

The logo features a stylized road with a dashed white line curving upwards and then looping back down, all contained within a circular shape.

# QATAR HIGHWAY DESIGN MANUAL

Index





## Index

### Accessibility

**V1-P2:** 11, 20, 44, 47, 48; **V2-P11:** 122; **V2-P20:** 62

### Accuracy

**V2-P12:** 41

### Acquisition

**V1-P2:** 6, 8, 97; **V2-P11:** 17, 53, 59, 152

### Addendum

**V2-P16:** 33

### Alignment

**V1-P2:** 26, 65; **V1-P3:** 35, 36, 65, 67, 82, 83, 85, 87, 89, 91, 164, 189; **V1-P5:** 30, 36, 38, 45;  
**V1-P6:** 32, 33, 38, 74, 91; **V1-P7:** 23; **V1-P9:** 11, 24, 25, 64, 67; **V2-P11:** 91; **V2-P19:** 48;  
**V3-P21:** 27, 48; **V3-P25:** 17, 18, 46

### Approach

**V1-P1:** 14; **V1-P2:** 6, 19, 28, 98; **V1-P3:** 24, 29, 67; **V1-P6:** 22, 23, 25, 39, 53; **V1-P7:** 2, 13, 14,  
15, 25, 26, 31, 32, 35, 41, 45, 46, 51, 54, 59; **V1-P8:** 14, 17, 18, 28, 36, 44, 45, 46; **V1-P9:** 10;  
**V2-P12:** 56; **V2-P13:** 42; **V2-P20:** 7, 37, 84, 93; **V3-P21:** 21; **V3-P23:** 3, 4, 19, 94; **V3-P24:** 1

### Approach half-width

**V1-P7:** 2

### Aquifer

**V2-P15:** 121, 131

### Ashghal

**V1-P1:** 3, 12, 17; **V1-P3:** 78, 121, 122, 189; **V1-P5:** 2, 47; **V1-P10:** 1, 3, 6, 17, 19, 20, 21, 25,  
38, 81, 86, 104, 105, 111, 115; **V2-P11:** 1, 5, 7, 14, 17, 47, 58, 61, 66, 67, 90, 98, 100, 101,  
102, 104, 105, 108, 132, 143, 145, 152; **V2-P12:** 1, 19, 23, 30, 33, 35, 43, 44, 85, 110;  
**V2-P13:** 3, 4, 13, 19, 31, 36, 37, 38; **V2-P14:** 6; **V2-P15:** 17, 131, 153; **V2-P17:** 1, 4, 5, 9, 11,  
13, 14, 18, 23, 24, 27, 30, 31, 39, 43; **V2-P18:** 1, 2, 5, 7, 8, 10, 15, 16, 17, 19, 20, 23, 25;  
**V2-P19:** 35, 76, 83; **V2-P20:** 97; **V3-P21:** 16, 17, 36, 40, 42, 77; **V3-P22:** 6, 11, 13, 22, 35, 37;  
**V3-P23:** 34, 35, 45, 46, 93; **V3-P24:** 1, 2, 9, 11, 15, 17, 20, 25; **V3-P25:** 26, 29, 31

### Attenuation Tank

**V1-P10:** 104

### Auxiliary Lane

**V1-P3:** 101; **V1-P6:** 35, 46, 47, 49, 50, 51, 52, 53, 57, 73, 76, 79; **V1-P9:** 5, 23

Note: V = Volume, P = Part

**Axle****V2-P12:** 40, 41, 42, 45, 48, 49, 50, 51, 52, 53, 70**Axle load****V2-P12:** 41, 70**Bank****V2-P11:** 43**Barchan dune****V2-P14:** 31; **V2-P15:** 9**Barrier****V1-P2:** 26; **V1-P3:** 103; **V2-P19:** 55**Base Course****V2-P12:** 9, 19, 21, 110**Batter****V3-P21:** 58**Bearing****V2-P12:** 1, 14, 76, 109; **V2-P13:** 20; **V2-P15:** 33, 37, 42, 45, 47, 76, 103, 104, 120, 121, 127;  
**V2-P16:** 70**BES 6001****V3-P21:** 66**Bicycle****V1-P1:** 4; **V1-P3:** 79; **V1-P6:** 87, 89; **V2-P12:** 85, 110; **V2-P13:** , 25; **V2-P19:** 83**Bike path****V1-P2:** 41; **V1-P3:** 5; **V1-P6:** 88; **V1-P5:** 19, 22; **V2-P19:** 48, 56; **V2-P20:** 62; **V3-P25:** 3**Bedrock****V2-P14:** 25; **V2-P15:** 11**Berm****V2-P14:** 13, 16**Blackspot****V3-P23:** 10, 15

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Note: V = Volume, P = Part

#### **Borehole**

**V1-P10:** 93; **V2-P15:** 66, 88, 92, 95, 123, 153, 207, 210, 211, 217

#### **Borrow**

**V2-P15:** 21

#### **Braking distance**

**V1-P3:** 12

#### **Breakaway**

**V3-P23:** 86; **V3-P25:** 45, 46

#### **Bridge**

**V1-P2:** 23; **V1-P3:** 5; **V2-P13:** 5, 14, 19, 20, 21, 22, 31, 35, 42; **V2-P14:** 29; **V2-P15:** 26, 29, 41, 70, 103, 104, 119, 128, 130; **V2-P20:** 7; **V3-P25:** 4, 17, 45

#### **Bypass**

**V1-P10:** 47

#### **Bus**

**V1-P2:** 60, 61, 95, 98; **V1-P3:** 180, 181, 183, 190; **V1-P7:** 9, 45; **V2-P12:** 38, 54, 72; **V2-P17:** 36; **V2-P19:** 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 83, 84; **V2-P20:** 44, 63, 64, 65; **V3-P21:** 48; **V3-P23:** 50

#### **Bus lane**

**V1-P7:** 9

#### **Bus stop**

**V1-P7:** 9, 45; **V2-P19:** 73, 74, 77, 78; **V2-P20:** 44; **V3-P21:** 48; **V3-P23:** 50

#### **Bypass**

**V1-P7:** 37, 39, 40, 41, 44, 45

#### **Calibration**

**V2-P12:** 29, 109; **V2-P14:** 20; **V2-P15:** 72, 74, 84, 135, 205; **V2-P16:** 64, 65

#### **California Bearing Ratio (CBR)**

**V1-P10:** 107; **V2-P12:** 3; **V2-P15:** 33, 37, 47

#### **Cantilever**

**V2-P13:** 5, 7; **V2-P15:** 42, 103, 104

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Note: V = Volume, P = Part

**Capacity**

**V1-P1:** 5, 17; **V1-P2:** 75, 79, 80, 89, 98; **V1-P3:** 18, 183, 190; **V1-P4:** 10, 15; **V1-P6:** 12, 31, 93;  
**V1-P7:** 8, 13, 14, 61; **V1-P8:** 5; **V1-P9:** 1, 4, 11, 15, 17, 18, 19, 20, 23, 74, 75, 76, 88, 96, 99,  
101, 103, 105, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120;  
**V1-P10:** 92, 111; **V2-P15:** 57, 74, 161; **V2-P19:** 15, 16, 17, 84; **V3-P25:** 9, 20, 21, 47

**CAPEX**

**V3-P21:** 7

**Centerline**

**V1-P2:** 33, 61; **V1-P3:** 39, 59; **V3-P25:** 45, 46

**Central island**

**V1-P3:** 116; **V1-P7:** 2

**Channelizing island**

**V1-P6:** 60, 66

**Circulatory roadway**

**V1-P7:** 2

**Clear zone**

**V1-P3:** 93; **V1-P5:** 33, 37, 43, 45; **V3-P23:** 60, 61, 62, 66

**Closed-circuit television (CCTV)**

**V2-P11:** 14

**Colebrook-White Equation**

**V1-P10:** 39

**Collector**

**V1-P2:** 38, 39, 44, 45, 46, 47, 51, 53, 56, 57; **V1-P3:** 2, 103, 123, 124, 131, 132, 133, 134, 135,  
136, 137, 138, 139, 140, 141, 142, 143, 156; **V1-P4:** 4; **V1-P5:** 1, 6, 8, 16, 17; **V1-P6:** 21, 30;  
**V1-P7:** 4; **V1-P9:** 16, 17, 19, 28; **V1-P10:** 43, 44, 45, 77, 85; **V2-P11:** 21, 37, 38; **V2-P18:** 9;  
**V2-P19:** 8, 14; **V2-P20:** 52, 53; **V3-P23:** 29, 31

**Collector-distributor road**

**V1-P2:** 38; **V1-P5:** 6

**Community**

**V1-P1:** 15, 17; **V1-P2:** 2; **V2-P20:** 6, 15, 16, 17, 18, 22, 23, 29; **V3-P21:** 3, 6, 20, 52, 79, 81;  
**V3-P22:** 18; **V3-P23:** 49

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Note: V = Volume, P = Part

## **Community Engagement**

**V1-P1:** 15; **V2-P20:** 15, 16, 18

## **Compaction**

**V2-P14:** 20, 33, 34; **V2-P15:** 33, 37, 47, 120, 123, 125

## **Consultation**

**V1-P1:** 9, 15; **V1-P3:** 102, 163; **V2-P11:** 9; **V2-P20:** 11, 17; **V3-P21:** 5, 15, 21, 42, 52, 67;  
**V3-P23:** 51, 52, 101, 103

## **Context**

**V1-P1:** 1, 4, 13, 14, 15, 17; **V1-P2:** 31, 38, 89; **V1-P3:** 163; **V2-P20:** 1, 2, 3, 20, 22, 23, 24, 25, 34, 35, 41, 46, 49, 74, 94, 97; **V3-P24:** 1

## **Contingency**

**V3-P21:** 27

## **Contract**

**V2-P11:** 59; **V2-P13:** 45, 46, 47, 49; **V2-P14:** 21; **V2-P15:** 60; **V3-P23:** 93

## **Contractor**

**V2-P11:** 143

## **Corridor**

**V2-P11:** 23, 27, 29, 32, 34, 35, 37, 38, 49, 91, 92, 97, 98, 100, 101, 115; **V2-P17:** 3;  
**V3-P22:** 22, 27

## **Crash**

**V1-P2:** 26, 29, 70, 86; **V1-P3:** 6; **V1-P6:** 10, 33, 47, 90; **V1-P8:** 2; **V2-P17:** 30; **V3-P23:** 6, 7, 8, 10, 11, 13, 15, 18, 20, 21, 23, 24, 53; **V3-P24:** 19; **V3-P25:** 10

## **Crash investigation**

**V3-P23:** 18

## **Crashworthy**

**V3-P25:** 45

## **Cross section**

**V1-P9:** 26; **V3-P24:** 6

## **Cross slope**

**V2-P19:** 8; **V3-P25:** 4

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Note: V = Volume, P = Part

**Crossfall**

**V1-P6:** 74; **V1-P10:** 91, 92; **V2-P19:** 56

**Crossroad**

**V1-P9:** 17, 29, 35, 37, 38, 45, 81, 82, 85; **V1-P10:** 44

**Cross slope**

**V1-P3:** 5, 40; **V1-P5:** 24; **V1-P7:** 52; **V2-P13:** 42

**Crown**

**V1-P7:** 53; **V1-P10:** 81; **V2-P11:** 151

**Curb**

**V1-P2:** 23, 62; **V1-P3:** 114, 115; **V1-P5:** 17; **V1-P6:** 64; **V1-P7:** 24, 36; **V1-P10:** 86, 87, 90;  
**V2-P19:** 17, 19, 44, 68, 78; **V2-P20:** 72, 73; **V3-P23:** 56, 78

**Curb extension**

**V2-P20:** 72

**Cycle**

**V1-P2:** 97; **V1-P8:** 3, 53; **V2-P12:** 101; **V2-P19:** 21, 24, 41, 42, 45, 50, 65, 66, 67, 68, 83;  
**V3-P21:** 21

**Dam**

**V2-P15:** 4, 7, 8, 10, 127, 142

**Deck**

**V2-P13:** 13, 22

**Defect**

**V2-P11:** 150, 151

**Deflection**

**V1-P3:** 39; **V1-P7:** 37, 40, 41, 42, 61; **V2-P12:** 98; **V3-P23:** 79, 84

**Deformation**

**V2-P12:** 12; **V2-P15:** 75

**Delay**

**V1-P2:** 79; **V1-P4:** 11; **V1-P6:** 31, 56; **V1-P8:** 5; **V2-P19:** 16, 17

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Note: V = Volume, P = Part

## Density

**V1-P2:** 86; **V2-P12:** 18, 33, 109; **V2-P15:** 34, 53, 79, 118, 120, 121, 122, 123, 211; **V2-P15:** 17, 130, 151, 153; **V3-P23:** 50

## Departure determination

**V3-P25:** 14

## Departure from Standards

**V1-P3:** 3, 4, 97; **V1-P6:** 31, 41, 49, 50, 51, 52, 58; **V1-P8:** 17, 20, 21, 22, 28; **V3-P25:** 1, 2, 3, 4, 14, 25, 26, 41

## Design criteria

**V1-P3:** 101; **V1-P5:** 6, 34; **V1-P9:** 1, 15, 70; **V2-P12:** 69

## Design life

**V2-P12:** 29, 41

## Design organization

**V3-P24:** 24

## Design speed

**V1-P2:** 88; **V1-P3:** 1, 5, 40, 81; **V1-P5:** 21; **V1-P6:** 72, 90; **V1-P9:** 29, 67; **V2-P19:** 44; **V3-P23:** 34, 66, 68, 69, 70; **V3-P24:** 19; **V3-P25:** 3, 16, 35, 36

## Design team

**V3-P21:** 41

## Design vehicle

**V1-P2:** 60, 61, 95

## Detector

**V2-P11:** 69, 70; **V2-P17:** 5

## Diamond interchange

**V1-P9:** 34

## Directional ramp

**V1-P9:** 46

## Director

**V3-P25:** 31

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Note: V = Volume, P = Part

**Divided roadway****V3-P23:** 22, 23, 27**Dowel****V2-P12:** 28, 35**Downstream****V1-P10:** 43, 47**Drainage**

**V1-P1:** 4; **V1-P3:** 66, 79, 93, 105, 115, 174, 177; **V1-P6:** 74; **V1-P7:** 53; **V1-P10:** 2, 3, 4, 17, 22, 25, 30, 37, 38, 47, 55, 80, 81, 91, 92, 93, 95, 96, 98, 99, 101, 102, 103, 104, 106, 107, 111, 112; **V2-P11:** 90, 102, 104, 105, 108; **V2-P12:** 16, 21, 29, 32, 66, 74, 85, 108, 115; **V2-P13:** 20, 22, 23, 25; **V2-P14:** 4, 6, 10, 11, 29; **V2-P16:** 69, 75; **V2-P19:** 19, 29, 36, 43, 83; **V2-P20:** 7, 37; **V3-P21:** 35, 36, 37, 39, 40, 43, 58, 60, 69, 75, 77, 78, 80; **V3-P23:** 44, 65, 77, 88, 90; **V3-P24:** 6

**Drainage systems****V1-P10:** 4, 95, 103; **V3-P23:** 88**Driveway****V1-P2:** 85; **V1-P5:** 23, 24, 25**Dropped curb****V1-P3:** 116; **V1-P6:** 69, 88; **V1-P7:** 58; **V1-P8:** 49; **V2-P19:** 17**Earth pressure****V2-P11:** 124; **V2-P15:** 84, 227**Easement****V2-P11:** 54**Effluent****V1-P10:** 15; **V2-P11:** 42, 108; **V3-P21:** 40**Embankment****V1-P3:** 159; **V1-P10:** 99; **V2-P14:** 15, 30, 31; **V2-P16:** 75, 80**Enclosure****V2-P17:** 6, 10, 14, 27, 32; **V2-P20:** 31**Entry path radius****V1-P7:** 3, 13

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Note: V = Volume, P = Part

## Exemption

**V3-P24:** 10, 11, 17

## Exploratory holes

**V2-P15:** 26, 30

## Expressway

**V1-P2:** 37, 44, 51, 54, 56; **V1-P3:** 2, 103, 123, 152, 153, 154; **V1-P4:** 4, 9; **V1-P5:** 1; **V1-P7:** 4;  
**V1-P9:** 1, 2, 3, 4, 5, 10, 18, 19, 27, 28, 29, 38; **V1-P10:** 45, 85; **V2-P11:** 21; **V2-P19:** 8, 14;  
**V2-P20:** 53; **V3-P21:** 36; **V3-P23:** 22, 23, 27, 29, 37; **V3-P25:** 31

## Facies

**V2-P15:** 5, 11, 14, 127, 142

## Fill

**V1-P3:** 187; **V2-P14:** 11, 15, 16, 29, 30, 31, 47, 48; **V2-P16:** 80; **V3-P23:** 61, 63, 64, 68, 69, 70, 76

## Filter drain

**V1-P10:** 43, 47, 58, 59

## Flare

**V1-P7:** 26, 27

## Flexible pavement

**V2-P12:** 9, 101

## Flood

**V1-P10:** 11, 12, 14, 19, 20, 21, 93; **V2-P15:** 151

## Flora

**V3-P21:** 12, 14, 29, 34, 80

## Foundation

**V1-P1:** 3; **V1-P10:** 115; **V2-P11:** 15; **V2-P12:** 11, 29; **V2-P13:** 35; **V2-P15:** 29, 65, 69, 70, 71, 103, 124, 126, 129, 131; **V2-P16:** 70, 80

## Functional Classification

**V1-P2:** 35, 36, 40, 42; **V1-P3:** 66, 103, 123, 124; **V1-P4:** 3, 4; **V1-P7:** 58; **V1-P9:** 26

## Gantry

**V2-P13:** 15; **V2-P15:** 26, 29; **V2-P18:** 23

Note: V = Volume, P = Part

**Gateway**

**V2-P20:** 75, 76, 89, 91; **V3-P23:** 44, 47, 54, 56

**Geometric design**

**V1-P2:** 85; **V1-P9:** 24; **V2-P11:** 27

**Geosynthetic**

**V3-P21:** 70

**Geotechnical design**

**V2-P15:** 25, 99; **V2-P16:** 13

**Geotechnical engineering**

**V2-P16:** 8

**Geotechnical hazard**

**V2-P16:** 8

**Geotechnical practitioner**

**V2-P15:** 11, 18, 31, 32, 58, 97, 162; **V2-P16:** 3, 5

**Geotechnical risk**

**V2-P16:** 8, 55, 71

**Geotechnical risk register**

**V2-P16:** 55, 71

**Geotextile**

**V1-P10:** 52, 64

**Grade-separated roundabout**

**V1-P7:** 8

**Grade Separation**

**V1-P4:** 23; **V1-P6:** 77, 78, 89; **V2-P19:** 14

**Gradient**

**V1-P3:** 45; **V1-P6:** 39; **V1-P7:** 15, 51; **V1-P10:** 97; **V2-P19:** 9, 10, 48, 56, 67

**Ground investigation**

**V2-P15:** 59, 148, 165; **V2-P16:** 13, 49; **V3-P21:** 57

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Note: V = Volume, P = Part

## Groundwater

**V1-P10:** 4, 46, 55, 106, 107; **V2-P11:** 67, 119, 152; **V2-P14:** 12, 15; **V2-P15:** 17, 22, 35, 40, 43, 51, 55, 63, 68, 69, 74, 104, 122, 126, 127, 131, 148, 234, 235; **V2-P16:** 64, 79; **V2-P20:** 32; **V3-P21:** 56, 57

## Groundwater table

**V2-P14:** 12, 15

## Gully

**V1-P10:** 21, 82, 85, 89, 90, 100, 101, 103; **V2-P11:** 7, 61

## Gutter

**V1-P10:** 22, 86

## Hard strip

**V1-P3:** 101; **V2-P19:** 2

## Hertz

**V3-P21:** 50

## Hierarchy

**V2-P18:** 1; **V3-P21:** 64; **V3-P23:** 28, 29, 31

## Highway

**V1-P1:** 1, 4, 5, 6, 7, 17; **V1-P2:** 1, 4, 19, 22, 55, 59, 65, 75, 78, 97, 98; **V1-P3:** 1, 11, 12, 18, 49, 94, 103, 152, 153, 154, 189, 190; **V1-P4:** 8, 20, 25; **V1-P5:** 2, 14, 20, 23, 29, 38, 43, 45, 47; **V1-P6:** 8, 9, 12, 38, 93; **V1-P7:** 54, 56, 59, 61; **V1-P8:** 1, 5, 12, 55; **V1-P9:** 1, 4, 7, 9, 11, 15, 17, 18, 19, 20, 23, 66, 74, 88, 95, 96, 99, 101, 103, 105, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 127, 129; **V1-P10:** 2, 3, 11, 21, 22, 104, 111; **V2-P11:** 1, 4, 40, 61, 147, 149; **V2-P12:** 1, 2, 3, 1, 15, 29, 72, 109, 110, 111; **V2-P13:** 1, 3, 11, 12, 13, 19, 31, 35, 36, 37, 40, 41; **V2-P14:** 1, 27, 28, 29, 30, 34; **V2-P15:** 1, 70, 87, 101, 116, 118, 119, 120, 128, 130, 132, 135, 136; **V2-P15:** 46, 86, 121, 122, 123; **V2-P16:** 33; **V2-P18:** 1, 3, 9, 13, 29; **V2-P19:** 1, 7, 15, 16, 17, 58, 76, 83, 84; **V2-P20:** 1, 3, 7, 24, 97; **V3-P21:** 1, 10, 21, 23, 31, 38, 46, 49, 55, 63, 75, 79; **V3-P22:** 6, 15, 19; **V3-P23:** 1, 67, 75, 77, 93; **V3-P24:** 25; **V3-P25:** 1, 9, 21, 25

## Highway capacity

**V1-P2:** 78

## Horizontal alignment

**V1-P3:** 1, 5, 35, 81

## Horizontal curve

**V1-P2:** 32; **V1-P3:** 35, 39, 40; **V1-P5:** 38, 45; **V3-P23:** 67

Note: V = Volume, P = Part

**Hydrology****V1-P10:** 111, 112; **V2-P16:** 53, 70**Hyetograph****V1-P10:** 32, 33**Infiltration****V1-P3:** 171; **V1-P10:** 33, 43, 47, 48, 55, 56, 58, 60, 70, 72, 77; **V2-P12:** 13, 74**Information Sharing****V1-P1:** 15; **V2-P20:** 11**Inland****V2-P15:** 9, 12, 17**Inscribed circle diameter (ICD)****V1-P7:** 3**Intelligent transportation system (ITS)****V2-P11:** 100**Intensity****V1-P10:** 5, 26, 29, 30, 32, 87, 117, 119**Interchange****V1-P2:** 17, 18, 20; **V1-P4:** 4, 11; **V1-P5:** 14; **V1-P9:** 6, 7, 8, 9, 16, 17, 18, 24, 26, 27, 28, 31, 32, 33, 35, 36, 38, 39, 41, 42, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 63, 64, 67, 68, 70, 72, 75, 81, 82, 85, 86, 87, 95, 99, 101, 103, 105, 107, 108, 109, 111, 112, 113, 114, 116, 117, 118, 119; **V2-P14:** 53; **V2-P15:** 95; **V3-P25:** 4**International Roughness Index (IRI)****V2-P12:** 35**Intersection****V1-P2:** 4, 26, 33, 44, 47, 49, 54, 79; **V1-P3:** 3, 11, 21, 22, 24, 26, 27, 31, 33, 67, 110, 190; **V1-P4:** 1, 2, 3, 4, 7, 8, 9, 10, 11, 12, 19, 21, 22, 23; **V1-P5:** 14, 20, 22, 37, 43, 45; **V1-P6:** 2, 4, 6, 10, 16, 17, 18, 21, 25, 31, 33, 34, 35, 39, 44, 46, 47, 52, 54, 65, 66, 67, 70, 74, 80; **V1-P7:** 46; **V1-P8:** 2, 3, 4, 7, 8, 10, 12, 17, 18, 19, 20, 25, 28, 30, 41, 50, 53; **V1-P9:** 37, 39, 95; **V1-P10:** 44, 99, 102; **V2-P11:** 36, 37; **V2-P18:** 12, 26, 27, 28; **V2-P19:** 4, 24; **V2-P20:** 67; **V3-P22:** 16; **V3-P23:** 23, 24, 27, 29, 31; **V3-P24:** 6, 7; **V3-P25:** 26, 47**Interstate Highway System****V1-P9:** 88

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Note: V = Volume, P = Part

## **Irrigation**

**V2-P11:** 90, 108; **V2-P15:** 116; **V2-P20:** 45; **V3-P21:** 42; **V3-P22:** 13, 35

## **Island**

**V1-P6:** 61, 63, 64, 65, 69, 79, 80; **V1-P7:** 20, 21, 22, 24, 36, 41, 43, 44; **V1-P8:** 32; **V2-P19:** 14

## **Junction approach**

**V1-P6:** 26

## **Junction approach sight distance**

**V1-P6:** 26

## **k-value**

**V2-P12:** 15, 16, 22, 63, 64, 65, 91, 125; **V2-P19:** 48

## **Land use**

**V1-P2:** 5; **V1-P3:** 111, 178; **V1-P4:** 16; **V2-P11:** 23; **V2-P20:** 8, 23, 25, 31, 38; **V3-P23:** 50

## **Landmark**

**V2-P20:** 47

## **Landscape**

**V1-P1:** 4, 15; **V1-P3:** 8, 105, 163, 172, 173, 174, 175, 184; **V1-P6:** 89; **V1-P7:** 56; **V2-P11:** 51; **V2-P20:** 8, 22, 23, 24, 27, 29, 30, 31, 32, 33, 81, 85, 93, 94; **V3-P21:** 6, 27, 28, 31, 33, 34, 40, 42, 43, 48, 53, 59, 60, 68, 78, 79; **V3-P22:** 5, 6, 8, 11, 13, 14, 17, 18, 22, 26, 37

## **Lane**

**V1-P2:** 26, 67; **V1-P3:** 3, 5, 18, 52, 59, 60, 61, 98, 99, 100, 101, 103, 110, 152, 153, 154; **V1-P5:** 4, 8, 10, 16, 17, 21, 31, 35, 40, 44; **V1-P6:** 10, 54, 55, 56, 57, 58, 59, 72; **V1-P7:** 9, 25, 39, 40, 41, 55; **V1-P8:** 7, 14, 28, 29, 30, 34, 35, 39, 44, 45, 46; **V1-P9:** 5, 6, 25, 75, 76, 79, 80, 88, 125, 126; **V2-P12:** , 44, 45; **V2-P17:** 25, 26, 31, 36; **V2-P19:** 43; **V3-P23:** 27; **V3-P25:** 3, 15, 16, 45

## **Layout**

**V1-P3:** 111, 180, 189; **V1-P6:** 65, 79, 80; **V1-P7:** 21, 39, 41, 44; **V1-P8:** 55; **V2-P11:** 33, 36; **V2-P13:** 25, 31; **V2-P15:** 26, 152; **V2-P16:** 64, 65; **V2-P18:** 25, 26, 27, 28; **V2-P19:** 23, 24, 29, 32, 68, 71, 72, 78, 79; **V2-P20:** 25; **V3-P22:** 23, 26; **V3-P23:** 79

## **Left-turn lane**

**V1-P6:** 53, 72; **V1-P8:** 35

## **Legibility**

**V2-P20:** 24, 27, 38, 47, 93, 94

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Note: V = Volume, P = Part

**Leq****V3-P21:** 49, 50**Level of service (LOS)****V1-P7:** 14**Likelihood****V2-P16:** 29, 30; **V2-P19:** 16, 17**Limit state****V2-P15:** 100**Liquefaction****V2-P15:** 76, 123, 129, 148**Longitudinal****V1-P2:** 33; **V1-P3:** 5, 66, 67, 68; **V1-P5:** 23; **V1-P7:** 51; **V1-P10:** 82, 91, 96, 99, 100, 101, 103;  
**V2-P12:** 28, 33, 94, 107, 110; **V2-P17:** 23, 27; **V2-P17:** 23, 27; **V2-P18:** 11; **V3-P23:** 73, 75**Loop****V1-P9:** 27, 28, 45, 58, 60, 80**Luminaire****V2-P18:** 10, 17, 26, 27, 28**Mainline****V1-P3:** 99, 183; **V1-P6:** 53; **V1-P9:** 10, 15, 19, 24, 27, 28**Maintenance****V1-P1:** 12, 13, 17; **V1-P2:** 18, 23; **V1-P3:** 175; **V1-P4:** 11; **V1-P7:** 56; **V1-P10:** 51, 54, 55, 58,  
61, 64, 65, 70, 74, 87, 95, 105; **V2-P11:** 55, 91, 92, 95, 97, 98, 100, 101, 102, 104, 105, 108,  
110, 114, 115, 116; **V2-P12:** 93; **V2-P13:** 4, 19, 31, 35; **V2-P15:** 136; **V2-P18:** 1, 10, 19, 23;  
**V2-P20:** 9, 35, 40; **V3-P21:** 34, 69, 76; **V3-P22:** 18, 32, 35; **V3-P23:** 10, 17, 63, 90**Major system****V1-P10:** 4**Manhole****V2-P11:** 7, 61, 66**Median****V1-P2:** 26; **V1-P3:** 93, 100, 103, 104, 105; **V1-P4:** 21; **V1-P5:** 4, 5, 8, 10, 13, 16, 18, 31, 33, 35,  
36, 40, 42; **V1-P6:** 22, 26, 72, 73, 80; **V1-P8:** 10, 26, 27; **V1-P10:** 96, 97; **V2-P11:** 29;  
**V2-P19:** 19; **V3-P22:** 20; **V3-P23:** 21, 23, 24, 55, 75

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Note: V = Volume, P = Part

## Merge

**V1-P6:** 51, 52, 75, 76; **V1-P7:** 38, 39, 42, 44; **V1-P9:** 18, 71, 72, 79; **V3-P23:** 24, 27

## Mini-roundabout

**V1-P7:** 4, 5, 20, 36

## Moderately conservative parameters

**V2-P15:** 99

## Moisture content

**V2-P12:** 13; **V2-P15:** 32, 33, 34, 37, 38, 47; **V2-P20:** 22, 23, 26, 37, 43, 44, 58

## Movement

**V2-P14:** 27, 37, 44, 45; **V3-P21:** 12

## Mushtarak

**V2-P20:** 59

## Network

**V1-P1:** 3; **V1-P2:** 36, 41, 50, 51, 53; **V1-P3:** 95; **V1-P5:** 3, 6, 18, 21, 30, 34, 38, 43; **V1-P6:** 2; **V1-P9:** 87; **V2-P11:** 14, 27, 102, 104, 105, 108; **V2-P12:** 92, 93; **V2-P18:** 8; **V2-P20:** 43; **V3-P21:** 43, 68, 79, 81; **V3-P24:** 5, 9

## Nose

**V1-P6:** 59

## Offtracking

**V1-P2:** 62

## Outfall

**V1-P10:** 15

## Overseeing Organization

**V1-P1:** 2, 3, 10, 12, 13, 14, 15; **V1-P2:** 4, 5, 8, 11, 13, 14, 18, 19, 21, 22, 23, 24, 25, 29, 30, 35, 42, 46, 53, 59, 75, 78, 83, 89, 91; **V1-P3:** 3, 5, 6, 22, 74, 77, 94, 97, 98, 122, 177, 179, 183, 185, 186; **V1-P5:** 7, 13, 18, 24; **V1-P6:** 11, 26, 90; **V1-P8:** 2, 5, 28, 35, 36; **V1-P9:** 4, 6, 8, 10, 26, 51, 58, 60, 70, 88, 129; **V1-P10:** 14, 15, 21, 35, 41, 47, 86, 106; **V2-P11:** 50, 60, 89; **V2-P13:** 1, 3, 4, 5, 7, 8, 11, 12, 13, 14, 20, 21, 25, 29, 40, 45, 46, 47, 49; **V2-P14:** 28; **V2-P15:** 57, 58, 60, 61, 108, 151; **V2-P16:** 1, 8, 9, 15, 16, 17, 19, 20, 21, 23, 24, 25, 30, 31, 49, 53, 59, 63, 65, 69, 75, 79; **V2-P17:** 7, 10, 14, 15, 18, 19, 28, 32, 39; **V2-P19:** 4, 19, 45, 76; **V2-P20:** 8, 9; **V3-P22:** 11, 32; **V3-P23:** 34, 36, 52, 53, 74, 75, 83, 85, 87, 88, 89; **V3-P24:** 13, 15, 17, 18, 19, 21, 23, 24; **V3-P25:** 1, 2, 3, 5, 7, 8, 9, 11, 12, 13, 14, 42

Note: V = Volume, P = Part

**Participation****V1-P1:** 15; **V2-P20:** 11**Passenger****V1-P2:** 60, 61; **V1-P3:** 25, 26, 27, 28, 31, 33; **V1-P5:** 24; **V1-P6:** 30; **V2-P12:** 54, 72**Passenger car****V1-P3:** 25, 27, 28, 31; **V1-P6:** 30; **V2-P12:** 54, 72**Peak hour****V3-P24:** 20**Pedestrian**

**V1-P1:** 4; **V1-P2:** 34, 41, 57, 89, 90, 91, 93, 97; **V1-P3:** 76, 79, 119, 120, 121, 168, 169;  
**V1-P4:** 4, 12; **V1-P5:** 13, 19, 22; **V1-P6:** 26, 69, 87, 89; **V1-P7:** 16, 50, 51, 57, 58, 59;  
**V1-P8:** 19, 20, 33, 34, 37, 40, 49, 50, 51, 52, 53; **V1-P9:** 30; **V1-P10:** 86, 93; **V2-P11:** 7, 61;  
**V2-P13:** 14, 25, 32; **V2-P18:** 3, 13, 14, 29; **V2-P19:** 1, 3, 5, 6, 7, 8, 9, 12, 13, 14, 16, 17, 19, 20,  
21, 24, 25, 30, 31, 33, 34, 35, 36, 38, 47, 51, 52, 76, 78, 83, 84; **V2-P20:** 24, 32, 44, 58, 59, 60,  
61, 62, 65, 69; **V3-P21:** 48; **V3-P23:** 10, 17, 22, 23, 27, 46, 54, 56; **V3-P24:** 19

**Penstock****V1-P10:** 47**Permeability****V1-P10:** 3, 11; **V2-P15:** 34, 38, 43, 46, 50, 85, 118, 120, 122, 125, 126**Phase****V2-P19:** 14**Piezocone test****V2-P15:** 71**Pile****V2-P15:** 29, 41, 70, 76, 103, 104, 128, 131**Pile load capacity****V2-P15:** 76**Phase****V1-P2:** 12, 14; **V2-P11:** 9, 117; **V2-P15:** 24, 81, 84; **V3-P21:** 47; **V3-P25:** 35, 36**Pipeline****V1-P10:** 25

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Note: V = Volume, P = Part

## Plans

**V1-P2:** 17, 18, 22; **V1-P8:** 7; **V2-P11:** 57; **V2-P15:** 97, 136; **V2-P16:** 55, 71; **V2-P20:** 8, 20, 94;  
**V3-P21:** 81; **V3-P22:** 31

## Policy

**V1-P1:** 14; **V1-P2:** 63, 97; **V1-P3:** 189; **V1-P5:** 2, 5, 29, 30, 36, 47; **V1-P7:** 61; **V1-P8:** 55;  
**V1-P9:** 1, 5, 7, 8, 9, 10, 11, 65, 66, 74, 76, 77, 78, 79, 95; **V1-P10:** 12, 111; **V2-P12:** 111;  
**V2-P20:** 20, 21; **V3-P21:** 9, 20, 81; **V3-P23:** 6; **V3-P24:** 25

## Porewater pressure

**V2-P15:** 72

## Positive drainage

**V1-P10:** 7

## Priority intersection

**V1-P8:** 5; **V2-P20:** 66

## Preliminary sources study

**V2-P16:** 49

## Priority intersection

**V1-P4:** 3, 7, 9, 10, 11; **V1-P6:** 2, 80

## Project

**V1-P1:** 3, 14; **V1-P2:** 3, 11, 14, 17, 18, 19; **V1-P9:** 96; **V1-P10:** 9, 112; **V2-P11:** 9, 10, 17, 20,  
57, 59, 143; **V2-P12:** 69, 93, 111; **V2-P13:** 35; **V2-P14:** 34; **V2-P15:** 26, 29, 37, 38, 130, 131,  
159, 165, 234; **V2-P16:** 11, 13, 17, 28, 49, 53, 55, 59, 63, 64, 65, 69, 71, 75, 79; **V2-P19:** 75;  
**V2-P20:** 5, 6, 7, 8, 12, 34, 35; **V3-P21:** 1, 5, 14, 15, 16, 19, 20, 21, 24, 37, 73, 77, 79;  
**V3-P23:** 49; **V3-P24:** 5, 10, 17, 19, 21, 22; **V3-P25:** 13, 14, 26, 32, 35, 36, 41, 42

## Proposal

**V2-P16:** 59

## Public art

**V2-P20:** 8, 88

## Public transportation

**V1-P10:** 115; **V3-P23:** 4, 51

## Rehabilitation

**V2-P12:** 37, 44, 87, 88, 89, 90; **V3-P23:** 8

Note: V = Volume, P = Part

**Rail**

**V1-P1:** 3; **V1-P2:** 6, 56, 57; **V1-P3:** 76; **V1-P5:** 33, 37; **V1-P6:** 89, 90; **V1-P9:** 30; **V1-P10:** 115;  
**V2-P11:** 14, 29, 49, 50, 115; **V2-P19:** 62, 63, 69, 83; **V2-P20:** 63

**Rainfall intensity**

**V1-P10:** 6, 82

**Ramp**

**V1-P9:** 6, 8, 11, 18, 19, 20, 23, 24, 27, 28, 30, 39, 63, 67, 69, 70, 72, 75, 79, 80, 81, 85, 125,  
126; **V2-P17:** 29, 30, 31; **V2-P19:** 10, 66

**Ramp metering**

**V1-P9:** 24; **V2-P17:** 29, 30

**Rehabilitation**

**V1-P2:** 3, 23, 31

**Resources**

**V1-P1:** 17; **V2-P15:** 130, 135, 153; **V3-P21:** 3, 62, 64, 65, 75, 79, 80, 81

**Resurfacing**

**V1-P2:** 23, 31

**Reverse curve**

**V1-P3:** 37

**Right-of-way**

**V1-P2:** 20, 25, 49; **V1-P3:** 119, 121; **V1-P6:** 86; **V1-P9:** 68; **V2-P13:** 41

**Right-turn bypass lane**

**V1-P7:** 37, 38, 41, 45

**Right-turn lane**

**V1-P8:** 32

**Risk**

**V1-P1:** 4; **V1-P2:** 27, 28; **V1-P9:** 70; **V1-P10:** 11, 12, 47, 111; **V2-P11:** 101, 135, 137, 149;  
**V2-P14:** 5, 34; **V2-P15:** 3, 19, 24, 25, 58, 113, 115, 116, 125, 129, 131, 134, 135, 147, 160,  
162; **V2-P16:** 7, 11, 12, 13, 14, 17, 19, 21, 23, 27, 28, 29, 30, 31, 33, 49, 55, 71, 83, 85;  
**V2-P19:** 16, 17; **V3-P21:** 20, 21, 22, 27, 77; **V3-P23:** 73, 81, 93; **V3-P25:** 9, 10

**Road**

**V1-P1:** 2, 4, 5, 6, 7, 11, 12, 14, 15, 17; **V1-P2:** 2, 4, 11, 12, 26, 29, 30, 35, 36, 39, 40, 41, 45,  
47, 49, 51, 53, 54, 56, 57, 64, 65, 66, 68, 70, 78, 86, 97, 98; **V1-P3:** 2, 7, 8, 9, 24, 25, 26, 27,

Note: V = Volume, P = Part

28, 29, 30, 31, 32, 33, 63, 67, 76, 77, 79, 95, 103, 104, 107, 109, 115, 117, 118, 119, 120, 123, 124, 138, 139, 140, 141, 142, 145, 146, 147, 154, 155, 158, 163, 164, 180, 183, 189;  
**V1-P4:** 4, 9, 10; **V1-P5:** 8, 21, 33, 37, 43, 45; **V1-P6:** 2, 7, 8, 10, 13, 21, 22, 23, 25, 32, 33, 34, 35, 40, 41, 42, 43, 53, 55, 56, 65, 67, 68, 71, 74, 75, 76, 84, 85, 90; **V1-P7:** 9, 23, 44, 55, 61;  
**V1-P8:** 1, 2, 4, 23, 33; **V1-P9:** 10, 17, 19, 30, 49, 85, 86, 95; **V1-P10:** 5, 14, 20, 21, 24, 43, 44, 49, 53, 56, 59, 63, 67, 71, 80, 83, 85, 89, 91, 112; **V2-P11:** 4, 7, 13, 21, 29, 32, 38, 39, 61, 115, 127, 141, 143, 144, 149, 152; **V2-P12:** 3, 68, 90, 102, 110; **V2-P13:** 13, 15, 19, 31, 32, 35, 41;  
**V2-P14:** 34; **V2-P15:** 21, 41, 43, 45, 47, 49, 51, 53, 54, 55, 79, 103, 115, 131, 132, 134, 151;  
**V2-P16:** 7, 33; **V2-P17:** 1, 3, 13, 30, 43; **V2-P18:** 3, 9, 11, 12, 14, 15, 17, 20, 21, 29; **V2-P19:** 5, 8, 14, 26, 27, 41, 42, 44, 45, 47, 50, 57, 58, 75, 76, 79, 83; **V2-P20:** 6, 7, 9, 15, 20, 22, 23, 33, 37, 39, 43, 48, 49, 51, 53, 55, 56, 63, 66, 94, 95; **V3-P21:** 4, 24, 28, 31, 32, 33, 34, 39, 40, 50, 51, 58, 60, 61, 62, 69, 75, 77, 78, 79, 80; **V3-P22:** 14, 19, 22, 23, 27; **V3-P23:** 1, 2, 3, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 22, 23, 24, 26, 27, 28, 29, 30, 31, 35, 37, 44, 46, 49, 50, 61, 63, 67, 81, 86, 93, 94; **V3-P24:** 1, 2, 3, 5, 6, 7, 9, 10, 11, 13, 14, 15, 16, 17, 18, 20, 23, 24, 25; **V3-P25:** 2, 5, 13, 21, 26, 31, 42

#### Road earthworks

**V2-P15:** 21

#### Road markings

**V1-P7:** 23, 55; **V3-P24:** 7

#### Road project

**V1-P1:** 14, 15; **V1-P2:** 11; **V2-P20:** 15; **V3-P25:** 2

#### Road structures

**V2-P15:** 21; **V3-P21:** 32

#### Road users

**V1-P8:** 4

#### Roadside

**V1-P2:** 26; **V1-P3:** 110, 111, 117, 119, 170, 189; **V1-P5:** 2, 29, 31, 33, 37, 43, 45, 47;  
**V1-P8:** 55; **V2-P15:** 104, 105, 118; **V2-P20:** 40, 82; **V3-P21:** 75, 78; **V3-P22:** 6; **V3-P23:** 59, 62, 65, 74, 76, 82; **V3-P25:** 5

#### Roadway

**V1-P1:** 2, 3, 4, 11; **V1-P2:** 6, 26, 28, 38, 44, 47, 49, 59, 67, 70, 74, 88, 93, 96, 97; **V1-P3:** 1, 8, 9, 13, 66, 87, 89, 91, 93, 100, 180; **V1-P5:** 1, 2, 5, 6, 12, 13, 14, 15, 18, 19, 20, 22, 23, 25, 29, 30, 33, 34, 36, 37, 38, 39, 42, 43, 45; **V1-P6:** 22, 29, 30, 40, 58, 59, 60, 62, 68, 77, 79, 80;  
**V1-P7:** 21, 22, 38, 41, 42, 45, 49, 50, 58; **V1-P8:** 3, 7, 17, 18, 22, 27, 28, 30, 33, 36, 37;  
**V1-P9:** 24, 25, 30, 63, 69, 79; **V1-P10:** 80, 81, 96, 100; **V2-P11:** 29, 132; **V2-P13:** 11, 12, 13, 14, 15, 29; **V2-P14:** 6; **V2-P18:** 3, 16; **V2-P19:** 27, 43, 46, 47, 48, 52; **V2-P20:** 39, 53, 66, 73, 75, 93, 95; **V3-P22:** 15; **V3-P23:** 3, 24, 27, 29, 31, 55; **V3-P25:** 20, 21, 26

Note: V = Volume, P = Part

**Roadway width****V2-P11:** 29**Roughness coefficient****V1-P10:** 97**Roundabout****V1-P2:** 26, 47, 76, 77; **V1-P4:** 4, 11, 15; **V1-P7:** 1, 2, 3, 4, 6, 7, 8, 13, 20, 24, 33, 34, 36, 53, 54, 57, 59, 61; **V1-P8:** 42, 43; **V1-P9:** 18, 39, 40; **V1-P10:** 44, 103; **V2-P11:** 38; **V2-P18:** 12, 26; **V2-P20:** 68; **V3-P23:** 31**Rural areas****V1-P3:** 95**Rutting****V2-P12:** 25, 26, 27, 91, 92, 94**R-value****V2-P12:** 15, 76, 79**Sabkha****V2-P12:** 12; **V2-P15:** 8, 9, 11, 12, 36, 44, 70, 75, 135, 147; **V3-P21:** 32, 57**Sag****V1-P3:** 17, 68, 72, 73, 74, 78, 79, 85; **V1-P5:** 4, 8, 10, 16, 17, 21, 30, 31, 35, 36, 38, 40, 44, 45; **V1-P10:** 87**Scale****V1-P10:** 41; **V2-P16:** 27; **V2-P19:** 75; **V2-P20:** 31; **V3-P21:** 27; **V3-P22:** 27**Schedule****V2-P13:** 37, 41; **V2-P15:** 94**Scoping****V1-P2:** 12; **V3-P21:** 14, 15**Scour****V2-P14:** 38**Seepage****V2-P16:** 9

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Note: V = Volume, P = Part

#### Seismic hazard

**V2-P15:** 107, 109, 119; **V2-P16:** 9

#### Semitrailer

**V1-P2:** 60, 61, 62; **V1-P3:** 25, 27, 28; **V1-P5:** 24

#### Service road

**V1-P2:** 40; **V1-P3:** 105, 106; **V1-P5:** 14; **V1-P6:** 74, 75, 77; **V1-P7:** 21; **V1-P9:** 15; **V1-P10:** 20, 43, 44, 49, 53, 56, 59, 63, 71, 85; **V2-P11:** 21, 29; **V2-P19:** 14, 42; **V2-P20:** 52

#### Setback

**V1-P3:** 119; **V2-P18:** 16

#### Setting

**V1-P2:** 86; **V1-P10:** 49, 56, 59, 62, 66, 71; **V2-P15:** 87, 89, 129, 139, 143; **V3-P21:** 43, 77; **V3-P23:** 19, 33, 35, 93

#### Settlement

**V2-P11:** 102; **V2-P12:** 28, 74, 94; **V2-P13:** 38; **V2-P15:** 41, 43, 103, 104, 105, 114, 115; **V2-P16:** 80; **V2-P20:** 31

#### Settlement pattern

**V2-P20:** 31

#### Shared-use path

**V2-P19:** 5; **V2-P20:** 60

#### Sheet

**V2-P15:** 159

#### Shift

**V3-P23:** 43

#### Shoulder

**V1-P2:** 26, 32; **V1-P3:** 5, 54, 58, 100; **V1-P5:** 4, 8, 10, 16, 17, 31, 35, 40, 44; **V1-P6:** 59; **V1-P9:** 25; **V2-P12:** 32; **V3-P23:** 61; **V3-P25:** 3, 16, 17, 45, 46

#### Sidewalk

**V1-P3:** 79; **V2-P13:** 37; **V3-P23:** 55

#### Sieve

**V2-P12:** 13, 76, 109

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Note: V = Volume, P = Part

**Sight distance**

**V1-P3:** 1, 5, 11, 185; **V1-P6:** 80; **V1-P8:** 18; **V2-P19:** 45; **V3-P22:** 15

**Sight line**

**V1-P3:** 21

**Sign**

**V1-P7:** 61; **V2-P13:** 5, 6, 15; **V2-P17:** 21, 22, 26, 27; **V2-P18:** 23; **V3-P23:** 77

**Signal-controlled intersection**

**V1-P6:** 69; **V2-P19:** 13

**Signal head**

**V1-P8:** 37

**Sikka**

**V2-P20:** 59

**Single-lane roundabout**

**V1-P7:** 5

**Skew angle**

**V2-P13:** 41

**Slab**

**V2-P12:** 50, 51; **V2-P14:** 38

**Slope**

**V1-P2:** 26; **V1-P3:** 40, 41, 45; **V1-P5:** 4, 5, 8, 10, 12, 16, 17, 18, 21, 31, 33, 35, 36, 40, 42, 44, 45; **V1-P7:** 51, 53; **V1-P10:** 107; **V2-P13:** 41; **V2-P14:** 11, 13, 14, 15, 16, 21, 33, 34, 35, 37; **V2-P15:** 103, 128, 131; **V2-P19:** 8, 9; **V3-P23:** 21, 61, 63, 68, 69, 70; **V3-P25:** 18, 47

**Soakaway**

**V1-P10:** 43, 53, 54, 55; **V2-P15:** 125

**Source control**

**V1-P10:** 75

**Spacing**

**V1-P2:** 44, 47, 49, 85; **V1-P3:** 177, 178; **V1-P5:** 23; **V1-P6:** 39; **V1-P9:** 6, 7, 49; **V1-P10:** 21, 89, 112; **V2-P11:** 90; **V2-P12:** 34; **V2-P15:** 24, 26, 27, 28, 52; **V2-P17:** 26; **V2-P18:** 16; **V2-P19:** 16; **V3-P22:** 7, 65; **V3-P23:** 29, 31, 51

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Note: V = Volume, P = Part

## Specialist advisor

**V3-P24:** 14

## Specifications

**V1-P3:** 63, 189; **V1-P8:** 14, 17, 18, 33, 36; **V1-P10:** 49, 111; **V2-P11:** 59; **V2-P12:** 19, 110;  
**V2-P13:** 19, 31; **V2-P14:** 1, 34; **V2-P15:** 61, 136; **V2-P18:** 3, 29; **V3-P21:** 15, 67, 78; **V3-P22:** 8,  
9, 13, 35, 37

## Speed

**V1-P2:** 28, 44, 47, 49, 64, 68, 69, 87, 88; **V1-P3:** 1, 2, 3, 13, 18, 20, 21, 23, 24, 25, 26, 27, 29,  
30, 31, 33, 41, 42, 45, 72, 74, 76, 99, 100; **V1-P5:** 4, 8, 10, 16, 17, 21, 31, 35, 40, 44;  
**V1-P7:** 16, 42, 59; **V1-P9:** 10, 11, 24, 27, 28, 66, 67, 68, 69, 74; **V2-P13:** 35; **V2-P14:** 44;  
**V2-P17:** 35, 36; **V2-P18:** 16; **V2-P19:** 13, 14, 26, 28, 34, 44, 45, 47, 48, 79; **V3-P21:** 34, 52;  
**V3-P22:** 20; **V3-P23:** 16, 19, 21, 22, 25, 26, 29, 31, 34, 35, 36, 39, 40, 41, 43, 44, 45, 54, 55,  
63, 68, 89, 93; **V3-P24:** 2, 19; **V3-P25:** 9, 16, 26, 36, 45

## Speed limit

**V1-P2:** 87

## Splitter island

**V1-P7:** 3, 23; **V3-P23:** 55

## Spoil

**V2-P11:** 127; **V2-P15:** 227, 235

## Stabilization

**V2-P12:** 17; **V2-P14:** 31, 33, 46, 47, 48, 49, 52, 53

## Stage

**V1-P10:** 2, 9, 14, 16, 19, 20, 21, 35, 42, 44, 45, 79; **V2-P11:** 2, 10, 11, 12, 13, 17; **V2-P13:** 4;  
**V2-P16:** 11, 12, 13, 14, 15, 17, 19, 20, 21, 23, 25, 49; **V3-P24:** 5, 6, 7, 8, 9, 10, 19, 20, 21;  
**V3-P25:** 35, 36

## Stakeholder

**V1-P1:** 3, 14, 15; **V1-P2:** 18, 21; **V1-P10:** 16; **V2-P20:** 6, 9, 10, 11, 12, 13, 14; **V3-P21:** 21;  
**V3-P23:** 8

## Stakeholder engagement

**V1-P1:** 14, 15; **V1-P10:** 16; **V2-P20:** 6, 9, 11

## Stone matrix asphalt (SMA)

**V2-P12:** 23

Note: V = Volume, P = Part

**Stopping sight distance**

**V1-P3:** 3, 70, 72; **V1-P7:** 40, 45; **V1-P9:** 25; **V3-P25:** 4, 35, 36

**Storage**

**V1-P3:** 173; **V1-P4:** 20; **V1-P6:** 55, 73; **V1-P8:** 10, 12, 29, 31, 36; **V1-P10:** 77, 123;  
**V2-P15:** 122, 152

**Storage length**

**V1-P4:** 20

**Stormwater**

**V1-P10:** 94, 115; **V2-P11:** 14, 105

**Street**

**V1-P1:** 4; **V1-P2:** 98; **V1-P3:** 111, 173, 183, 189; **V1-P5:** 2, 13, 19, 22, 47; **V1-P6:** 70, 74, 85, 87; **V1-P7:** 56, 57; **V2-P11:** 50, 53, 90, 131; **V2-P13:** 15, 25; **V2-P15:** 116; **V2-P18:** 1, 10, 17, 19; **V2-P19:** 38, 46; **V2-P20:** 25, 41, 43, 49, 56, 58, 62, 80, 83, 84, 85, 86, 88, 89, 97;  
**V3-P22:** 11, 15, 37; **V3-P23:** 44, 94

**Street furniture**

**V2-P11:** 50; **V2-P20:** 56, 84

**Streetscape**

**V2-P20:** 56, 57, 77, 78, 79; **V3-P22:** 5

**Structural Number (SN)**

**V2-P12:** 30

**Subgrade**

**V2-P12:** 12, 13, 14, 15, 16, 17, 63, 64, 65, 74, 75, 76, 79, 112; **V2-P15:** 131; **V2-P16:** 54, 70

**Superelevation**

**V1-P2:** 26; **V1-P3:** 5, 40, 41, 42, 43, 46, 47, 49, 50, 52, 53, 54, 56, 57, 58; **V1-P5:** 5, 12, 18, 21, 33, 36, 42, 45; **V1-P7:** 38, 52; **V1-P9:** 28, 68; **V2-P14:** 28; **V3-P25:** 4, 18, 46

**Surface course**

**V2-P12:** 23, 58

**Surface runoff**

**V1-P6:** 74

**Surface treatment**

**V2-P11:** 149

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Note: V = Volume, P = Part

#### **Surface water**

**V1-P6:** 74; **V1-P10:** 4, 6, 36, 80, 95; **V2-P13:** 25; **V2-P14:** 10, 38; **V2-P15:** 116; **V3-P21:** 14

#### **Surveillance**

**V2-P11:** 90; **V3-P25:** 45

#### **Sustainability**

**V1-P1:** 7, 8; **V1-P3:** 7; **V1-P9:** 60; **V2-P18:** 2; **V2-P20:** 38, 45, 94; **V3-P21:** 3, 4, 5, 23, 24, 66, 77

#### **Sustainable development**

**V1-P1:** 8; **V3-P21:** 3

#### **Swale**

**V1-P10:** 43, 47, 57, 58

#### **Swept path**

**V1-P2:** 61, 62

#### **Tactile paving**

**V1-P8:** 49, 52; **V2-P20:** 69

#### **Taper**

**V1-P6:** 44, 49, 52, 56, 57, 72; **V1-P3:** 99; **V1-P7:** 39, 42; **V1-P8:** 14; **V1-P9:** 65, 66

#### **Time of concentration**

**V1-P10:** 40

#### **T-intersection**

**V1-P2:** 64; **V1-P3:** 28; **V1-P4:** 12; **V1-P6:** 2, 3, 6, 7, 8, 9, 10, 11, 12, 15, 16, 17, 18, 22, 33, 35, 43, 46, 48, 64, 65, 66, 77, 84; **V1-P8:** 5, 9, 10, 31; **V1-P10:** 100; **V2-P18:** 27; **V3-P23:** 20

#### **Topography**

**V1-P4:** 13, 16; **V2-P20:** 23

#### **Topsoil**

**V1-P3:** 173; **V1-P10:** 68; **V2-P14:** 3; **V2-P16:** 79

#### **Tractor**

**V1-P2:** 61, 62; **V1-P7:** 21

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Note: V = Volume, P = Part

**Traffic**

**V1-P1:** 2, 5, 17; **V1-P2:** 9, 18, 20, 26, 27, 28, 34, 37, 48, 59, 66, 73, 78, 86, 89, 96, 98;  
**V1-P3:** 2, 31, 60, 110, 118, 183, 184, 185, 189; **V1-P4:** 3, 5, 10, 11, 12, 15, 25; **V1-P5:** 14, 20, 23, 38, 43, 45, 47; **V1-P6:** 2, 4, 6, 10, 13, 14, 31, 39, 47, 59, 64, 69, 74, 75, 85, 90, 93;  
**V1-P7:** 8, 9, 13, 14, 51, 55, 61; **V1-P8:** 1, 2, 3, 40, 55; **V1-P9:** 3, 4, 5, 8, 11, 21, 22, 37, 53, 54, 71, 88, 95; **V1-P10:** 43; **V2-P11:** 5, 7, 14, 19, 61, 122, 145; **V2-P12:** 2, 3, 29, 32, 37, 39, 41, 42, 43, 44, 45, 54, 57, 70, 71, 73, 90, 102, 111, 112; **V2-P13:** 1, 5, 35, 36; **V2-P14:** 1; **V2-P15:** 1, 116; **V2-P16:** 59; **V2-P17:** 3, 19, 30, 33, 42, 43; **V2-P18:** 3, 19, 23, 29; **V2-P19:** 1, 6, 13, 27, 29, 31, 32, 41, 42, 73, 75; **V2-P20:** 1, 7, 9, 74, 76, 77, 91; **V3-P21:** 48, 78; **V3-P23:** 1, 6, 8, 33, 34, 35, 36, 38, 41, 42, 43, 44, 46, 47, 48, 49, 55, 68, 89, 93; **V3-P24:** 19, 25; **V3-P25:** 9, 16, 26

**Traffic capacity**

**V2-P12:** 70

**Traffic control**

**V1-P2:** 66; **V1-P4:** 3; **V1-P6:** 39, 69, 90; **V1-P8:** 1; **V2-P12:** 102

**Traffic flow**

**V1-P4:** 5; **V1-P9:** 3; **V3-P23:** 6; **V3-P24:** 19

**Traffic island**

**V2-P19:** 13; **V3-P23:** 47

**Traffic sign**

**V1-P2:** 34; **V1-P4:** 3, 12; **V1-P7:** 8, 51; **V1-P8:** 1, 2, 40; **V1-P9:** 37; **V2-P13:** 5; **V2-P17:** 42; **V2-P20:** 91; **V3-P23:** 44, 47; **V3-P24:** 19

**Traffic signal**

**V1-P2:** 34; **V1-P4:** 3, 12; **V1-P7:** 8; **V1-P8:** 1, 2, 40; **V1-P9:** 37; **V2-P17:** 42; **V3-P24:** 19

**Traffic volume**

**V1-P2:** 27, 37, 73; **V1-P3:** 110; **V1-P7:** 14; **V2-P19:** 41, 75

**Trailer**

**V2-P12:** 38

**Transition**

**V1-P3:** 43, 47, 49, 50, 52, 53, 99; **V2-P15:** 130

Note: V = Volume, P = Part

## Transportation

**V1-P1:** 4, 5, 6, 17; **V1-P2:** 4, 22, 57, 75, 78, 89, 91, 93, 97, 98; **V1-P5:** 2, 13, 19, 22, 29, 47;  
**V1-P3:** 12, 18, 36, 37, 39, 52, 75, 79, 121, 189, 190; **V1-P4:** 4, 25; **V1-P6:** 9, 12, 31, 87, 89, 93;  
**V1-P7:** 9, 15, 16, 50, 56, 58, 59, 61; **V1-P8:** 5, 12, 19, 34, 37, 40, 49, 50, 52, 55; **V1-P9:** 1, 4,  
40, 58, 67, 70, 75, 95, 96, 99, 101, 103, 105, 107, 108, 109, 110, 112, 113, 114, 115, 117,  
118, 119; **V1-P10:** 111; **V2-P11:** 4, 14, 100; **V2-P12:** 1, 107, 109, 111, 112; **V2-P13:** 15, 19, 25,  
31; **V2-P15:** 88, 101, 118, 119, 126, 131, 136; **V2-P17:** 41, 43; **V2-P19:** 1, 15, 16, 17, 69, 83,  
84; **V2-P20:** 1, 7, 59, 62, 63, 74, 97; **V3-P21:** 2, 48, 60, 75, 76; **V3-P22:** 5, 37; **V3-P23:** 51, 93;  
**V3-P24:** 25; **V3-P25:** 9, 21

## Transverse

**V1-P10:** 90, 96, 101; **V2-P12:** 34, 82, 83, 94, 107, 110; **V2-P19:** 29; **V3-P23:** 64; **V3-P25:** 47

## Travelled way

**V1-P3:** 60

## Treated sewage effluent

**V1-P10:** 15; **V2-P11:** 108

## Trenchless technology

**V2-P15:** 228; **V3-P21:** 69

## Trial pit

**V2-P11:** 67; **V2-P15:** 36

## Truck

**V1-P2:** 60; **V1-P3:** 33, 182; **V1-P5:** 24; **V1-P6:** 33; **V1-P7:** 20, 22; **V2-P12:** 40, 52, 53, 57

## Truck apron

**V1-P7:** 20, 22

## Trunk sewer

**V1-P10:** 4

## Tunnel

**V1-P10:** 104, 111; **V2-P11:** 47, 48, 115, 123, 124; **V2-P13:** 13, 31; **V2-P15:** 26, 29, 124, 125;  
**V2-P17:** 41; **V2-P18:** 3, 14, 29

## Two-lane roundabout

**V1-P6:** 30; **V1-P7:** 6, 26

## Underpass

**V1-P10:** 104, 111; **V2-P13:** 22, 25

Note: V = Volume, P = Part

**Upstream****V1-P6:** 23**Urban area****V1-P10:** 37**Urban design****V2-P20:** 8**Urban form****V2-P20:** 23, 24**Utility corridor****V2-P11:** 1, 3, 13, 27, 29, 35**U-turn****V1-P2:** 61, 62; **V1-P3:** 104; **V1-P4:** 4, 19, 20, 21; **V1-P6:** 23, 25, 26, 30, 70, 71, 72, 73, 74;  
**V1-P7:** 19; **V1-P8:** 8, 26, 27, 28, 29, 35, 37, 51; **V1-P9:** 86; **V3-P23:** 55**Vehicle****V1-P2:** 37, 59, 60, 65; **V1-P3:** 25, 27, 31, 33, 110, 117, 183; **V1-P5:** 3, 12, 18, 21, 24, 30, 36,  
38, 45; **V1-P6:** 1, 60; **V1-P7:** 20, 41; **V1-P8:** 5, 26; **V2-P11:** 132; **V2-P12:** 38, 41, 54, 57, 70, 71,  
72; **V2-P14:** 29; **V2-P17:** 4, 5, 17, 31, 41; **V2-P19:** 6, 14, 32, 43; **V2-P20:** 44; **V3-P23:** 3, 4, 6, 7,  
9, 41, 43, 44, 59, 73, 74, 81, 83, 84, 85, 90**Vernacular****V2-P20:** 83**Vertical alignment****V1-P3:** 1, 5, 65, 66; **V2-P13:** 12; **V3-P25:** 4**Vertical curve****V1-P3:** 65, 75; **V1-P6:** 91**View****V1-P2:** 21; **V1-P9:** 38; **V1-P10:** 71**Vortex****V1-P10:** 94, 105**Wadi****V2-P15:** 151

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Note: V = Volume, P = Part

**Wayfinding**

**V2-P20:** 89

**Worst credible parameters**

**V2-P15:** 99

**Y-intersection**

**V1-P6:** 36, 37, 38

**Zoning**

**V2-P11:** 7, 53, 61