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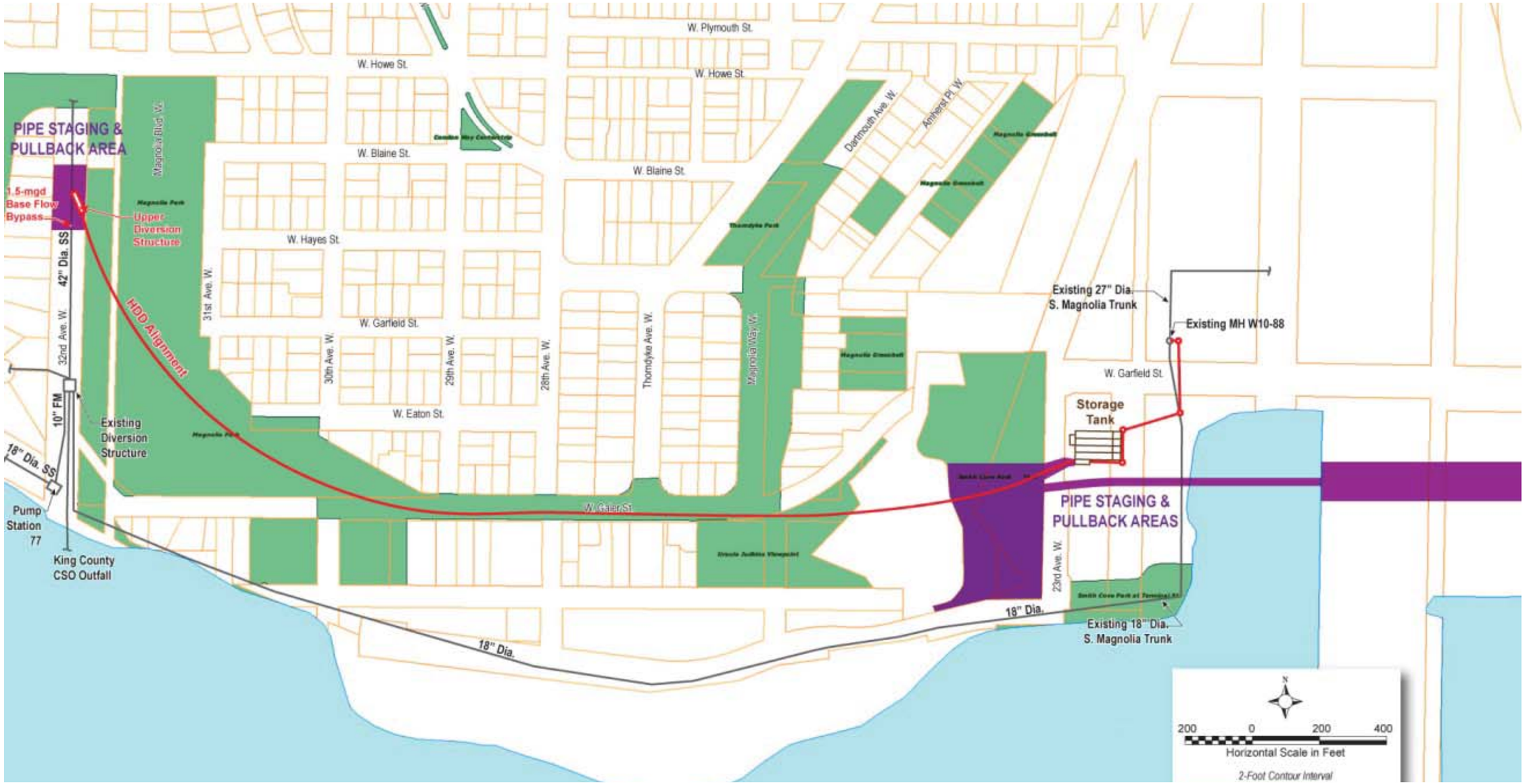
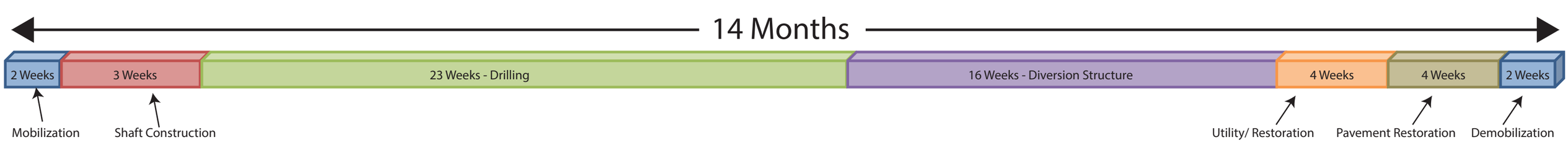
HDD Site Plan





HDD Sequence

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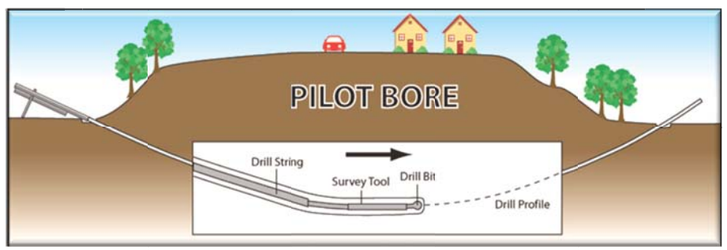
Step 1 - Drilling the Pilot Bore

An initial drilling step establishes a pilot hole. The surrounding soils are stabilized with drilling mud



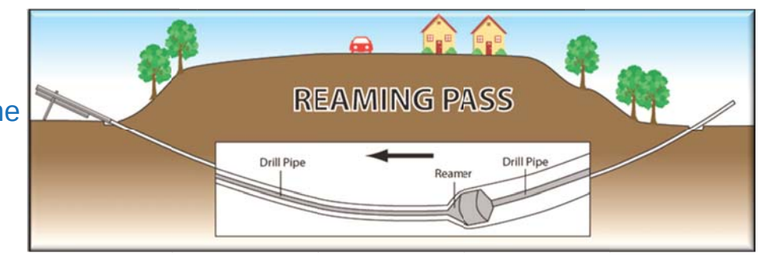
A drilling engineer steers the drill bit using special survey tools

Horizontal Directional Drilling (HDD) Rig used for Drilling and Reaming

Tracking devices at the surface track the drill bit location during the initial bore

Step 2 - Reaming Pass

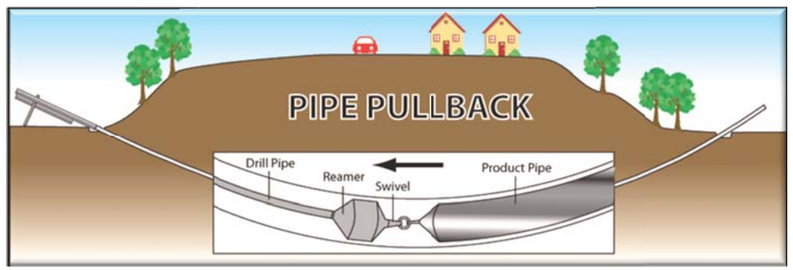
The pilot hole is then enlarged to the final pipe size using a reamer. The drilling mud excavated in this step is collected and recycled.



Specific equipment is used for drilling in different conditions. Both drill bits and reaming heads for the Magnolia Project will be selected based on the soil types found at the drill depth

Step 3 - Pipe Pullback

The final pipeline is then pulled back through the prepared bore hole



Heavy equipment is used to lift the pipe and pull it through the prepared bore hole

Shaft Construction on 32nd for HDD

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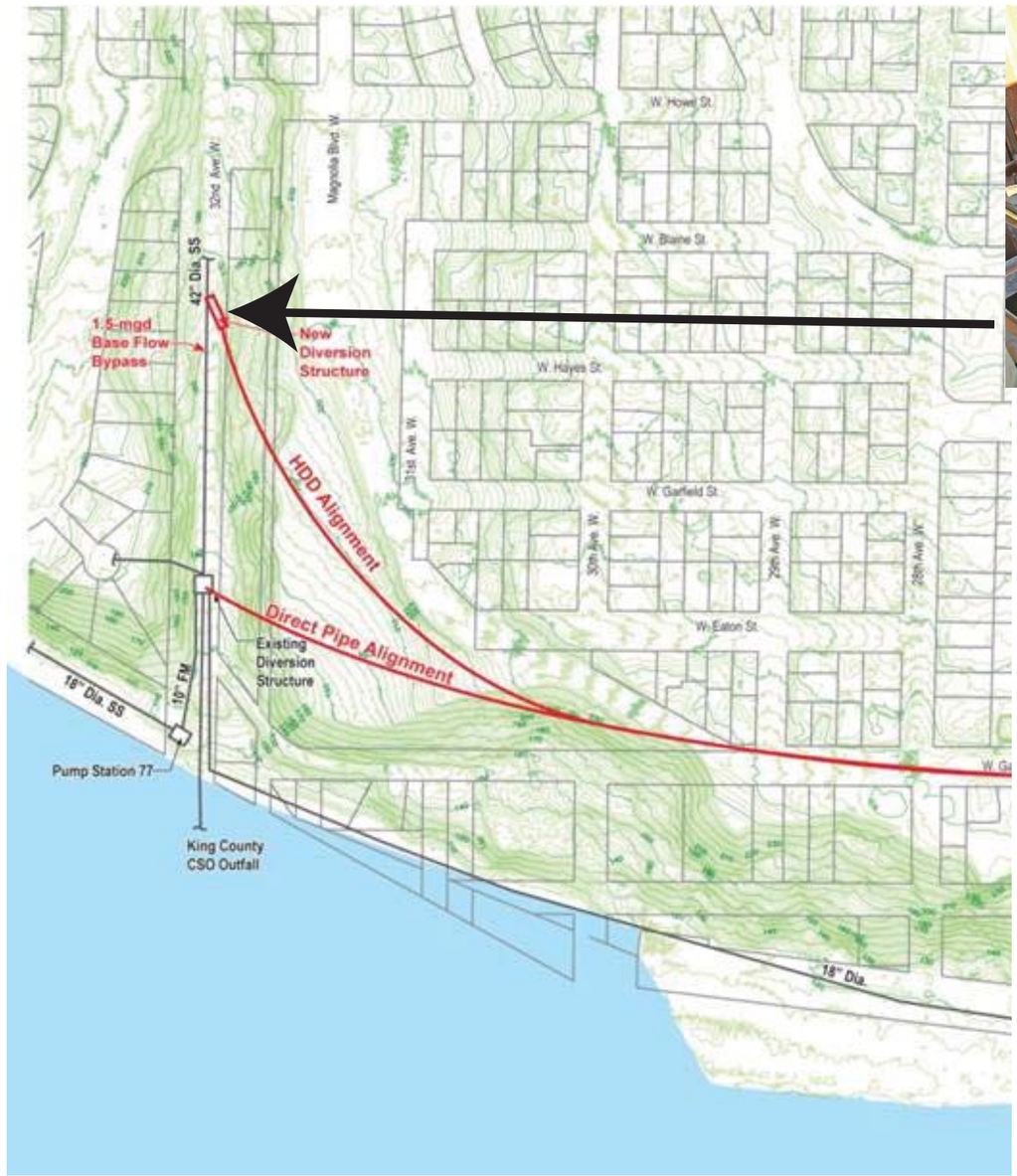
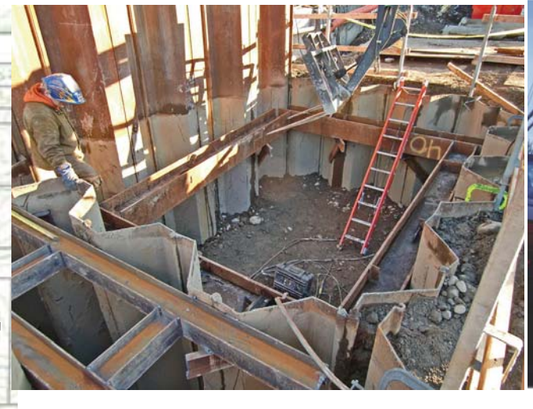


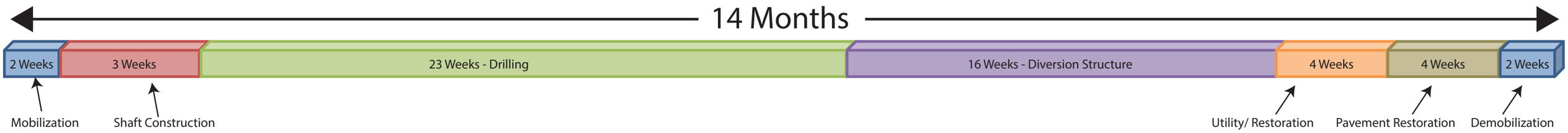


Overall Duration for Construction on 32nd Ave. W = 14 Months

Duration for Shaft Construction on 32nd Ave. W
About 3 Weeks

Diversion Structure Construction
About 16 Weeks

Pavement Restoration
About 4 Weeks



HDD Rig and Noise Enclosures

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HDD Layout Area

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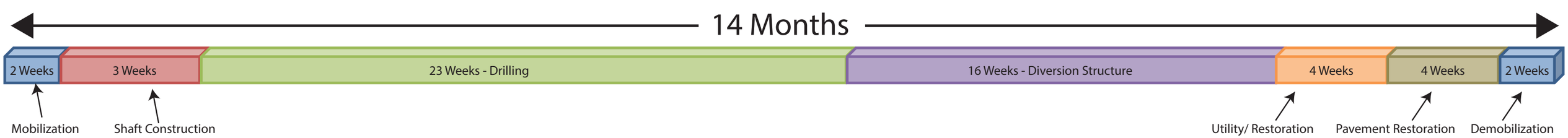
Pipe Laydown Duration: 8 Weeks



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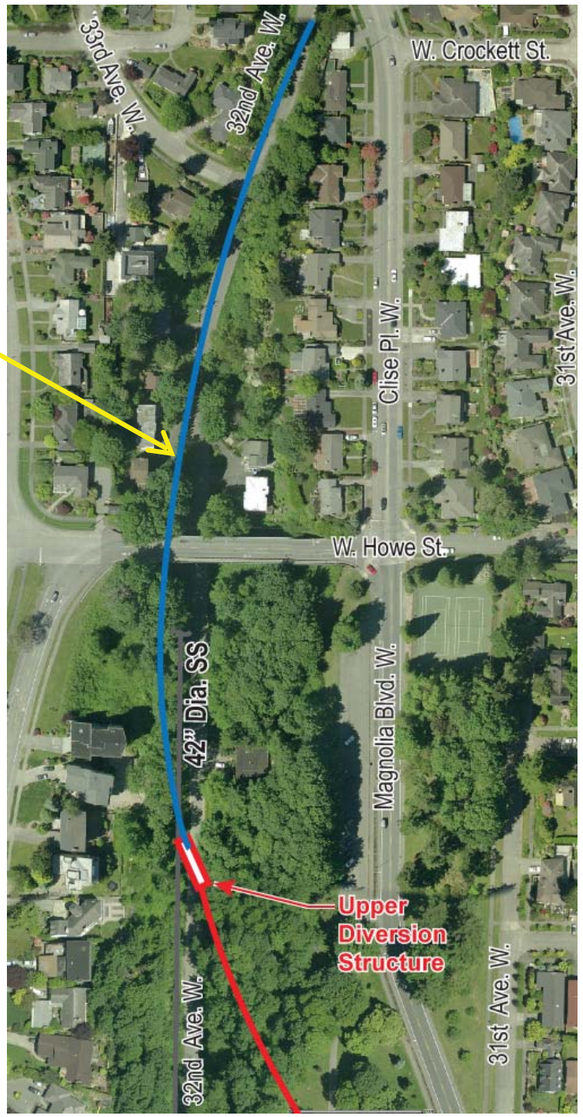
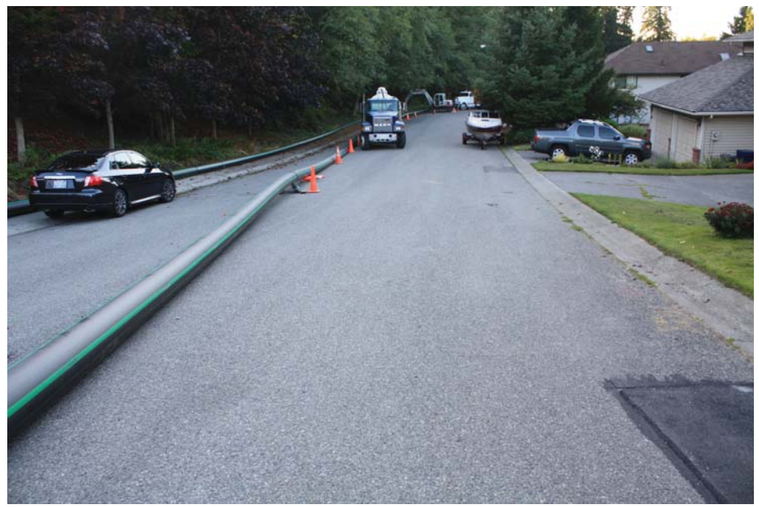
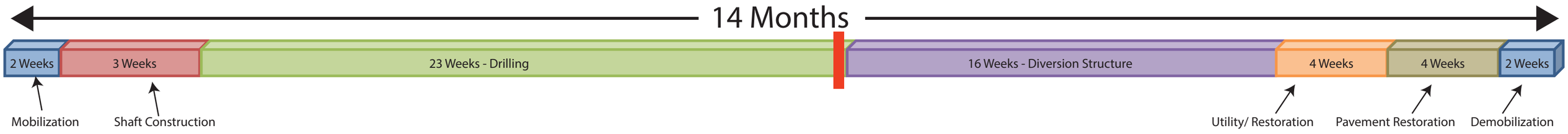
Pipe Pull Back

Pipe Pullback





Duration: 1-2 Days



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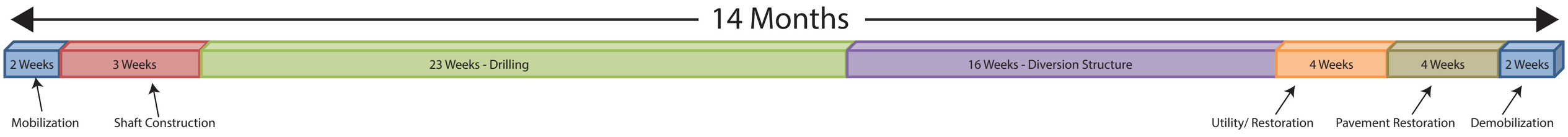
Diversion Structure



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Pavement Restoration