



**SE BEND SEPTIC TO SEWER  
ADVISORY COMMITTEE MEETING**

**THURSDAY, OCTOBER 5, 2017**

# WELCOME & INTRODUCTIONS



- Project Goals
- Research Finding
- Preliminary Design Alternatives
- Committee Q&A
- Look Ahead: *Four Ingredients of Affordability*
- Public Comment

# PROJECT TECHNICAL GOALS

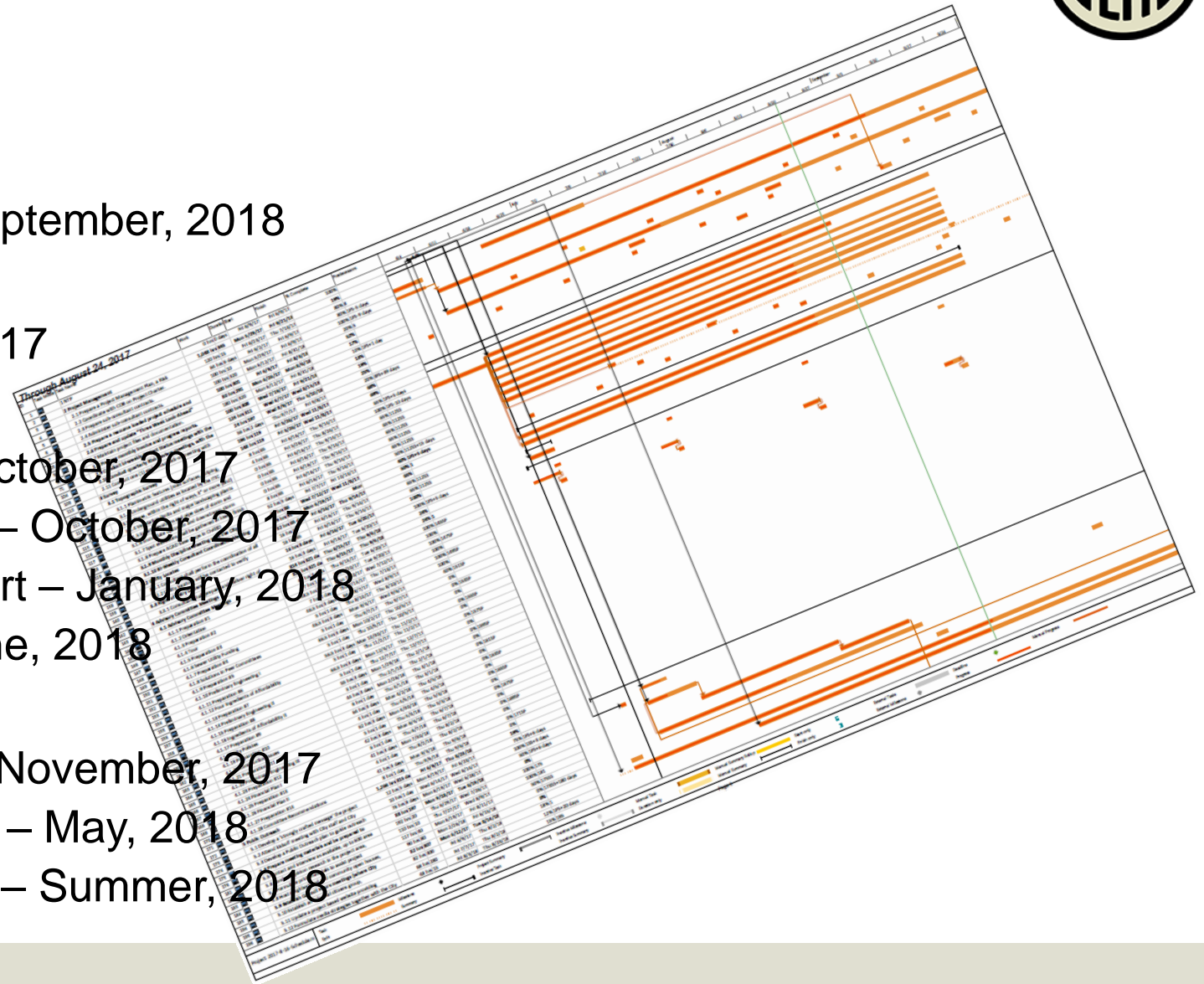




- Where are we headed?
  - 30% Designs
  - Class 3 Cost Estimates
- How do we get there?
  - Technical Alternatives Analysis
  - Preliminary Engineering Report
  - Detailed Engineering
- Where are we?
  - Draft Technical Alternatives Analysis
  - Beginning Preliminary Engineering Report
  - Completing Topographic Survey end of this month



- Key Milestones
  - Advisory Committee
    - Monthly Meetings Through September, 2018
  - Public Outreach
    - Door-to-door – September, 2017
  - Engineering
    - Field Topographic Survey – October, 2017
    - Basin Alternative Tech Memo – October, 2017
    - Preliminary Engineering Report – January, 2018
    - 30% Designs and Costs – June, 2018
  - Financing & Strategy
    - Initial Financial Alternatives – November, 2017
    - Refined Financial Alternatives – May, 2018
    - Recommendations to Council – Summer, 2018

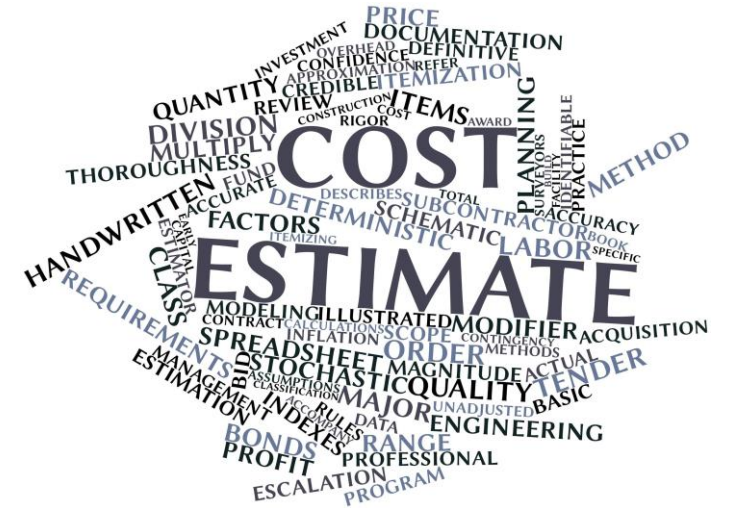




- What are 30% Designs?
  - Typically horizontal and vertical designs complete to a level to start right-of-way and/or easement acquisitions.
    - Potential utility conflicts identified
    - Designs consider vegetation impacts
    - Services locations to each lot set
    - Road reconstruction designs
  - Why is this a critical step?
    - Right-of-way/easement acquisition is typically a critical step
    - Increased level of confidence in Class 3 cost estimates



# COST ESTIMATING 101



# WHO SETS THE STANDARD FOR COST ESTIMATES



- Cost estimating on large projects is a profession unto itself
- Estimators follow the Association for the Advancement of Cost Engineering (AACE) International standards
- You can't equate getting a quote on building a home or remodel to developing an estimate for work that is not completely defined
- Cost estimates always tend to trend up and engineers are always looking to trim down every estimate
- There are some basics to understand



"WELL, MAYBE UMPTEEN ZILLION WAS TOO GENERAL A COST ESTIMATE."





- Cost Estimates Change
  - They are simply an estimate at a point in time of the project based on the amount of information available
  - Estimates are typically made at major milestones of a project
    - Master Plan
    - Feasibility Study
    - Pre-Design
    - 30% Design
    - 60% Design
    - 90% Design
    - Final Design
- Estimate accuracy typically improves at each milestone



# ACCURACY VS CONTINGENCY



- The contingency does not make up or represent accuracy of an estimate
- Contingency is built into the cost estimate to account for the “known” unknowns (i.e. cost escalations, things you know you will find but you won’t know the level of effort until you dig)
- Accuracy is a measurement of the actual to the estimate
- The difference between the actual and the estimate usually is the “unknown” unknowns (i.e. unidentified utility, geotech issues, sudden lack of availability of materials or equipment)
- The actual cost of a project is not known until the project is complete (so you really don’t know how accurate your estimates are until the project is done)

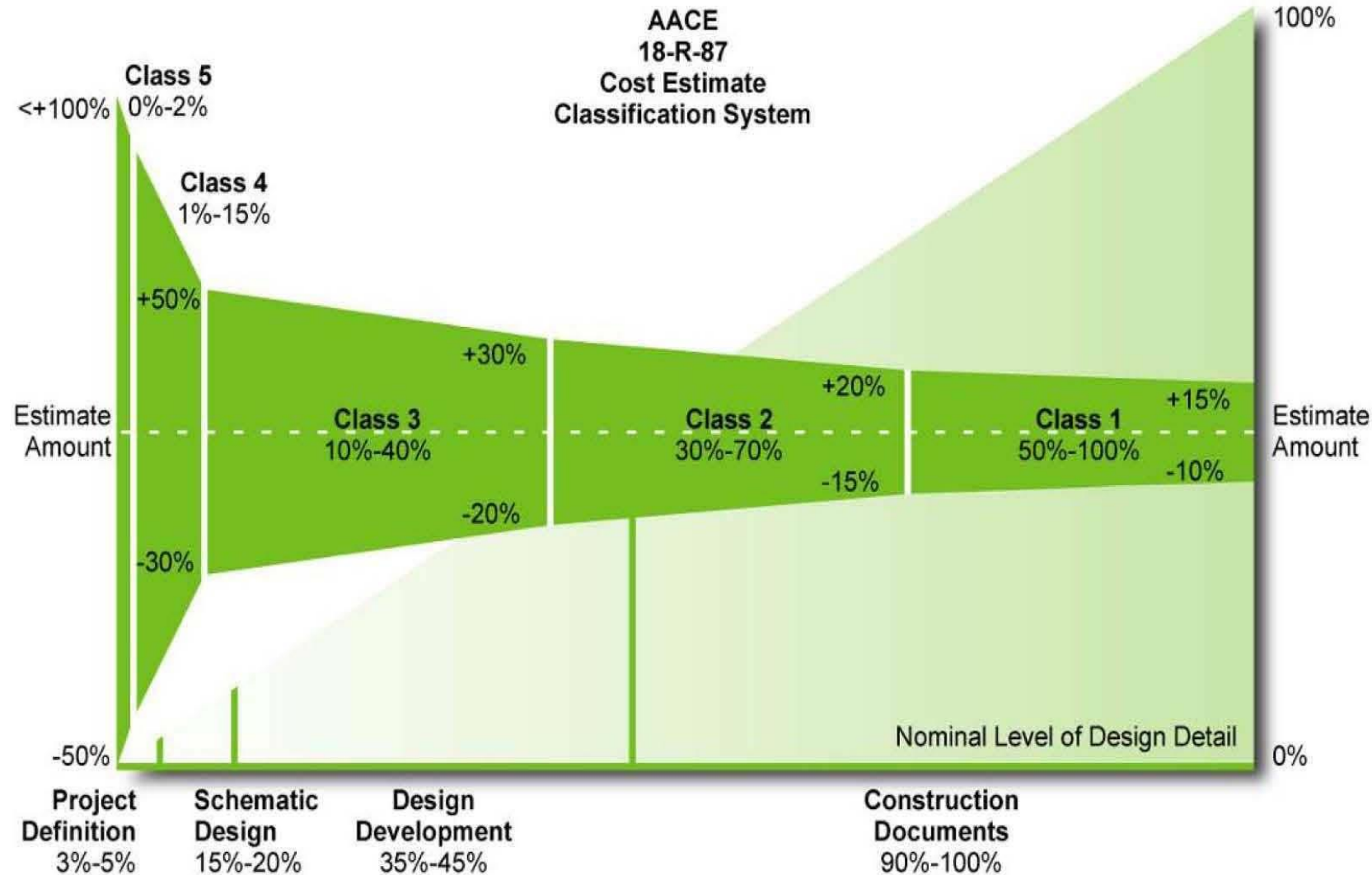


**Cost contingency** is a reserved fund that is added to a base cost estimate to account for cost uncertainty. It is the estimated cost of known-unknowns risks that can affect the project.

Shohreh Ghorbani  
[www.ProjectControlAcademy.com](http://www.ProjectControlAcademy.com)



# THE AACE COST CURVE



- Class level estimates are tied to the amount of known information
- The variance is different for every project and is typically related to the project complexity
- The timeline of the project also influences cost estimates



# WHY EVEN DO AN ESTIMATE WITH SO MUCH UNCERTAINTY?



According to AACE, they say.....

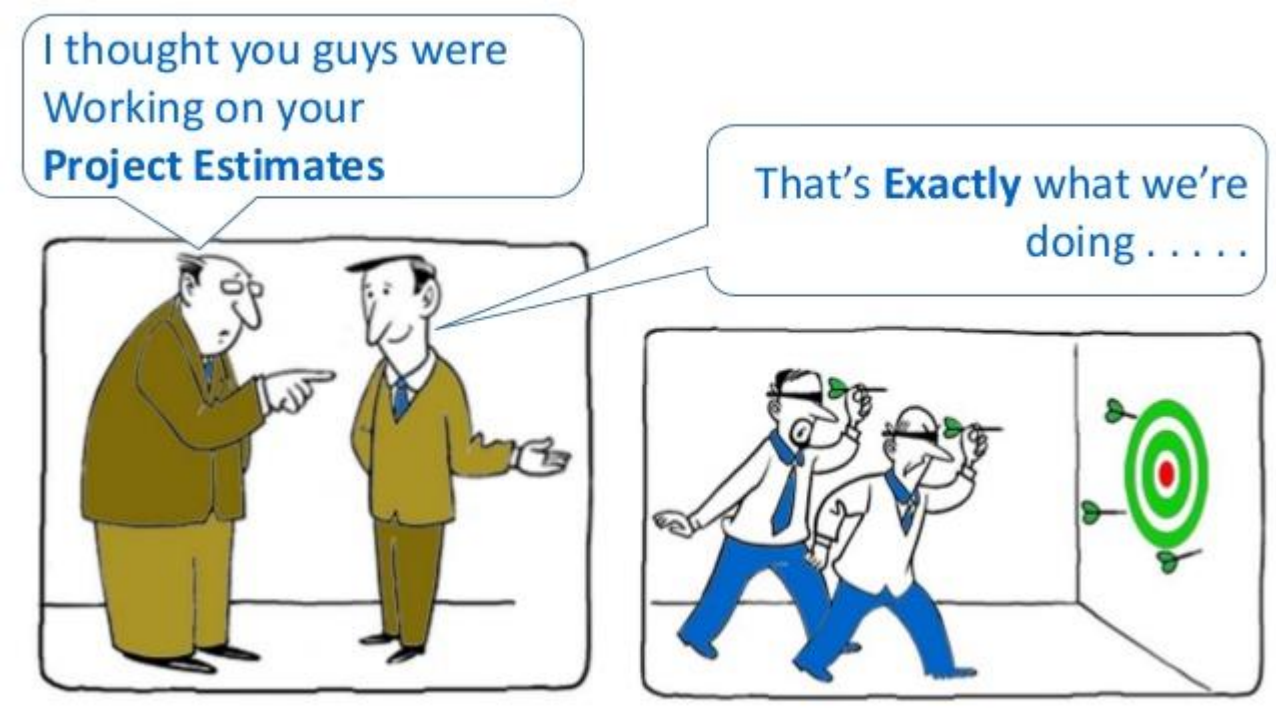
*“It is simply not possible to define a precise range of estimate based solely on the percentage of engineering complete or class of estimate”*

*“The values assigned to each individual component of an estimate are uncertain, and therefore the estimate as a whole is also subject to variability. Estimates involve uncertainty, therefore variability exists and we need to accept it”*

*“The word “estimate” implies a judgmental, probabilistic value; and the one sure thing we know about an estimate is that it is not “exact”*

*“At each phase of a project (or for each class of estimate), the estimate should reliably predict the costs to deliver the project, given the scope and assumptions reflected in the estimate. Thus the estimate should provide sufficient accuracy to effectively support the decision at hand”*

# QUESTIONS?



# Appendix C – Planning Document Outlines

The following outlines of a preliminary engineering report are from an interagency memorandum dated January 16, 2013:

## C.1: GENERAL OUTLINE

- 1) PROJECT PLANNING
  - a) Location
  - b) Environmental Resources Present
  - c) Population Trends
  - d) Community Engagement
- 2) EXISTING FACILITIES
  - a) Location Map
  - b) History
  - c) Condition of Existing Facilities
  - d) Financial Status of any Existing Facilities
  - e) Water/Energy/Waste Audits
- 3) NEED FOR PROJECT
  - a) Health, Sanitation, and Security
  - b) Aging Infrastructure
  - c) Reasonable Growth
- 4) ALTERNATIVES CONSIDERED
  - a) Description
  - b) Design Criteria
  - c) Map
  - d) Environmental Impacts
  - e) Land Requirements
  - f) Potential Construction Problems
  - g) Sustainability Considerations
    - i) Water and Energy Efficiency
    - ii) Green Infrastructure
    - iii) Other
  - h) Cost Estimates
- 5) SELECTION OF AN ALTERNATIVE
  - a) Life Cycle Cost Analysis
  - b) Non-Monetary Factors
- 6) PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)
  - a) Preliminary Project Design
  - b) Project Schedule
  - c) Permit Requirements
  - d) Sustainability Considerations
    - i) Water and Energy Efficiency
    - ii) Green Infrastructure
    - iii) Other
  - e) Total Project Cost Estimate (Engineer's Opinion of Probable Cost)
  - f) Annual Operating Budget
    - i) Income
    - ii) Annual O&M Costs
    - iii) Debt Repayments
    - iv) Reserves
- 7) CONCLUSIONS AND RECOMMENDATIONS

## PROJECT GOALS



- Draft Technical Memorandum
  - Basin Analysis
  - Alternatives Presentation
- Preliminary Engineering Report
  - Summarize the decision making process
  - Meets requirements for loan/funding alternatives
    - Need for project
    - Alternatives Considered
    - Selection of alternative
    - Proposed project
    - Environmental Review


# CURRENT RESEARCH



- Tour
- Review of Previous Studies
- County Records Research
- Internal Project GIS Database
- Local Construction Lessons Learned



- County Records Research
- Deschutes County Website (DIAL)
  - Property Research
  - Initial Septic Permit Application
  - Initial Septic Acceptance
  - Septic Repairs



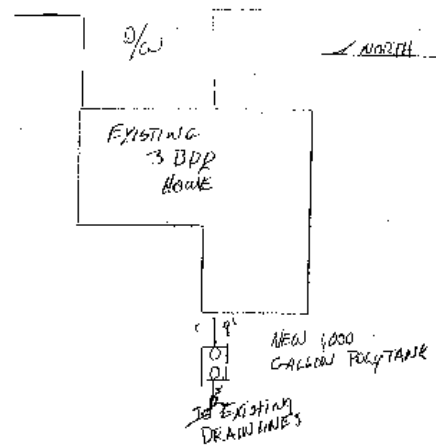
### Certificate of Satisfactory Completion

Deschutes County Community Development Department

Permit #: 247-14-006330-SEP

<p><b>Job Location - Address:</b> 61341 KING SOLOMON CT BEND, OR 97702</p> <p><b>Taxlot:</b> 184210CA02400</p> <p><b>Owner:</b> STANTON, JEFFREY C &amp; DANA F</p> <p><b>Installer:</b> MYCO EXCAVATION LLC <span style="float: right;"><b>DEQ License #:</b> 37954</span></p> <p><b>Type of Work:</b> Repair - Minor - Single Family Dwelling</p>	<p><b>Septic System Type:</b> Standard <span style="float: right;"><b>Drain Field Type:</b> Standard</span></p> <p><b>Tank Material &amp; Capacity:</b> 1000 <span style="float: right;"><b>Drain Line Length:</b></span></p> <p><b>Drain Field Media Type:</b> <span style="float: right;"><b>Trench Depth:</b></span></p>
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*KING SOLOMON*



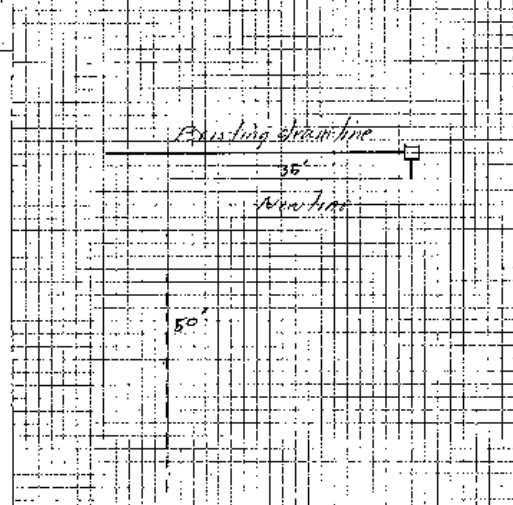
In accordance with Oregon Revised Statute 454-66 and Oregon Administrative Rules 340-71, this Certificate is issued as evidence of satisfactory completion and installation of components as described in the permit at the location identified.

Authorized Signature: *Judd Cleveland* Date: 11/5/2014

DESCHUTES COUNTY  
COMMUNITY DEVELOPMENT DEPARTMENT  
ENVIRONMENTAL HEALTH DIVISION  
ADMINISTRATION BUILDING - BEND, OREGON 97701  
(503) 388-4675

PERMIT NO. **5 28135**  
DATE ISSUED IN **4/26/190**

### CERTIFICATE OF SATISFACTORY COMPLETION

<b>ADDRESS:</b> 1 KING SOLOMON CT, BEND, OR	<b>CITY:</b> BEND								
<b>NAME:</b> T, THOMAS P. ROOPER	<b>LICENSE NO.:</b> 34736								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TOTAL G.U.D. CAPACITY</th> <th>EQUA. LOOP</th> <th>SERIAL PRES</th> <th>SANDS OTHER FILTER</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>		TOTAL G.U.D. CAPACITY	EQUA. LOOP	SERIAL PRES	SANDS OTHER FILTER				
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FEET FROM DRAINFIELD: N/A	FEET FROM DRAINFIELD: N/A								
<p>TAX LOT # 2500</p> 									

In accordance with Oregon Revised Statute 454-665, this Certificate is issued as evidence of satisfactory completion of an on-site sewage disposal system at the location identified above.

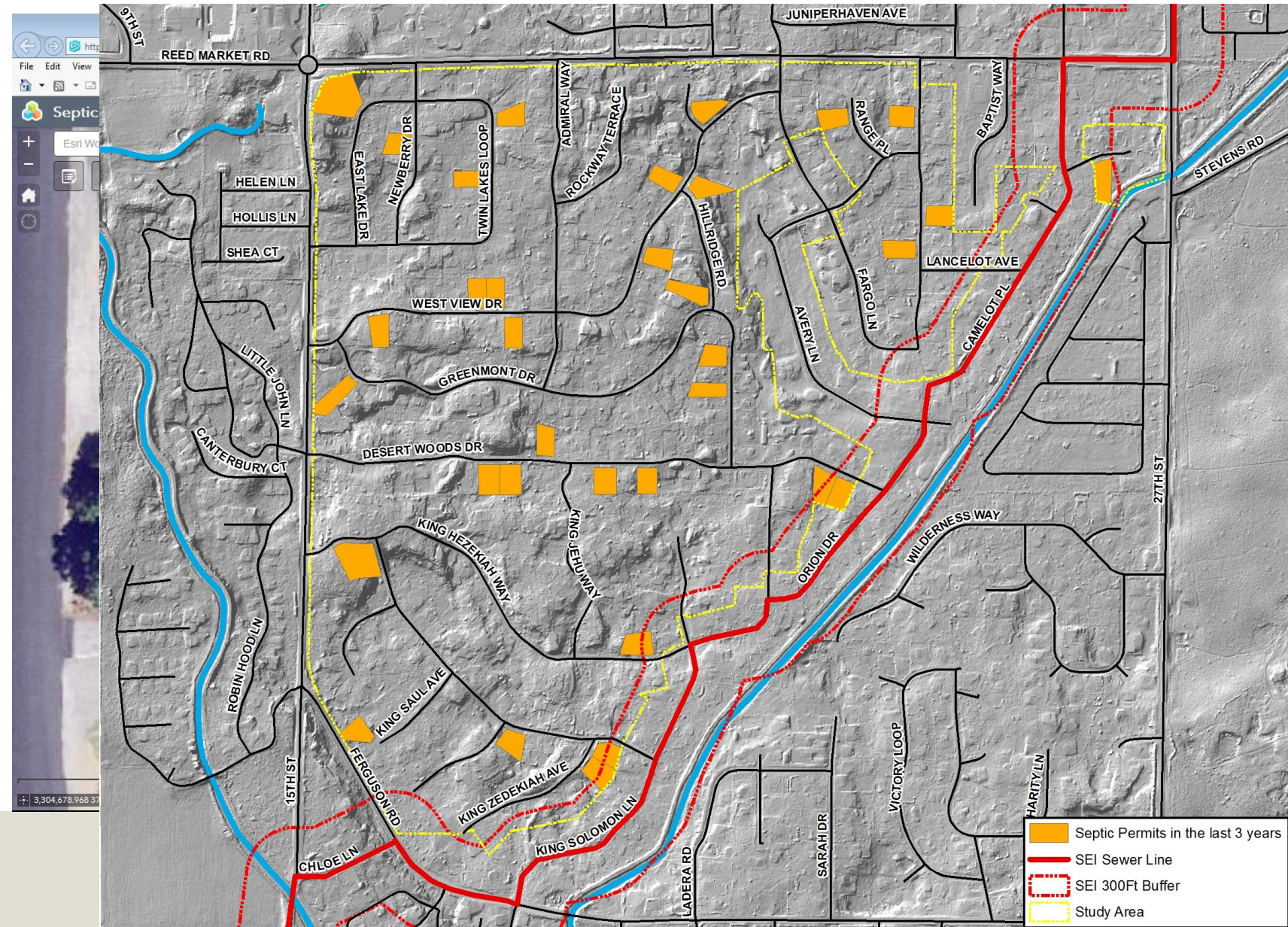
Signature: *TH. ROOPER* DATE: 4/27/190

**LIVE**

original pink-installer copy yellow-applicant copy gold-file copy



- Project GIS Database
  - Facility Locations
  - Types of facilities
  - Age of initial system
  - Age of repairs
  - Types of repairs
- Why is this information important
  - It helps determine service locations and depths
  - It helps identify potential problem areas – informing phasing





- Lessons Learned
  - Existing Utilities
    - Accurate Topographic Survey
    - Integrity of Existing Facilities
  - Vegetation
    - Sewer Alignment and Depth
    - Arborist input
  - Constructability
    - Trench Depth and Width
    - Road Reconstruction
    - Service Location
  - COMMUNICATION
    - Regular updates during design AND construction





# PRELIMINARY DESIGNS

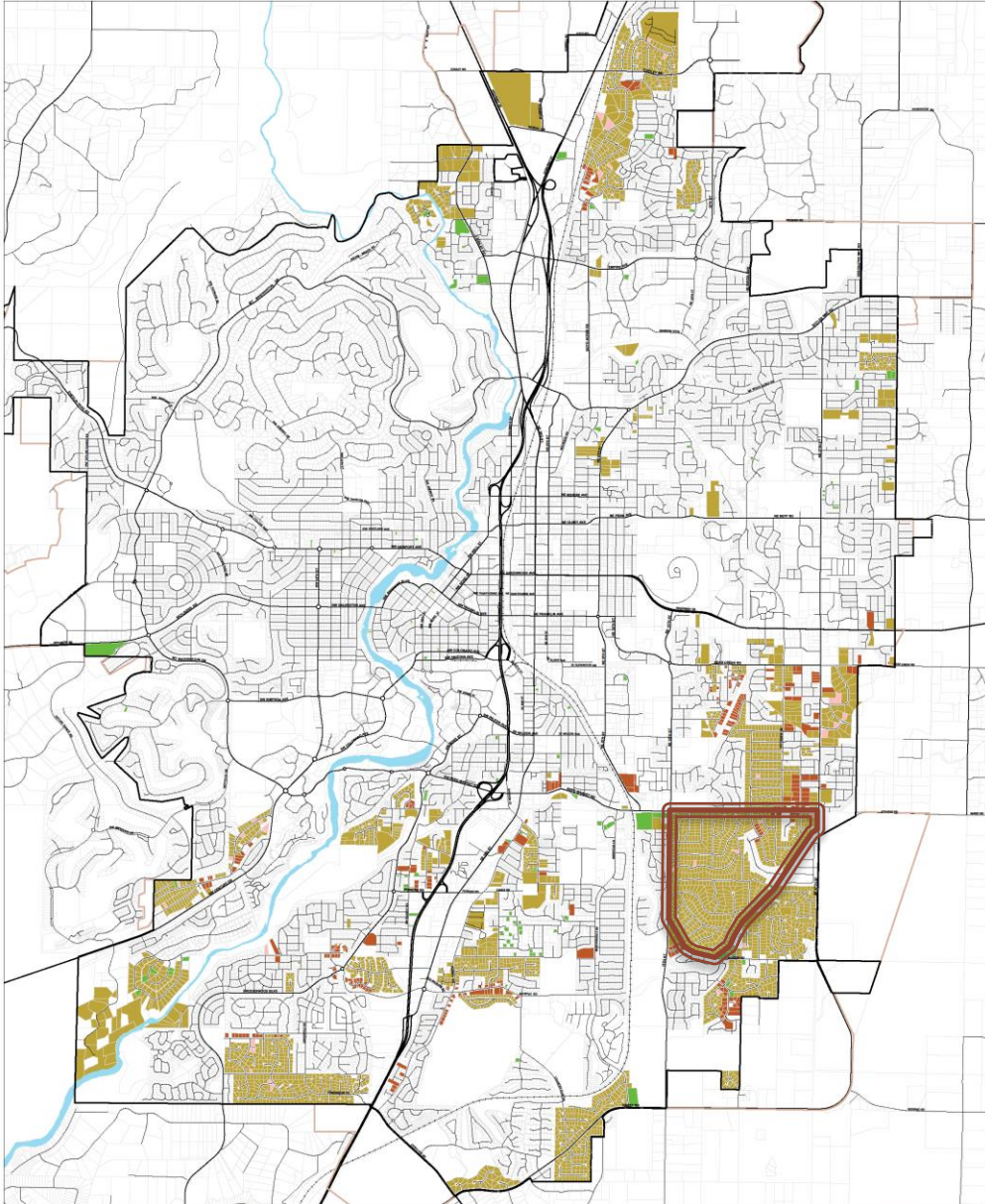


- Design Objectives
- Design Approach
  - Basin Analysis
  - Develop Design Criteria
  - Define Critical Points and Design Constraints
  - Identify Alternatives for Consideration

# PRELIMINARY DESIGN ALTERNATIVES



- Design Objectives
  - Advance the Collection System Master Plan (CSMP) for Provision of Sewer Service to Unsewered Areas
  - Develop Gravity Collector Sewer System Alternatives in Accordance with City of Bend Standards and Specifications
  - Develop Cost Estimates in Accordance with Industry Accepted AACE International Estimate Classifications for use in Developing Financing Alternatives



City Limit  
Urban Growth Boundary  
Sewer Status  
Active Septic  
Active Septic within 300' of Sewer  
Field Ventilation Needed  
Vented Parcel without Sewer

0 20 40 60 80 100



# PRELIMINARY DESIGN ALTERNATIVES



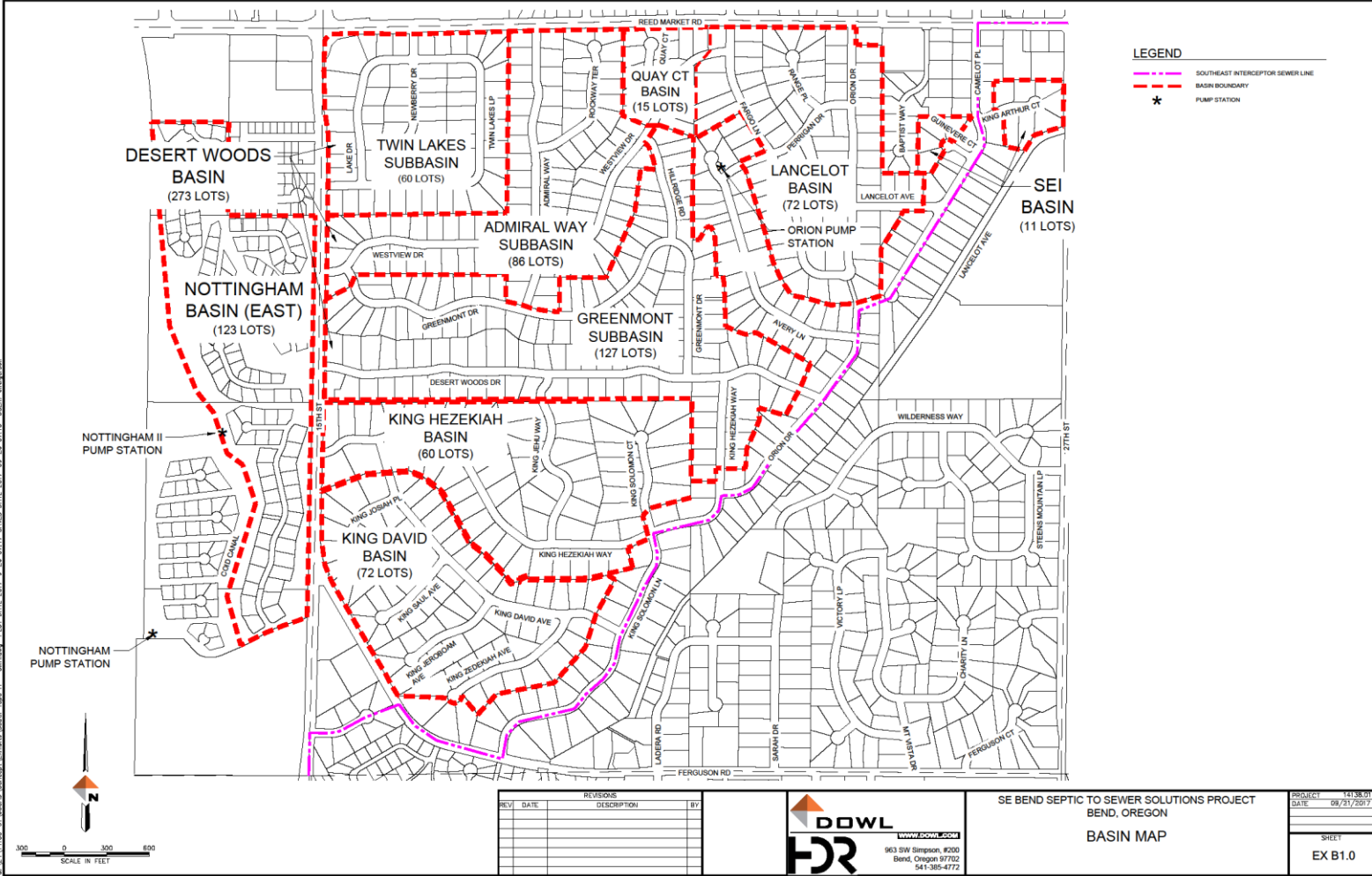
- Basin Analysis
  - Identify Geographic Sewer Service Limits within Study Area
    - Available Topographic Information
      - Aerial Mapping/LIDAR
    - Supplemental Field Survey (Currently in Progress)
      - Right-of-Way Features
      - Invert Elevations and Pipe Sizes of Storm and Sanitary Sewer Facilities Where Accessible
      - Verification of Southeast Interceptor (SEI) through Study Basin
      - Finish Floor Elevation of Residences (First Floor)



# PRELIMINARY DESIGN ALTERNATIVES



- Basin Analysis
  - Define Preliminary Collector Gravity Sewer Service Area Limits
  - Define Preliminary Pressure Sewer Service Area Limits
    - Private Sump Pumps (Homeowner Owned/Maintained)
    - Not Feasible to Serve 100 Percent of Study Area with Gravity System
      - Topography
        - Localized Low Points
        - Steep Elevation Drops to Back of Lots
      - Distance from SEI Connection
      - SEI Connection Depths
      - Limitations with Practical Sewer Installation Depths







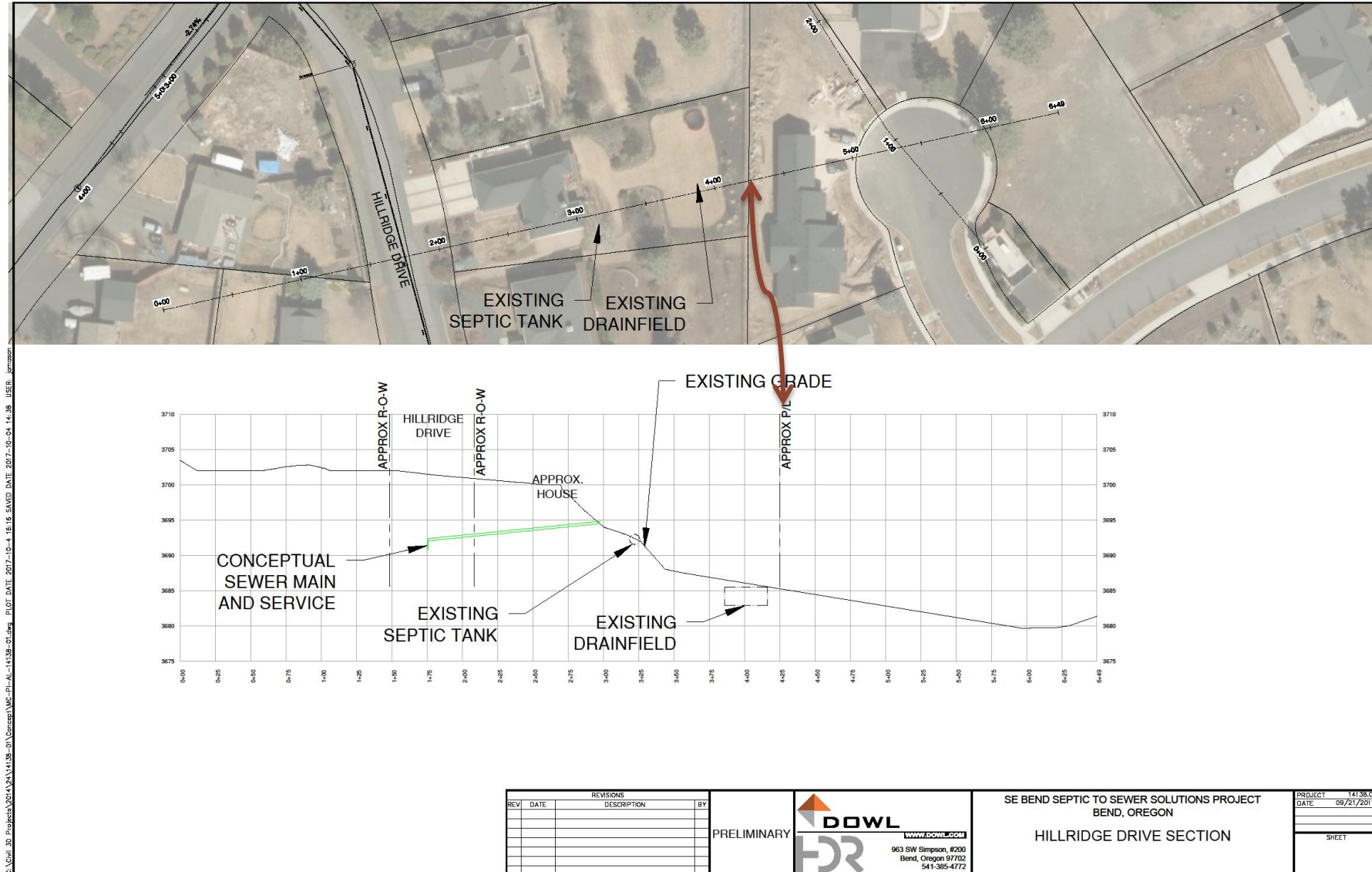
- Design Approach
  - Develop Design Criteria
    - Follow Criteria Established in the City of Bend Standards and Specifications & CSMP to Greatest Extent Possible
      - Minimum Pipe Diameter
      - Minimum Grade
      - Minimum Depth of Cover
      - Minimum Velocity
      - Etc.
    - Define Peak Sewer Flows
      - Determine Pipe Diameter of Gravity Collector Sewer Main
    - Define Acceptable Exceptions and Variances to Design Criteria
      - Determine “Balance” to Maximize Gravity Sewer Service
        - Acceptable Minimum Grade
        - Acceptable Minimum Depth of Cover
        - Acceptable Minimum Low Flow Velocity

# Design Approach

- Critical Points and Design Constraints

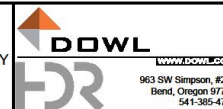
- Topography
  - Localized Low Points
  - Steep Elevation Drops to Back of Lots
- SEI Connection Depths
- Existing Utilities
- Easements/Right-of-Way
  - Minimize Private Lot Utility Easements

# PRELIMINARY DESIGN ALTERNATIVES



REVISIONS			
REV	DATE	DESCRIPTION	BY

PRELIMINARY



SE BEND SEPTIC TO SEWER SOLUTIONS PROJECT  
BEND, OREGON  
HILLRIDGE DRIVE SECTION

PROJECT	14138.01
DATE	09/21/2017
SHEET	

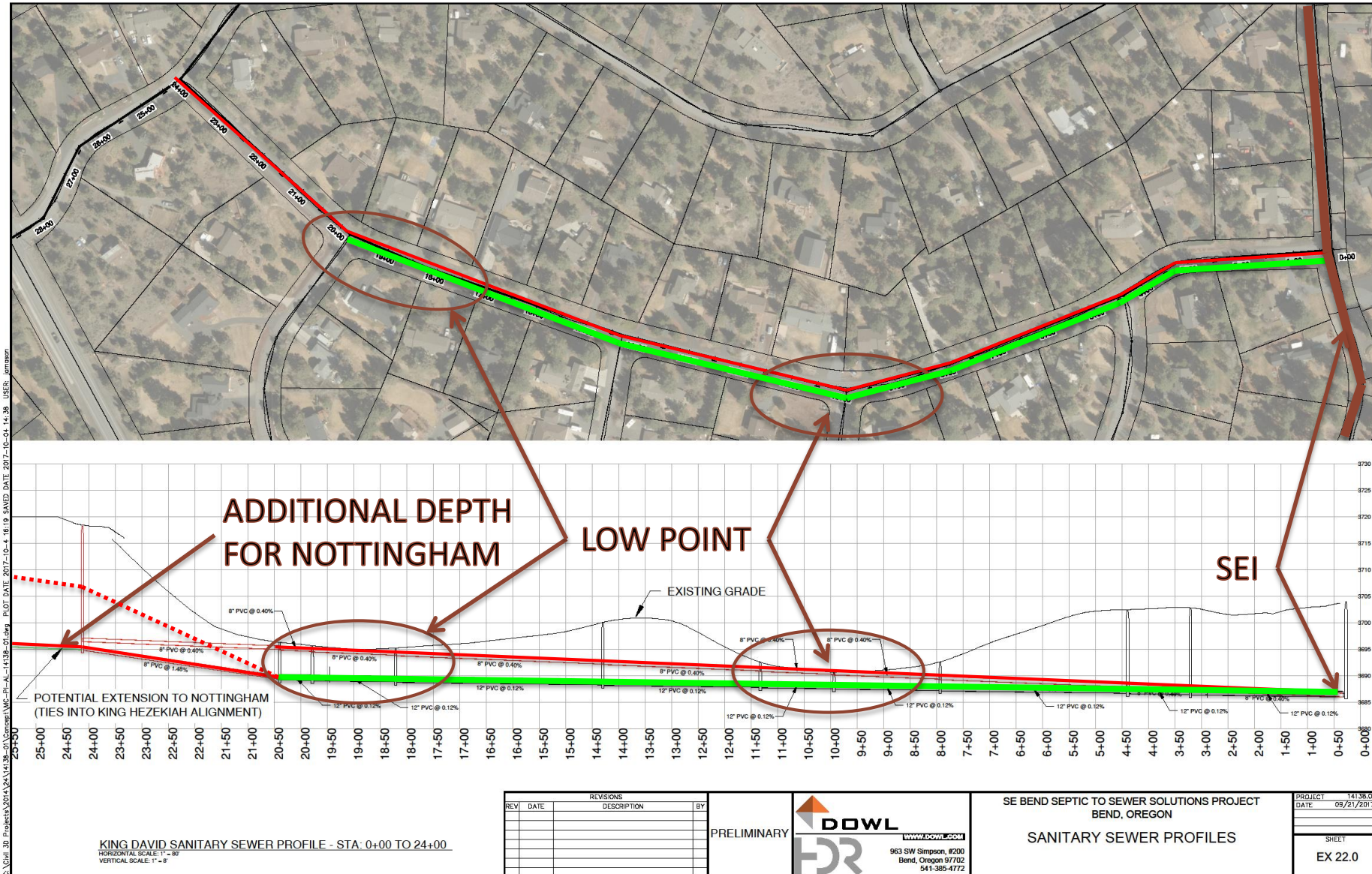




# PRELIMINARY DESIGN ALTERNATIVES

## Alternatives Identified for Consideration

- Upsize Collector Diameters
    - Reduces Collector Grade/Slope
    - Achieves Additional Collector Depth/Cover at Localized Low Points
      - King David Avenue Collector (12"/8")
      - Desert Woods Drive Collector (12"/8")
  - Extending Service to Nottingham Subdivision
    - Requires Additional Collector Depth
- 8" Gravity Sewer  
— 12" Gravity Sewer







- Alternatives Identified for Consideration
  - Consideration of Private Lot Easements
    - Refine/Determine Appropriate “Balance” Between Easements and Private Sump Pumps
  - Collector Sewer Depth Considerations
    - Refine/Determine Appropriate “Balance” Between Limitations with Practical Sewer Depths and Private Sump Pumps

# COMMITTEE Q&A

# INTERIM POLICY

# COMMITTEE Q&A



- 5 minutes
- Time divided among speakers
- Comment cards available



# UPCOMING ADVISORY COMMITTEE MEETINGS



**Thursday, November 2**

*Four Ingredients of Affordability*

**Thursday, December 7**

*Preliminary Engineering II*

***THANK YOU!***