seams, laminations, and minerals that could deteriorate as a result of weathering. Dress rock to remove thin or weak portions before use.

Furnish rock of the size, shape, weight, and face area necessary to produce the general characteristics and appearance SHOWN ON THE PLANS.

991.05 Screened Aggregate. Use screened material consisting of gravel, talus, rock, sand, shale, or other suitable material that is reasonably hard, durable, and free of organic material, mica, clay lumps, or other deleterious material. Use screened aggregate meeting the gradation requirements shown in table 961-1 and of the grading SHOWN IN THE SCHEDULE OF ITEMS.

991.06 Crushed Aggregate for Base or Surface Course. Use crushed aggregate meeting the requirements of tables 991-1.

At least 50 percent, by weight, of the aggregate retained on the No.4 sieve is to have one fractured face. Naturally fractured faces may be included in the 50-percent requirement.

The CO may approve other gradations if they are similar to those specified Grade aggregate from coarse to fine within the gradation band.

Table 991-1-Crushed and screened aggregate grading requirements for base or surface courses.

	Percent Passing (AASHTO T 11 and T 27)			
Sieve	Grading A	Grading B	Grading C	Grading D
1"				
¾"	100	100		
½"	50-90	70-100		
3/8"			100	100
No.4	30-65	45-75	60-85	70-90
No.8	25-55	30-60	35-70	45-70
No.30		15-40		20-40
No.200	8	6-20	5-20	5-20

Table 991-2.-Crushed Aggregate Quality Requirements

Description	AASHTO Test Method	Requirement
Percent Wear	T 96	40 Max.
Durability Index, Coarse and Fine	T 211	35 Min.
Liquid Limit	T 89	35 Max.
Plasticity Index	T 91	2-11

993.09 Temporary Plastic Fence. Furnish plastic noncorrosive fence fabricated from polyethylene (HDPE) and UV stabilized for outdoor weathering. Conform to the following:

(a) Height	48 inch min.
(b) Mesh openings	3 to 3.5 inches
(c) Color	International orange
(d) Mass	0.168 lb/ft min.

Section 994 - Geosynthetics

994.01 Geotextiles

(a) Use geotextiles, alone or in combination with other geosynthetics that meet the following Class B requirements for subsurface drainage as specified in AASHTO M288.

(1) Grab Strength at 50 percent elongation
ASTM D4632-91 .....…….. 355 N min.
(2) Seam Strength,
ASTM D 4632 .....…….... 310 N min.
(3) Puncture Strength,
ASTM D4833-88 .....…….. 110 N min.
(4) Mullen Burst,
ASTM D 3786-87 ..... 900 kPa min.
(5) Trap Tear Strength,
ASTM D4533-91 .....…….. 110 N min.

(b) Use geotextile meeting the following critical physical properties, unless otherwise SHOWN ON THE PLANS.

(1) Material Structure .....…….. Nonwoven (all purposes) or Slit Film (for reinforcement or separation)
(2) Polymer Composition .....……. Polypropylene
(3) Apparent Opening,
ASTM D 4751-87 .....……. .30 mm max.
(4) Permittivity, ASTM
D4491-92 .....…….. 4060 liters/minute/m^2 min.
(5) Ultraviolet Degradation .....…….. 70 at150 hours

994.06 Fasteners. Use anchors or fasteners of the design recommended by the manufacturer, and install per manufacturer's specifications.

994.07 Certification. Furnish a certificate or affidavit signed by an official from the company manufacturing the geosynthetic, verifying that the geosynthetic meets specifications.

994.08 Delivery, Storage, and Handling. During shipment and storage, wrap all geosynthetics to protect them from sunlight. When storing geosynthetics, protect them from mud, soil, dust, and debris. If materials are not installed immediately after delivery to site, do not store them in direct sunlight.

Section 995 - Material for Timber Structures

995.01 Untreated Structural Timber and Lumber. Conform to AASHTO M 168. Furnish an inspection certification from an agency accredited by the American Lumber Standards Committee for the species and grade. Mark all pieces with the inspection service, grade designation, species, and inspector identity.

Season and dry all structural timber and lumber before fabrication. Do not use material that is twisted, curved, or otherwise distorted.

Do not use boxed-heart pieces of Douglas fir in outside stringers, posts, or sills. Boxed-heart pieces are defined as timber so sawed that at any point in the length of a sawed piece the pith lies entirely inside the four faces.

Select the species and sizes of materials as SHOWN ON THE PLANS for stringers. Select stringers that are straight, sound, and free of defects.

Treat the following untreated timber surfaces in accordance with AWPA standard M4 prior to delivery to the project site.

(a) All ends and tops, and all contact surfaces of posts, sills, and caps.

(b) All ends, joints, and contact surfaces of bracing and truss members.

(c) All surfaces of timber bumpers and the back faces of bulkheads.

(d) All other timber that will be in contact with earth.

(e) All ends of stringers.

995.02 Holes for Bolts, Dowels, Rods & Lag Screws. Bore all holes at approved staging area at designated wood modification zone as approved by the owner's representative.

Bore holes for round drift bolts and dowels 1/16 inch smaller in diameter than that of the bolt or dowel to be used. Ensure that the diameter of holes for square drift bolts or dowels is equal to the side dimension of the bolt or dowel.

Bore holes for machine bolts 1/16 inch larger than the diameter, except when galvanized bolts are specified. In this case, drill all holes 1/8 inch greater than the bolt size.

Bore holes for lag screws 1/16 inch larger for the shank portion of the lag screw and drill the remainder of the hole approximately 75 percent of the shank diameter to a depth of 1 inch less than the length of the screw.

995.03 Hardware. Use wood screws (ANSI/ASME B 18.6.1), hex headed bolts and nuts (ASTM A307), lag screws (ASTM A307 and ANSI/ASME B18.2.1),

carriage bolts (ASTM A307), and drift pins and dowels (ASTM A307) or as SHOWN ON THE PLANS.

Fabricate washers from gray iron or malleable iron castings unless structural washers are specified. Use malleable iron washers with a diameter approximately four times the bolt diameter under all bolt heads or nuts in contact with wood, unless otherwise SHOWN ON THE PLANS.

Galvanize all hardware according to AASHTO M 232 or cadmium plate all hardware according to ASTM B 766 class 12, type III, unless otherwise SHOWN ON THE PLANS. Ensure that all fasteners, including nails, spikes, bolts, washers, and timber connectors, other than malleable iron, are galvanized.

Final tighten all nuts to provide proper bearing and snug tight condition. Snug tight is defined as sufficient tightness to bring faces of members into firm contact with each other. Cut off excess bolt lengths of more than 1 inch. After final tightening, check or burr all bolts effectively with a pointing tool to prevent loosening of the nuts.

995.04 Treated Structural Timber and Lumber. Furnish wood according to Subsection 995.01. Make all dimensional cuts and holes in the wood before pressure treatment. Use wood preservative treatment methods meeting or exceeding AWPA Use Category System (U1), category UC3B as SHOWN ON THE PLANS. Treat dimensional lumber, and sawn timber members shall be done in accordance with current specifications under the Code Report ICC – ESR3834 TRUCORE PTI TREATED WOODS as SHOWN ON THE PLANS.

All treated stringers, decking, running planks, shall be treated after fabrication shall meet or exceed AWPA Use Category System (U1), category UC3B.

All treated substructures (sills, backing planks, timber walls, etc.) shall meet or exceed AWPA Use Category System (U1), category UC4B.

Treat timber members shall meet or exceed requirements of the current edition of WWPI's *Best Management Practices for the Use of Treated Wood in Aquatic Environments.*

Field treat all cuts, abrasions, drilled holes, and recesses that occur after initial preservative treatment in in accordance with current specifications under the Code Report ICC – ESR3834 TRUCORE PTI TREATED WOODS. Plug all unused holes with preservative-treated plugs. Perform all field-applied preservation treatment with necessary precautions so as to prevent soil and/or water contamination.

All treated timber members must have an accredited agency certifying inspection and compliance with current specifications under the Code Report ICC – ESR3834 TRUCORE PTI TREATED WOODS.

Submit a certified copy of the lot certification, by a qualified independent inspection and testing agency, to the CO for each charge of preservative, stating penetration in inches and retention in pounds per cubic foot (assay method). In addition, provide a

written certification from the producer of the treated products that the preservative treatment meets or exceeds "Best Management Practices for Treated Wood in Western Aquatic Environments," published by the Western Wood Preservers Institute and Canadian Institute of Treated Wood, were utilized. Include a description and appropriate documentation of the Best Management Practices used.

Handle treated timber according to the Consumer Information Sheet published by AWPA. Do not cut, frame, or bore treated timber after treatment unless approved by the CO. Handle treated timbers carefully and do not drop, damage outer fibers, or penetrate the surface with tools. Do not use cant dogs, hooks or pike poles. In coastal waters, do not cut or bore timber below the highwater mark.

MILLER
CONSULTING
ENGINEERS

APPENDIX C

STRUCTURAL CALCULATIONS

Trillium Lake Trail Boardwalk Design
Trillium Lake, OR
Shapiro-Didway

February 23, 2022
Project No. 211244
15 pages

Principal Checked: ARL

***** LIMITATIONS *****

Miller Consulting Engineers, Inc. was retained in a limited capacity for this project. This design is based upon information provided by the client, who is solely responsible for accuracy of same. No responsibility and or liability is assumed by or is to be assigned to the engineer for items beyond that shown on these sheets.

Building Code:	2019 Oregon Structural Specialty Code				
Soils Report:	YES	**Soils Report by:**	GEO CONSULTANTS NORTHWEST	**Dated:**	2/16/2022
Soil Bearing:	NA PSF		**Retaining Walls:**	No	
Equivalent Fluid Pressure (active):	N/A PCF	**Passive bearing:**	N/A PCF	**Friction:**	N/A
Structural System:	BOARDWALK				
Vertical System:	WOOD FRAMED BOARDWALK	**Lateral Sys:**	DECKING / CANTILEVERED PILES		

Basic Design Loads:	**Element**	BOARDWALK	BOARDWALK		
	Load Type	DEAD	LIVE		
	Value (PSF)	10	100		
	Load Type	SNOW			
	Value (PSF)	317			
	Deflection Criteria	L/240	L/360		

Lateral Design Parameters:

Wind Design: NA **Wind Speed (3 sec Gust):** NA MPH

Exposure B

Importance Factors	I_W =	I_E =	I_S =	I_i =	**Risk Cat:**
	1.00 (ice)	1.00 (seismic)	1.00 (snow)	1.00 (ice)	II

Seismic Design

Seismic design parameters have been provided in the approved geotechnical report

TABLE 2 – SEISMIC DESIGN PARAMETERS

MAPPED MAXIMUM CONSIDERED EARTHQUAKE SPECTRAL RESPONSE ACCELERATION PARAMETER (SITE CLASS B)			
LAT	45.274	LON	-121.739
S_s	0.609g		
S_1	0.265g		
MAPPED MAXIMUM CONSIDERED EARTHQUAKE SPECTRAL RESPONSE ACCELERATION PARAMETER (SITE CLASS B)			
F_a	0.9		
F_v	0.8		
S_{MS}	0.55g		
S_{M1}	0.21g		
DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETER			
S_{DS}	0.365g		
S_{D1}	0.141g		

Latitude:	
Longitude:	

2% PE in 50 years, 0.2 sec SA = Ss

2% PE in 50 years, 1.0 sec SA = S1

(Site class B parameters are indicated on this page, for actual site class used in design, refer to seismic design summary)

Design Summary:

Scope of Work: The following calculations are for the design of a new boardwalk at Trillium Lake. The wood framing design consists of the decking, joists and header beams as well as their connections to the sill beams or pile driven foundations. Where pile driven foundations are required the connections to the piles were designed and the loading to foundations were checked to be in accordance with the capacities provided within the geotechnical report.

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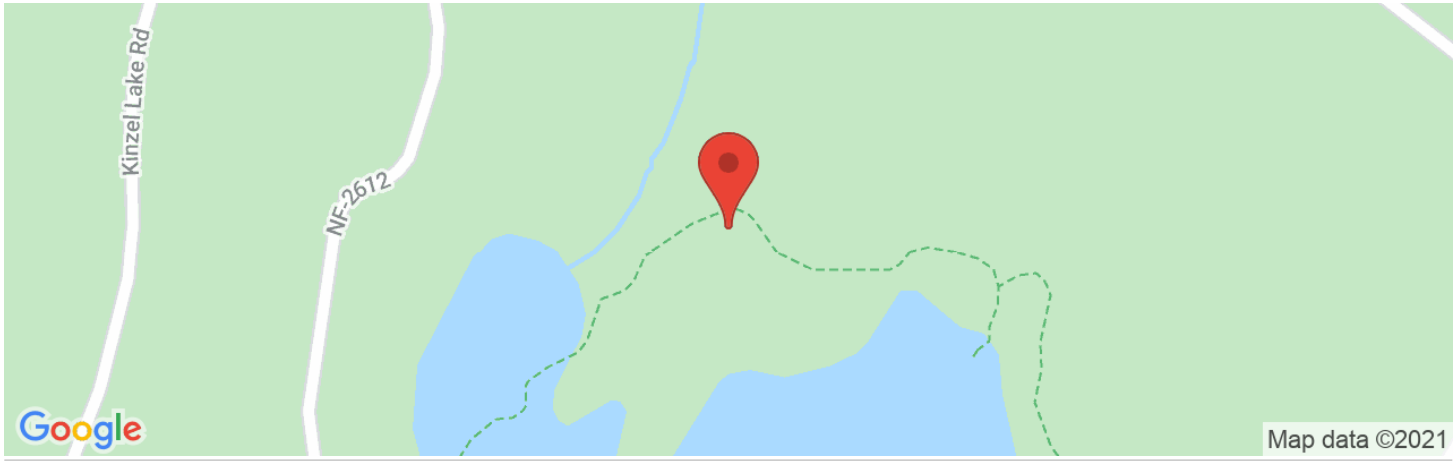
NOTE: Seismic parameters used for structural design based on Site Class D - Default are conservative - Actual Site Class D per approved geotechnical report.

Latitude, Longitude: 45.275037599956235, -121.73636492948816



Date	11/23/2021, 11:05:39 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	0.609	MCE_R ground motion. (for 0.2 second period)
S_1	0.265	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.799	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	0.533	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.313	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.275	MCE_G peak ground acceleration
F_{PGA}	1.325	Site amplification factor at PGA
PGA_M	0.364	Site modified peak ground acceleration
T_L	16	Long-period transition period in seconds
SsRT	0.609	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.69	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.265	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.304	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.883	Mapped value of the risk coefficient at short periods
C_{R1}	0.872	Mapped value of the risk coefficient at a period of 1 s

Oregon Snow Loading

The design ground snow of any location in the state of Oregon may be determined by entering the latitude and longitude of your site into the boxes below. The tool provides the design ground snow load (pg in ASCE7*) for your site. The design ground snow load values can also be viewed on the online map. Users are strongly recommended to review the Map Usage Notes.

Ground snow loads are very sensitive to geographic location, and particularly sensitive to elevation. It is recommended that the latitude and longitude values be entered with a precision of 0.001 (about 105 yards).

* ASCE Standard (ASCE/SEI 7-10) *Minimum Design Loads for Buildings and Other Structures* published by the American Society of Civil Engineers.

Latitude - Longitude Lookup

Results

Latitude:	45.27455175393804
Longitude:	-121.73654492709487
Snow Load:	315.0 psf
Modeled Elevation:	3838 ft > Actual elevation at Trillium Lake 3601 ft

Site Elevation versus Modeled Grid Elevation

Site elevation refers to the elevation (above sea level, in feet) of the location for which the snow load is required. The modeled grid elevation is the average elevation of the 4 km (about 2-1/2 miles) grid cell that was used in the snow load modeling. In relatively flat terrain, the two elevations will likely be the same or very similar. In sloped or mountainous terrain, the two elevations may be quite different.

The design ground snow load may be underreported for some locations where the site elevation is higher than the modeled grid elevation. Consult the Map Usage Notes if your site elevation is more than 100 ft. above the modeled grid elevation shown, or if your site is at or near the top of a hill.

Oregon Design Ground Snow Load Look Up Results

It is important that the user of this tool understand the principals and limitations of the modeling used to create it. Ground snow loads can vary dramatically over short distances due to changes in precipitation and elevation. It is critical to use good engineering judgment when interpreting and using the results reported by this tool. The user is recommended to review the online map, to gain a better understanding of the variations and range of magnitudes of the ground snow loads in the vicinity of the site location.

In remote regions at high elevation, reliable snow data was not available during the creation of the map. A site-specific case study is required to determine the design ground snow load in these areas. The ground snow load values on the map are based on extrapolation, and are not recommended for design. See the Map Usage Notes for the regions that require a site-specific case study.

It is recommended that the local building official having jurisdiction at the site be consulted for minimum design ground snow or roof snow loads.

The reported design ground snow loads must be adjusted as required by Chapter 7 of ASCE7* for site exposure, roof slope, roof configuration, etc. Only the properly adjusted loads can be used to design roof structural elements.

Oregon requires a minimum roof snow load of 20 psf (pm in ASCE7*) for all roofs, plus a 5 psf rain-on-snow surcharge for many roof types, resulting in a 25 psf minimum roof design load for most roofs. See the Map Usage Notes or *Snow Load Analysis for Oregon, Part II* for further information.

* ASCE Standard (ASCE/SEI 7-10) Minimum Design Loads for Buildings and Other Structures published by the American Society of Civil Engineers.

BOARDWALK LOADING

SNOW: $P_f = 0.7 C_e C_t I_s P_g$ (1.0, 315 PSF; C_e = 1.2, C_t = 1.2)

$= 317$ PSF

DEAD LOAD: 10 PSF

LIVE LOAD: 100 PSF

DEAD LOAD TAKEOFF:

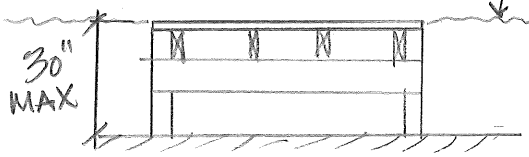
DECKING: 4.5 PSF
(3) 3X12 JSTS: 5 PSF
MISC: 0.5 PSF
10 PSF

D+L: W = 107 PSF

D+S: W = 324 PSF ← CONTROLS

D+0.75L+0.75S: W = 320 PSF

PORTION OF SNOW CONTRIBUTING TO SEISMIC MASS



ONCE SNOW BUILDS UP TO DECK LEVEL, BOARDWALK WILL BE ENCASED AND NOT SUBJECTED TO LATERAL LOADING ∴ USE 30" OF SNOW TO INCLUDE W/ SEISMIC MASS

SNOW DENSITY = 30 PCF

SNOW WT AT 30" = $30 \frac{\#}{ft^3} \times 2.5 ft = 75$ PSF

W = 10 PSF + 0.2 x 75 PSF = 25 PSF (EFFECTIVE SEISMIC WT)

ASCE 7-16: SEISMIC DESIGN FORCES

Is the building irregular per Section 12.3.2?	No		
S_s =	60.90%		*Risk Targeted Max Considered Earthquake (Figures 22-1, 22-3, 22-5, and 22-6)*
S_1 =	26.50%		*Risk Targeted Max Considered Earthquake (Figure 22-2, 22-4, 22-5, and 22-6)*
F_a =	1.31		*Table 11.4-1*
F_v =	2.07		*Table 11.4-2*
S_{MS} =	0.80		*Eqn. 11.4-1*
S_{M1} =	0.55		*Eqn. 11.4-2*
S_{DS} =	0.53		*Eqn. 11.4-3*
S_{D1} =	0.37		*Eqn. 11.4-4*
$T_s = S_{D1}/S_{DS}$ =	0.69		*Section 11.4.6*
Site Class	D (default)		*Table 20.3-1* Note: Exception 2 of Section 11.4.8 has been satisfied, therefore site specific geotech report is not required
Risk Category	II		*Table 1.5-1*

Seismic Force Resisting System G. Cantilevered Column Systems Detailed to Conform to the Requirements For:

6. Timber Frames

Seismic Design Category (Short-Period)	D		*Table 11.6-1*
Seismic Design Category (1-s)	D		*Table 11.6-2*
Seismic Design Category	D	(Controls)	
R =	1.50		*Table 12.2-1*
Ω_0 =	1.50		*Table 12.2-1*
C_d =	1.50		*Table 12.2-1*
I_E =	1.00		*Table 1.5-2*
C_T =	0.02		*Table 12.8-2*
x =	0.75		*Table 12.8-2*
h_n =	2.5	ft	*Section 12.8.2.1*
T =	0.040		*Eqn. 12.8-7*
k =	1.00		*Section 12.8.3*
C_u =	1.4		*Table 12.8-1*
T_a (max) =	0.056		*Section 12.8.2*
C_s =	0.355		*Eqn. 12.8-2*
T_L =	16		*Fig. 22-13 through 22-17*
C_s =	6.131		*need not exceed - Eqn. 12.8-3 & 12.8-4*
C_s =	0.023		*shall not be less than - Eqn. 12.8-5 & 12.8-6*
C_s =	0.355		*(control)*
W_{roof} =	1.0	k	
Redundancy Factor ρ:	1.00		*Section 12.3.4*
Vroof = CsW = 0.355(W) =	0.36	k	*Eqn. 12.8-1*

Vertical Distribution of Seismic Forces: *Eqns. 12.8-11 & Eqn. 12.8-12*

Level	h_x (ft)	w_x (k)	$w_x h_x^k$	C_{vx}	Force (k)	with ρ:
Roof	2.5	1.0	3	1.00	0.36	**0.36**
		Total	3	Total	0.36	

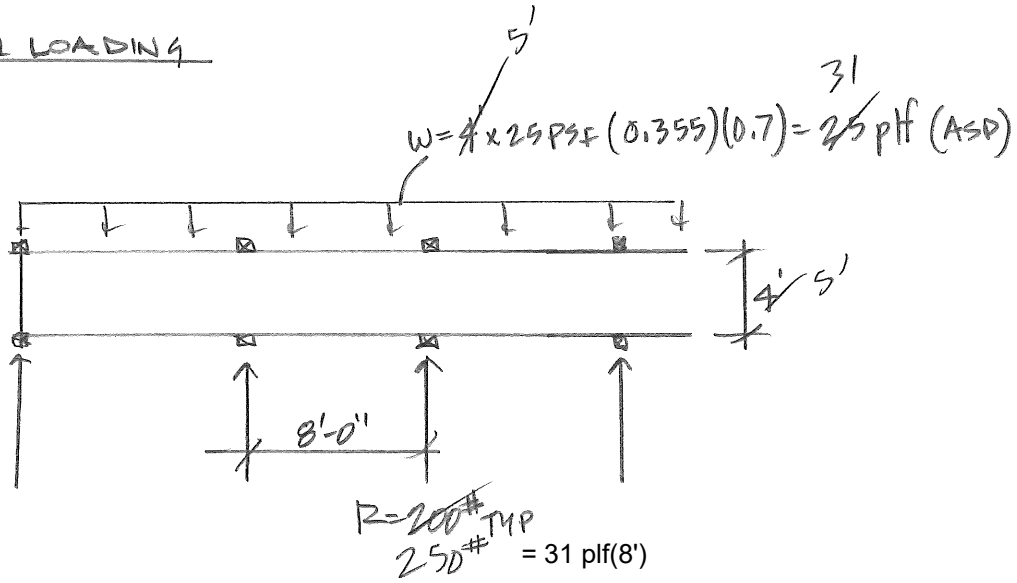
Vertical Seismic Load Effect, $E_v = 0.2S_{DS}D$ = 0.107 *D *Eqn. 12.4-4a*

Diaphragm Design Forces: *Eqns. 12.10-1, 12.10-2, & 12.10-3*

$F_{px,min} = 0.2S_{DS}I_e$ =	0.107	*w_x (min)	*Eqn. 12.10-2*
$F_{px,max} = 0.4S_{DS}I_e$ =	0.213	*w_x (max)	*Eqn. 12.10-3*

Level	w_x(k)	Force (k)	$\Sigma F_i / \Sigma w_i$	Diaphragm Design Force (k)	Diaphragm Collector Forces (k)
Roof	1.0	0.36	0.355	0.21	0.32

LATERAL LOADING



$M_{LOL} = \frac{250\#}{2} \times 12.5' = 1563$ ft-lb

5" ϕ STD PIPE: $\Delta = 0.32"$

$= 22/938$ OKAY

OR 10% OF LIVE LOAD:

$W = 4' \times 100$ psf $\times 0.1 = 40$ plf (ASD)

$R = 40(8') = 320\#$

Allowable Lateral Load Applied to Pile = 320# at 2'-6" above grade = 320 # OK

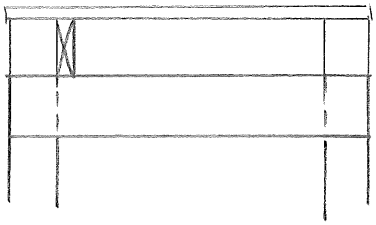
- Per Approved Geotechnical Report

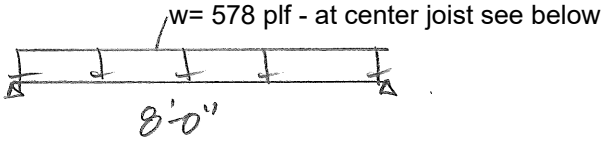
Expected Deflection = 0.48" - Per Approved Geotechnical Report

Allowable Deflection = 0.50" > 0.48" OK

Use piles as prescribed in Approved Geotechnical Report

CHECK JOISTS





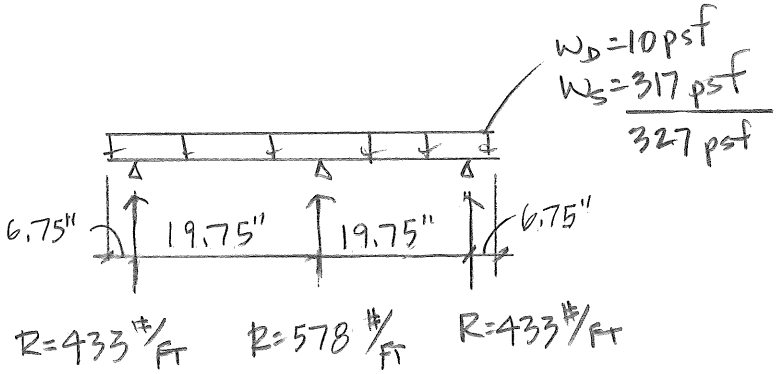
D+L: W = 107 PSF

D+S: W = 324 PSF ← CONTROLS

D+0.75L+0.75S: W = 320 PSF

See following page for joist design

CHECK DECKING



2x DF/L DECK:

$S = 12(1.5)^3/12 = 2.25\ in^3/ft$

$\Delta = 0.013" = L/650$ OKAY

$M^+ = 516\ in\cdot lb$

$M^- = -1019\ in\cdot lb$

$V = 289\ \#$

$f_b = 411\ psi$ OKAY

Check Beams:

Typical Support Spacing= 8' OC

Beam Span= 4' OC

Point Loads on Beam: P1=433 plf*8'= 3464 lbs , P2= 578 plf*8'= 4624 lbs

See page after next for design of header beams

WOOD BEAM DESIGN

2018 National Design Specification for Wood Construction **(ASD)**

Center Joist

MEMBER LOADING

Span =	8.00	ft	ℓ_u =	0.00	ft
x1 =	0.00	ft	w1 =	578.0	plf
x2 =	8.00	ft	w2 =	578.0	plf
Xa =	4.00	ft	Pa =	0	lbs
Xb =	0.00	ft	Pb =	0	lbs
Xc =	0.00	ft	Pc =	0	lbs

MEMBER ANALYSIS

M =	4624	lbs-ft	Reaction 1 =	2312	lbs
V =	1770	lbs	Reaction 2 =	2312	lbs
TL Δ_{limit} = L/	240		TL Δ =	0.115	in
LL Δ_{limit} = L/	360		LL Δ =	0.111	in
% LL =	97.0%				

MEMBER PROPERTIES

b =	2.500	in
d =	11.250	in
A =	28.13	in^2
S =	52.73	in^3
I =	296.63	in^4
E'I =	474,609	$kip\text{-}in^2$
F_b =	900	psi
F_v =	180	psi
E =	1600	ksi
E_{min} =	580	ksi
E' =	1,600	ksi
$F_{c\perp}$ =	625	psi
Weight =	6.84	lbs/ft
R_B =	0.00	< 50, OK

MEMBER INPUTS AND ADJUSTMENT FACTOR

		Reduction	F_b	F_v	$F_{c\perp}$	E & E_{min}
Material:	Dimensional Lumber					
Grade:	DF/L No. 2 or Better	C_{fu}	1.00			
Load Duration:	Two Months/Snow Load, CD = 1.15	C_D	1.15	1.15		
Temperature Factor:	DRY T < = 100°F	C_t	1.00	1.00	1.00	1.00
Wet Service Factor:	Moisture Content Less Than 19%	C_M	1.00	1.00	1.00	1.00
Incising Factor:	Member is not Incised	C_i	1.00	1.00	1.00	1.00
Repetitive Factor:	Member is Repetitive	C_r	1.15			
	.	C_V	1.000			
Member Size:	3 x12	C_F	1.00			
Number of Plies:	1 Ply	C_L	1.000			

BENDING

f_b =	1052	psi = M/S	M =	4624	lbs-ft
F_b' =	1190	psi = $F_bC_dC_tC_FC_MC_iC_rC_LC_{fu}$	M_{CAP} =	5231	lbs-ft = $F_b'S$
Moment Utilization =	**88.4%**	< 100% OK	4624 lbs-ft < 5231 lbs-ft		

SHEAR

f_v =	94	psi = 3V/2A	V =	1770	lbs
F_V' =	207	psi = $F_vC_dC_tC_MC_i$	V_{CAP} =	5822	lbs = $F_v'A$
Shear Utilization =	**45.6%**	< 100% OK	1770 lbs > 5822 lbs		

DEFL.

TL Δ =	L/838		$F_{c\perp}'$=	625	psi = $F_{c\perp}C_tC_MC_i$
LL Δ =	L/864		R1 Bearing Width =	1.5	in **< 2.5 in OK**
TL Δ Utilization =	**28.7%**	< 100% OK	R2 Bearing Width =	1.5	in **< 2.5 in OK**
LL Δ Utilization =	**41.7%**	< 100% OK			

Use 1 Ply of 3 x12 DF/L No. 2 or Better

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Project Name Trillium Lake Trail Boardwalk Design Project # 211244

Location Trillium Lake, OR

Client Shapiro-Didway

By EWA Ck'd ARL Date 2/18/2022

WOOD BEAM DESIGN

2018 National Design Specification for Wood Construction **(ASD)**

HEADER BEAM

MEMBER LOADING

Span =	4.00	ft	ℓ_u =	0.00	ft
x1 =	0.00	ft	w1 =	0.0	plf
x2 =	4.00	ft	w2 =	0.0	plf
Xa =	0.56	ft	Pa =	3464	lbs
Xb =	2.00	ft	Pb =	4624	lbs
Xc =	3.44	ft	Pc =	3464	lbs

MEMBER ANALYSIS

M =	6561	lbs-ft	Reaction 1 =	5776	lbs
V =	4585	lbs	Reaction 2 =	5776	lbs
TL Δ_{limit} = L/	240		TL Δ =	0.019	in
LL Δ_{limit} = L/	360		LL Δ =	0.019	in
% LL =	97.0%				

MEMBER PROPERTIES

b =	2.500	in
d =	11.250	in
A =	56.25	in^2
S =	105.47	in^3
I =	593.26	in^4
E'I =	949,219	$kip\text{-}in^2$
F_b =	900	psi
F_v =	180	psi
E =	1600	ksi
E_{min} =	580	ksi
E' =	1,600	ksi
$F_{c\perp}$ =	625	psi
Weight =	6.84	lbs/ft
R_B =	0.00	< 50, OK

MEMBER INPUTS AND ADJUSTMENT FACTOR

		Reduction	F_b	F_v	$F_{c\perp}$	E & E_{min}
Material:	Dimensional Lumber					
Grade:	DF/L No. 2 or Better	C_{fu}	1.00			
Load Duration:	Two Months/Snow Load, CD = 1.15	C_D	1.15	1.15		
Temperature Factor:	DRY T < = 100°F	C_t	1.00	1.00	1.00	1.00
Wet Service Factor:	Moisture Content Less Than 19%	C_M	1.00	1.00	1.00	1.00
Incising Factor:	Member is not Incised	C_i	1.00	1.00	1.00	1.00
Repetitive Factor:	Member is Repetitive	C_r	1.15			
	.	C_V	1.000			
Member Size:	3 x12	C_F	1.00			
Number of Plies:	2 Plies	C_L	1.000			

BENDING

f_b =	747	psi = M/S	M =	6561	lbs-ft
F_b' =	1190	psi = $F_bC_dC_tC_FC_MC_iC_rC_LC_{fu}$	M_{CAP} =	10461	lbs-ft = $F_b'S$
Moment Utilization =	**62.7%**	< 100% OK	6561 lbs-ft < 10461 lbs-ft		

SHEAR

f_v =	122	psi = 3V/2A	V =	4585	lbs
F_V' =	207	psi = $F_vC_dC_tC_MC_i$	V_{CAP} =	11644	lbs = $F_v'A$
Shear Utilization =	**59.1%**	< 100% OK	4585 lbs > 11644 lbs		

DEFL.

TL Δ =	L/2492		$F_{c\perp}'$=	625	psi = $F_{c\perp}C_tC_MC_i$
LL Δ =	L/2569		R1 Bearing Width =	3.75	in
TL Δ Utilization =	**9.6%**	< 100% OK	R2 Bearing Width =	3.75	in
LL Δ Utilization =	**14.0%**	< 100% OK			

Use 2 Plies of 3 x12 DF/L No. 2 or Better

MILLER CONSULTING ENGINEERS

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Project Name Trillium Lake Trail Boardwalk Design Project # 211244

Location Trillium Lake, OR

Client Shapiro-Didway

By EWA Ck'd ARL Date 2/18/2022

WinBeam

Project:				
By:	Date:	Checked:	Date:	Page:

Description:

Panel "N" Header - D+S Panel "Q" is the same layout

Units: English

Properties - X = feet, E = ksi, I = in^4
X = 0; E = 1600; I = 296.631;

Moment Releases - X = feet

Supports - X = feet, Displacement = inches, Rotation = radians
X = 0.104; Disp = 0;
X = 4.354; Disp = 0;

Springs - X = feet, VSpring = kip/inch, RSpring = kip in/rad

Point Loads - X = feet, PLoad = kips, Moment = kip ft

Uniform Loads - XStart & XEnd = feet, UStart & UEnd = kip/ft
XStart = 0; XEnd = 5.85; UStart = -1.134; UEnd = -1.296;
/w1= 324 psf(7/2), w2= 324 psf(8/2)

Analysis Data:

Beam Length = 5.85 feet
Number of Nodes = 201
Number of Elements = 200
Number of Degrees of Freedom = 402

Reactions:

X feet	Vert kips	Rot kip ft
0.104000	2.281	
4.354	4.827	

Equilibrium:

	Force	Reaction	Diff
Vert	-7.108	7.108	-0.000 kips
Rot	21.252	-21.252	0.000 kip ft

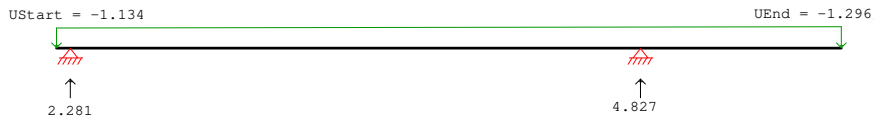
Min & Max values:

Min Shear	=	-2.919 kips	at	4.354 feet
Max Shear	=	2.163 kips	at	0.104 feet
Min Moment	=	-1.435 kip ft	at	4.354 feet
Max Moment	=	2.021 kip ft	at	1.951 feet
Min Rotation	=	-0.0006622 radians	at	3.797 feet
Max Rotation	=	0.0008456 radians	at	0.104 feet
Min Deflection	=	-0.012625 in	at	2.097 feet
Max Deflection	=	0.006876 in	at	5.850 feet

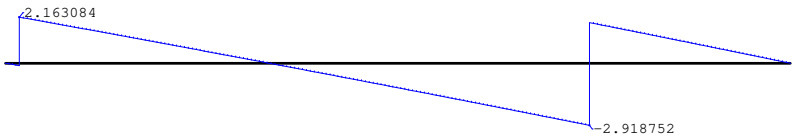
WinBeam

Project:				
By:	Date:	Checked:	Date:	Page:

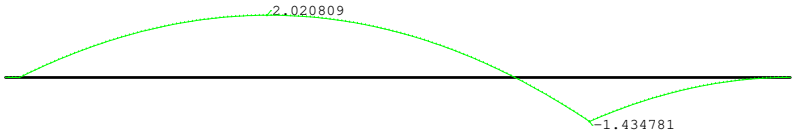
Reactions - kips, kip ft



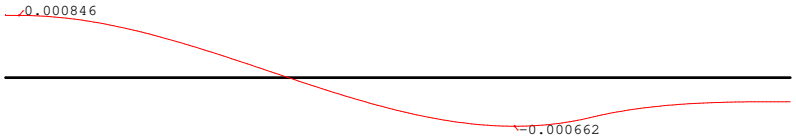
Shear - kips



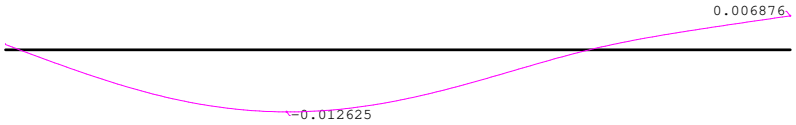
Moment - kip ft



Rotation - radians



Deflection - inches



WinBeam 3.30 - Registered to Miller Consulting Engrs.

WinBeam

Project:				
By:	Date:	Checked:	Date:	Page:

Description:

Panel "O" Header - D+S

Units: English

Properties - X = feet, E = ksi, I = in^4
X = 0; E = 1600; I = 296.631;

Moment Releases - X = feet

Supports - X = feet, Displacement = inches, Rotation = radians
X = 1.375; Disp = 0;
X = 5.375; Disp = 0;

Springs - X = feet, VSpring = kip/inch, RSpring = kip in/rad

Point Loads - X = feet, PLoad = kips, Moment = kip ft

Uniform Loads - XStart & XEnd = feet, UStart & UEnd = kip/ft
XStart = 0; XEnd = 6.75; UStart = -1.296; UEnd = -1.296;
/w1= 324 psf(8/2)

Analysis Data:

Beam Length = 6.75 feet
Number of Nodes = 201
Number of Elements = 200
Number of Degrees of Freedom = 402

Reactions:

X feet	Vert kips	Rot kip ft
1.375	4.374	
5.375	4.374	

Equilibrium:

	Force	Reaction	Diff
Vert	-8.748	8.748	-0.000 kips
Rot	29.525	-29.524	0.000 kip ft

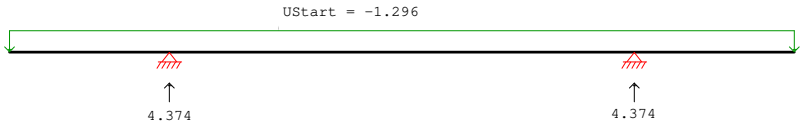
Min & Max values:

Min Shear	=	-2.592 kips	at	5.375 feet
Max Shear	=	2.592 kips	at	1.375 feet
Min Moment	=	-1.225 kip ft	at	1.375 feet
Max Moment	=	1.367 kip ft	at	3.375 feet
Min Rotation	=	-0.0004015 radians	at	4.833 feet
Max Rotation	=	0.0004015 radians	at	1.917 feet
Min Deflection	=	-0.006808 in	at	3.375 feet
Max Deflection	=	0.002927 in	at	6.750 feet

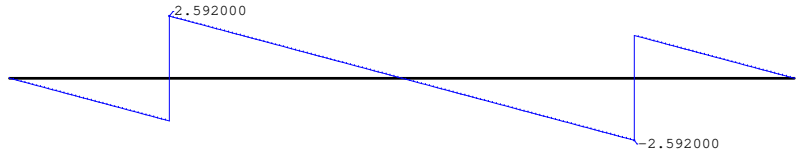
WinBeam

Project:				
By:	Date:	Checked:	Date:	Page:

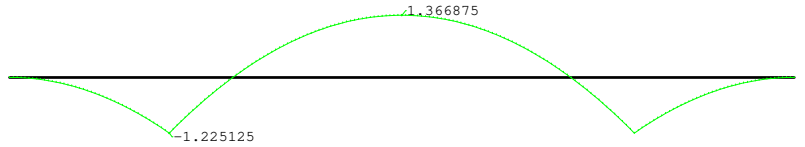
Reactions - kips, kip ft



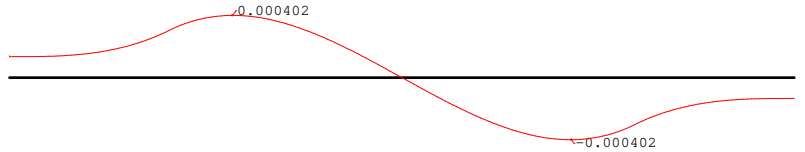
Shear - kips



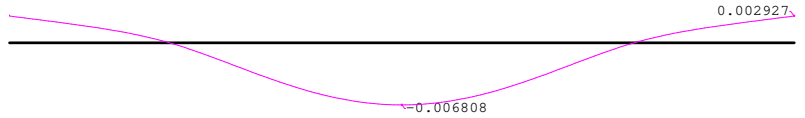
Moment - kip ft



Rotation - radians



Deflection - inches



WinBeam 3.30 - Registered to Miller Consulting Engrs.

WinBeam

Project:				
By:	Date:	Checked:	Date:	Page:

Description:

Panel "P" Header - D+S

Units: English

Properties - X = feet, E = ksi, I = in^4
X = 0; E = 1600; I = 296.631;

Moment Releases - X = feet

Supports - X = feet, Displacement = inches, Rotation = radians
X = 2.10; Disp = 0;
X = 6.35; Disp = 0;

Springs - X = feet, VSpring = kip/inch, RSpring = kip in/rad

Point Loads - X = feet, PLoad = kips, Moment = kip ft

Uniform Loads - XStart & XEnd = feet, UStart & UEnd = kip/ft
XStart = 0; XEnd = 8.05; UStart = -1.38; UEnd = -1.076;
/w1= 324 psf(8.52/2), w2= 324(6.65/2)

Analysis Data:

Beam Length = 8.05 feet
Number of Nodes = 202
Number of Elements = 201
Number of Degrees of Freedom = 404

Reactions:

X feet	Vert kips	Rot kip ft
2.100	5.794	
6.350	4.091	

Equilibrium:

	Force	Reaction	Diff
Vert	-9.885	9.885	0.000 kips
Rot	38.147	-38.147	-0.000 kip ft

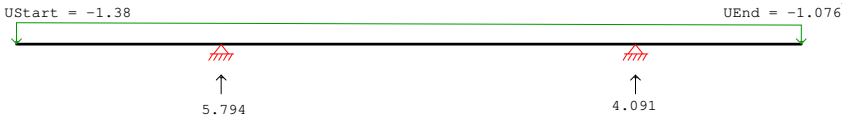
Min & Max values:

Min Shear	=	-2.815 kips	at	2.100 feet
Max Shear	=	2.979 kips	at	2.100 feet
Min Moment	=	-2.985 kip ft	at	2.100 feet
Max Moment	=	0.507481 kip ft	at	4.466 feet
Min Rotation	=	-0.001071 radians	at	0 feet
Max Rotation	=	0.0004151 radians	at	8.050 feet
Min Deflection	=	-0.022966 in	at	0 feet
Max Deflection	=	0.001556 in	at	2.782 feet

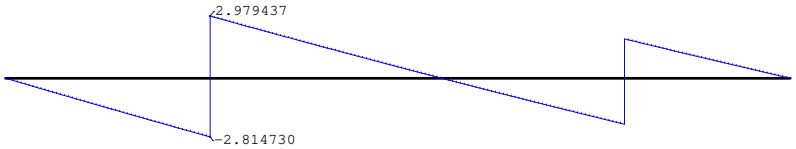
WinBeam

Project:				
By:	Date:	Checked:	Date:	Page:

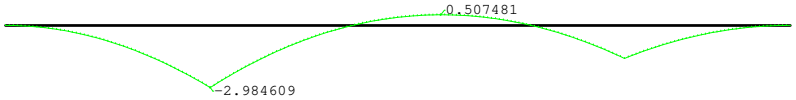
Reactions - kips, kip ft



Shear - kips

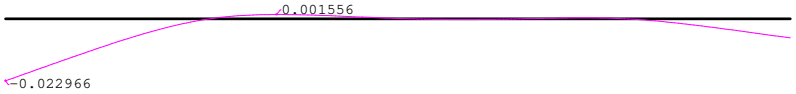


Moment - kip ft



Rotation - radians

Deflection - inches



WinBeam 3.30 - Registered to Miller Consulting Engrs.

Design Header to Pile Connection:

Worst Case Reaction: R = 5794 lbs - Panel "P" - Use 6000 lbs for design

Check Angle:

Try L 6 x 3 1/2 x 1/4 x 0'-5" long

Bearing Length Req= 3.75" < 5" OK

Check Angle Legs for Bending:

Check Flat Angle Leg Based on ASD Loads:

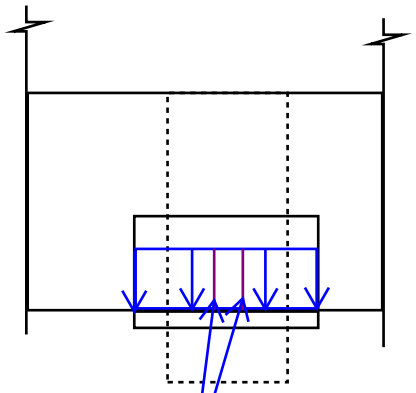
Material:	A36 Steel		
Fy=	36	ksi	
ASD Applied Load, R =	6.000	k	
Leg Width =	2.500	in	
Moment arm, a1 =	1.25	in	
Moment, M =	7.500	k-in	=6 k*1.25 in
Plate thickness =	1/2	in	
effective width, b =	6.00	in	width of plate
Z =	0.375	in^3	=6 in*(0.5 in)^2/4
Mn/Ω =	8.08	k-in	=36 ksi*0.375 in^3/1.67
	7.500 < 8.08 OK		

Use Flat Leg 0.5" x 2.5" x 0.5" wide

Check Vertical Angle Leg Based on ASD Loads:

Material:	A36 Steel		
Fy=	36	ksi	
ASD Applied Load, R =	6.000	k	
ASD Applied Load, R =	1.000	kli	=6 k/6 in
Cantilever Length, L =	3.00	in	
Moment, M =	4.500	k-in	=1 kli*(3 in)^2/2
Plate thickness =	1/2	in	
Leg length =	6.00	in	
Z =	4.500	in^3	=0.5 in*(6 in)^2/4
Mn/Ω =	97.01	k-in	=36 ksi*4.5 in^3/1.67
	4.500 < 97.01 OK		

Use Vertical Leg 0.5" x 6" wide



Verify vertical leg can carry bearing loads to welds

MILLER CONSULTING ENGINEERS

9600 SW Oak St #400
Portland, OR 97223

503.246.1250
miller-se.com

Project Name: Trillium Lake Trail Boardwalk Design Project #: 211244

Location: Trillium Lake, OR

Client: Shapiro-Didway

By: EWA Ck'd: AEL Date: 2/18/2022

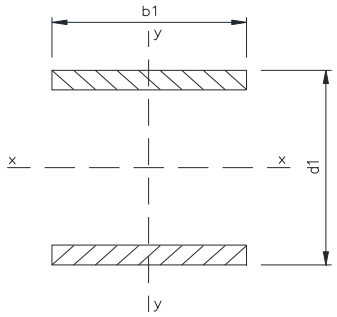
Flare-Bevel-Groove Weld Section Properties

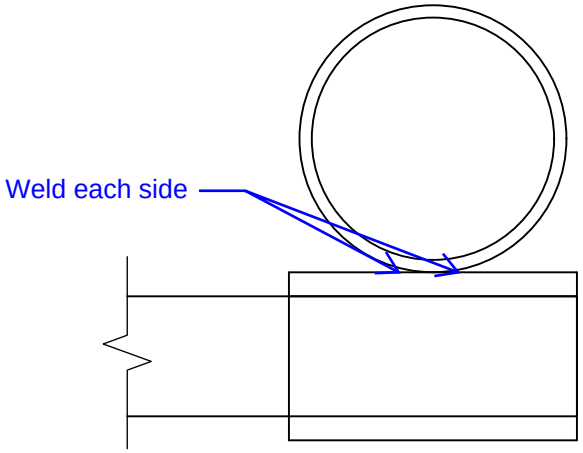
Check Weld From Angle to Pipe Cap - D+S+0.7E (Conservative)

EQUAL RECTANGLES (weld on both outside faces)

Vy =	280	lb	
Mx =		ft-lb	
Vx =	6000	lb	
My =		ft-lb	
t=	3/16	in	minimum
Effective Throat, E =	0.12	in	= 5/8*0.1875"
Length of weld, b1 =	6	in	
Width of tube, d1 =	1	in	
Inner width of weld, d =	0.76	in	= 1"-0.12"*2
A =	1.44	in^2	= (1"-0.76")*6"
Ix =	0.28	in^4	= 6*(1^3-0.76^3)/(12)
Sx =	0.56	in^3	= 0.28/(1/2)
Iy =	4.32	in^4	= (0.12*2)*6^3/12
Sy =	1.44	in^3	= 4.32/(6/2)
F =	21000	psi	(ASD)
Vc =	**30240**	**lb**	= 21000*1.44
Mcx =	**980**	**ft-lb**	= 21000*0.56/12
Mcy =	**2520**	**ft-lb**	= 21000*1.44/12
Capacity =	0.21	< 1.00 OK	

Use flare bevel weld to 0.1875" thick walled tube





Check Connections for Lateral Load:

Worst Case Panel - Panel P:

Panel Area= 8'*8'= 64 sf

Stringer to Header Conn:

Panel P: Trib Area= 64 sf/2/(6 stringers)= 5.33 sf

Typical Panel: Trib Area= (8'*4.5')/2/(3 stringers)= 6 sf - controls

0.7E: R= 6 sf(25 psf)(0.355)(0.7)= 38 lbs

0.1L: R= 6 sf(100 psf)(0.1)= 60 lbs - Controls Connection

H2.5ASS From Ea Stringer to Header - Rallow= 75 lbs = 60 lbs OK

Use H2.5ASS From Ea Stringer to Header

Check Header to Pile Conn:

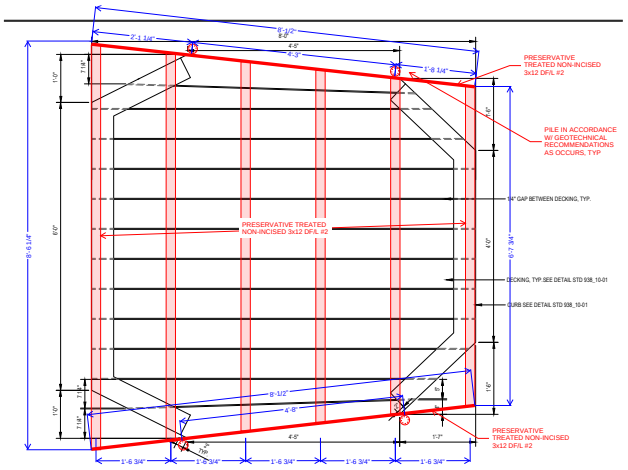
Trib Area= 64 sf/4= 16 sf

0.7E: R= 16 sf(25 psf)(0.355)(0.7)= 100 lbs

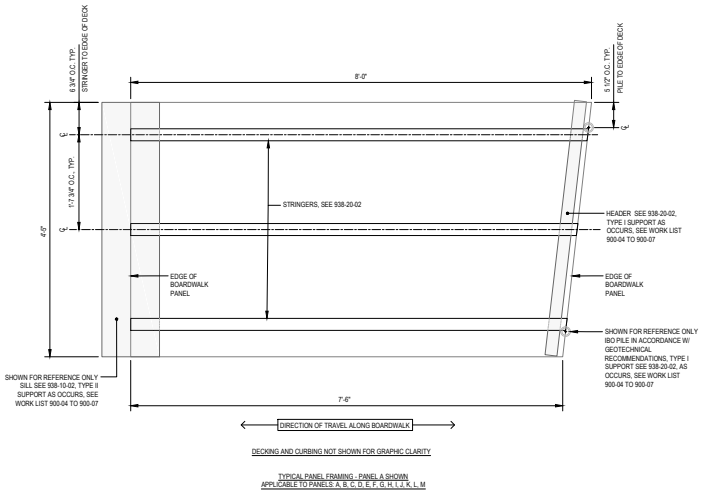
0.1L: R= 16 sf(100 psf)(0.1)= 160 lbs - Controls Connection

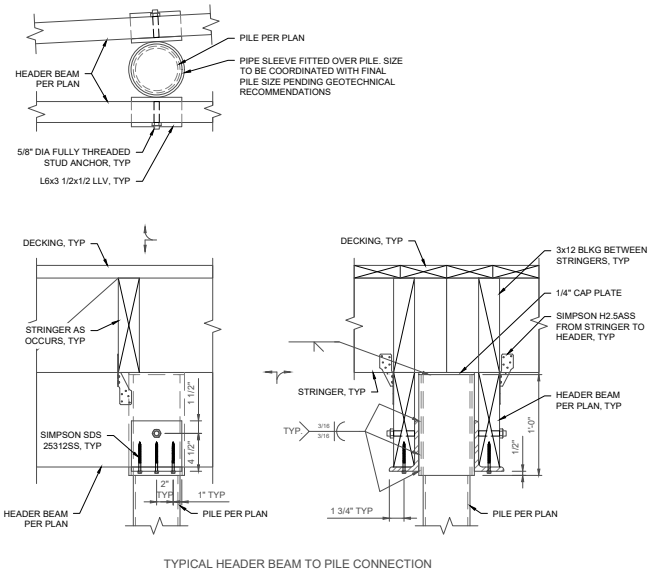
5/8" Threaded Stud: Vallow= 1050 lbs(Cd= 1.6)= 1680 lbs > 160 lbs OK

Use 5/8" Threaded Stud from 3x12 Header to Angle



Panel P





TYPICAL HEADER BEAM TO PILE CONNECTION

MILLER CONSULTING ENGINEERS
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Portland, OR 97223
503.246.1250
miller-se.com

Project Name: Trillium Lake Trail Boardwalk Design Project #: 211244

Location: Trillium Lake, OR

Client: Shapiro-Didway

By: EWA Ck'd: AEL Date: 2/18/2022

Appendix D

NFF Funding Code: 1593031
NFF Funding Name: Great American Outdoors Act Trillium Lake Treasured Landscape Accessible Replacement

Funder Agreement ID: 21-CS-11060600-010

Flowdown Provisions

PROHIBITION AGAINST INTERNAL CONFIDENTIAL AGREEMENTS.

All non federal government entities working on this agreement will adhere to the below provisions found in the Consolidated Appropriations Act, 2016, Pub. L. 114-113, relating to reporting fraud, waste and abuse to authorities:

1. The recipient may not require its employees, contractors, or subrecipients seeking to report fraud, waste, or abuse to sign or comply with internal confidentiality agreements or statements prohibiting or otherwise restricting them from lawfully reporting that waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

2. The recipient must notify its employees, contractors, or subrecipients that the prohibitions and restrictions of any internal confidentiality agreements inconsistent with paragraph (a) of this award provision are no longer in effect.

3. The prohibition in paragraph (a) of this award provision does not contravene requirements applicable to any other form issued by a Federal department or agency governing the nondisclosure of classified information.

4. If the Government determines that the recipient is not in compliance with this award provision, it:

    a. Will prohibit the recipient's use of funds under this award, in accordance with sections 743, 744 of Division E of the Consolidated Appropriations Act, 2016, (Pub. L. 114-113) or any successor provision of law; and

    b. May pursue other remedies available for the recipient's material failure to comply with award terms and conditions.