DESIGN CHECKLIST
FOR THE DEVELOPMENT OF GEOMETRIC PLANS

DATE: _____

DIST-CO-RTE-PM/PM: _____

EA/Project ID: _____

Description: _____

Project Engineer/Designee: _____

Disclaimer Statement

This checklist is NOT to be used as a substitute for the Highway Design Manual (HDM) and intentionally does not address all design policies, procedures, and standards (bold, underlined, procedural, permissive, etc.) discussed in the HDM. A complete list of bold and underlined standards can be found in Tables 82.1A and 82.1B of the HDM.

INSTRUCTIONS:

- This checklist should be used during the development of the geometric plans for highway projects
- This checklist is to be used in conjunction with the most current versions of the Highway Design Manual (HDM), Design Information Bulletins (DIBs) and Project Development Procedures Manual (PDPM). It is not the intent that DIB 78 supersede the most current versions of the HDM and DIBs, but rather that it reference and refer to the current guidance available.
- References to the pertinent HDM Indices and standards are shown in brackets following the question.
- The following abbreviations and format are used in this checklist:
  B = Boldface Design Standard; HDM
  U = Underlined Design Standard; HDM
- Some items in the checklist may not apply to every project.
- Questions in Section 1.1 answered with "no" require an explanation in the space below the question and, if deviations from standards result, the appropriate approvals are to be obtained and the engineering decisions documented appropriately.
- Design features or elements that deviate from **boldface** standards require approval of the Chief, Division of Design. This approval authority has been delegated to the District Director for projects on conventional highways and expressways, and for certain other facilities in accordance with the District Design Delegation Agreement. Approval authority for design standards indicated in boldface type on all other facilities has been delegated to the Project Delivery Coordinators except as noted in Table 82.1A where: (a) the standard has been delegated to the District Director, (b)

the standards in Chapters 600 through 670 that require approval of the State Pavement Engineer, and (c) standards specifically delegated to the District Director per the District Design Delegation Agreement yet may involve coordination with the Project Delivery Coordinator. [**B: Index 82.2(1)**]

- The authority to approve exceptions to underlined standards has been delegated to the District Directors per the District Design Delegation Agreement. [*U: Index 82.2(2)*]
- The remaining design standards listed are permissive, and engineering decisions related to them should be documented in the project history files per index 82.2(4).

1.0 Basic Design Criteria

These design standards and criteria are to be established prior to geometric plan development.

1.1 Design Speed

HDM Index 101.1 should be read before selecting a design speed. Design speed selection will affect sight distance, vertical alignment, horizontal alignment, and other requirements. Based on engineering judgement, projects with multiple roadways may require more than one selected design speed.

Proposed design speed for project	
Minimum Design Speed for this type of facility	
Design Speed of the roadway segment prior to project	
Design Speed of roadway segment after project	
Posted speed (for existing facilities)	
Operating speed (85th percentile or observed) (for existing facilities)	
Does the design speed comply with Topic 101 including the parameters indicated in Index 101.1(2) and the ranges shown in Table 101.2? **[B: Index 101.1, Index 101.2 and Table 101.2]** and [*U: Index 101.1*]	
If the selected design speed does not fall within the range shown in Table 101.2, has concurrence been received from the Project Delivery Coordinator, District Design Liaison and District traffic unit?	

Does the design speed meet or exceed the posted and operating speeds?	
Is design speed consistent with the Project Initiation Document (PID) or Project Report (PR)?	
Does the PDT concur with the selected design speed of the project?	

1.2 Design Period

1. Has a period of 20 years after completion of construction been selected as the design period for new facilities and reconstruction projects? If no, has the District Director provided approval with concurrence from the Project Delivery Coordinator? (See Index 103.2)
2. If the project involves a roundabout, are you complying with the design period for roundabouts? (see Index 405.10(1))

1. 3 Pedestrian Facilities

1. Have suitable pedestrian facilities been provided for anticipated pedestrian demand that is based on existing and projected land uses?
2. Do all proposed pedestrian facilities comply with DIB 82?
3. Do sidewalk widths meet or exceed minimums? [*U: Index 105.2*]
4. Are curb ramps or blended transitions serving each pedestrian crossing? [*U:Index 105.5(2)*]
5. Are ramps and/or curb openings provided at midblock crosswalks and where pedestrians cross curbed channelization or median islands? (See Index 105.5 (2))

1.4 Design Vehicle Selection

1. For State highways, has the STAA design vehicle been selected in accordance with HDM Topic 404 and Figures 404.5A or B for use on the National Network, Terminal Access, California Legal, and Advisory routes? (U: Index 404.4(1)(b))

2. If STAA design vehicle is not feasible and the California Legal Design Vehicle in Figures 404.5C and D is used, has concurrence been received from the District Truck Manager? (U: Index 404.4(2)(b))

1.5 Fencing

Have fencing or other approved barriers been installed on all newly acquired controlled access areas except as provided in Index 701.2(3)?
[**B: Index 104.4** and **Index 701.2(1)**]

1.6 Bike

Have appropriate bicycle facilities been included if part of the regional or local Bike Master Plan? [Index 115.1]

2.0 Geometric Design Criteria

2.1 Vertical Alignment

1. Sight Distance Criteria:
   a. Has the project sustained downgrades steeper than 3% and longer than one mile? If yes, has the design stopping sight distance in Table 201.1 been increased by 20%? [*U: Index 201.3*]
   b. Does each crest vertical curve provide the minimum stopping sight distance related to design speed as indicated in Table 201.1?
   [**B: Index 201.1** and **Table 201.1**]; (Also See Index 201.4 and Figure 201.4)
   c. At each grade sag, does the length of vertical curve provide headlight sight distance? If no, has lighting been considered as mitigation? (See Index 201.5 and Figure 201.5**)**
   d. On freeways and expressways, is decision sight distance from Table 201.7 provided at lane drops and at off-ramp noses? [*U: Index 201.7 and Table 201.7*]
2. Grade Standards:
   a. Does the entire profile grade comply with the maximum grades specified in Table 204.3? [**B: Index 204.3**]
   b. Does the profile grade exceed the minimum grades of 0.5% for snow country and 0.3% at other locations? [*U: Index 204.3*]
   a. Are ramp grades less than or equal to 8 percent; or 9 percent if descending on-ramps or ascending off-ramps?
   [*U: Index 204.3* and *Index 504.2(5)*]
3. Vertical Curve Criteria:
   a. Do the lengths of the vertical curves equal or exceed:

1) 10V, if the design speed is ≥40 mph and algebraic grade difference is ≥ 2%? [*U: Index 204.4*]

2) 200 feet, if design speeds are <40 mph or algebraic grade difference is < 2%? [*U: Index 204.4*]

b. On 2-lane highways, are the crest vertical curves less than ½ mile in length? (See Index 204.4)

4. Climbing Lane Requirements:

a. If the profile grade has sustained upgrades exceeding 2% where the total rise exceeds 50 feet, has the need for a climbing lane been investigated? (See Index 204.5(2) and Figure 204.5)

b. If a climbing lane is determined to be necessary, has the District Traffic Engineer been consulted regarding the length of climbing and passing lanes? (See Index 204.5(3))

c. Is decision sight distance (See Table 201.7) provided at climbing lane drops on freeways? [*U: Index 204.5(2)*]

5. Structure Grade Lines:

a. Has the profile design taken into account the structure depth, falsework depth and vertical clearance? [Index 204.8 and Table 204.8]

b. Where grade lines are depressed under structures, has the sag been designed at a location to avoid conflicts between the structure footings and the drainage facilities? (See Index 204.8(3))

c. Where the grade line on a bridge is constant or tangent, is the grade 0.3% or greater? (See Index 204.8(4))

d. Where the grade line on a bridge includes a vertical curve, is there a fall of at least 0.05 foot per station and does the stated minimum grade extend for a length of no more than 100 feet? (See Index 204.8(4))

e. Is the falsework vertical clearance over freeway and non-freeway lanes at least 15 feet? [**B: Index 204.8(5)**]

6. Local Roads:

a. Do the local roads within the State rights of way with connections to freeways or expressways satisfy State highway design standards for vertical alignment? [Highway standards in Topic 204 applied by reference in Index 204.1.]

b. Do the local roads without connections to freeways or expressways satisfy AASHTO vertical alignment standards (or local standards that exceed AASHTO)? [**B: Index 204.1**]

2.2 Horizontal Alignment

1. Do all the curve radii exceed the minimum values listed in Tables 202.2A – 202.2E for the appropriate superelevation rate and design speed? [**B: Index 203.2** and **Tables 202.2A – 202.2E**]
2. Is the minimum stopping sight distance listed in Table 201.1 provided at each horizontal curve for the appropriate design speed? [**B: Index 203.1**, **Index 201.1** and **Table 201.1**]; (Also see Index 203.2 and Figure 201.6 if desired lateral clearance to an obstruction is not achievable)
3. If central angle is less than 10 degrees, is the curve length 800 feet or greater? (See Index 203.4)
4. Is the curve length on 2-lane roads between 500 feet and ½ mile? (See Index 203.4)
5. Where compound curves are necessary, is the shorter radius, R1, at least two-thirds the longer radius, R2 (when R1 < 1000 feet)? On one-way roads does the larger radius follow the smaller radius? [*U: Index 203.5*]
6. Is the intervening tangent between horizontal reversing curves long enough to accommodate the standard superelevation runoffs given in Figure 202.5A? If not, is it at least long enough for the 6% maximum per 100 feet rate of change?] When feasible, is at least 400 feet of tangent length provided? [*U: Index 203.6 and Figure 202.5A*]
7. For local facilities, within the State R/W, with either no connection or a connection to a non-access controlled facility, does the horizontal alignment conform to AASHTO standards? [**B: Index 203.1**] If local agency standards are applied, do those standards exceed AASHTO standards? [*U: Index 203.1*]
8. For freeways, are 5000-foot and 3000-foot minimum radius curves used on the mainline in rural and urban areas respectively? (See Index 203.2)

2.3 Alignment Consistency

1. Is the variance in design speed between successive curves less than 10 mph? (Applicable only when a curvature of lower standard than the design speed for the project is introduced.) [*U: Index 203.3*]
2. Does each horizontal curve which is located at the end of a long tangent and/or steep downgrade meet or exceed the design speed? [*U: Index 203.3*]
3. Are the horizontal and vertical alignments coordinating such that the horizontal curves are not “hidden” behind crest vertical curves? (See Index 203.3)
4. Where horizontal and vertical curves are superimposed at sags in grade, or summits in mountainous or rolling terrain, is the design speed of the horizontal curve at least equal to the design speed of the vertical curve? Also, is the horizontal curve design speed no more than 10 mph less than the estimated or measured running speed of the approach roadway? [*U: Index 204.6*]

2.4 Superelevation

1. Have the superelevation rates specified in the Highway Design Manual been used for all horizontal curves? [**B: Tables 202.2A – 202.2E**]
2. On rural 2-lane roads, is the standard superelevation rate carried across the full width of the traveled way and shoulders, except on transitions? [*U: Index 202.2*]
3. Has adverse superelevation been avoided in warping street or ramp surface areas for drainage? (See Index 202.3)
4. For undivided highways, has the axis of rotation been selected to improve perception of curves (i.e. on desert highways) and to avoid drainage pockets at superelevated highway sections (which usually occur in flat terrain)? (See Index 202.4(1))
5. For freeways with an initial median width of 65 feet or less, has the axis of rotation been selected at the centerline? Where initial median width is greater than 65 feet, ultimate median width is 65 feet or less and the resulting initial median slope is steeper than 10:1, is the axis of rotation at the ultimate median edges of traveled way? (See Index 202.4(3)(a))
6. For divided freeways and conventional highways, has the axis of rotation been selected with consideration of aesthetics, grade distortion, superelevation transitions, drainage and driver perception? (See Index 204.2)
7. Is the superelevation transition designed in accordance with the diagram and tabular data shown in Figure 202.5A? [*U: Index 202.5(1)*]
8. Where standard superelevation transition is not attainable (restrictive situations), has the rate of change of the cross slope been limited to 6% per 100 feet? [*U: Index 202.5(3)*]
9. Have the profiles for the edge of traveled way and shoulders been plotted to identify irregularities resulting from the interaction of the super elevation transition and the vertical alignment of the roadway? Have the irregularities been eliminated by introducing smooth curves? Have transitions located near grade sags and crests been checked for flat areas that are undesirable for drainage? (See Index 202.5 (1))
10. Does two-thirds of each superelevation runoff length occur on the tangent which precedes or follows the curve, and does one-third occur within the curve? [*U: Index 202.5(2)*]
11. Are the superelevation transitions for the project avoiding the bridges? (See Index 202.5(4))
12. Are the superelevation transitions for compound curves, if used on the project, designed in accordance with Figure 202.6? [*U: Index 202.6*]
13. Do the superelevation rates on the local streets and roads that are within the State R/W with or without connection to State facilities, conform to AASHTO standards [**B: Index 202.7**]; or, local agency standards that exceed AASHTO standards? [*U: Index 202.7*]

14. Has superelevation been avoided for horizontal curves with a radius of 10,000 feet or greater where the combination of flat grades and superelevation transitions result in locations where surface water is allowed to concentrate on the pavement? (See Index 202.2 and Index 831.4 (5))

2.5 Geometric Cross Section

1. Basic roadway widths for projects which include the construction or reconstruction of local streets and roads as part of the freeway project consider the following guidance:

    1) Has the State highway undercrossing span length been designed to accommodate the future requirements of the local facility? (See Index 208.1(2)(b))

    2) Where a local facility, not on the NHS, crosses over or under a freeway or expressway, but has no connection to the State facility, does the minimum cross section conform to local agency adopted standards? [**B: Index 308.1**]

    3) Where a local facility, on the NHS, crosses over or under a freeway or expressway, but has no connection to the State facility, does the minimum cross section conform to AASHTO standards? (See Index 308.1)

    4) Is the minimum width of all 2-lane overcrossing structures at least 32 feet curb to curb? [**B: Index 308.1**]

    5) Where a local facility crosses over, or under, a freeway or expressway and connects to the State facility, does the minimum cross section meet the standards for a conventional highway with the exception that the outside shoulder width shall match the approach roadway, but not be less than 4 feet? [**B: Index 308.1**]

        At such locations, is the minimum width of the 2-lane overcrossing structure 40 feet curb to curb? [**B: Index 308.1**]

    6) Are the shoulders at least 3 feet wider than gutter pans, if curbs with gutter pans are proposed? [**B: Index 308.1**]

2. Traffic Lane and Shoulder Widths and Cross Slopes:

    a. Are all conventional highway traffic lanes outside of urban, city or town centers (rural main streets) 12 feet wide where posted speeds exceed 40 mph and average daily truck volumes exceed 250 per lane? [**B: Index 301.1**]

    b. Where rumble strips are proposed in the shoulder, has 3 feet of shoulder width been provided to the right of the grooved rumble strip or 4 feet if a vertical element is present at the edge of shoulder? [**B: Index 302.1**]

    c. On new construction projects for all types of surfaces, is the traveled way cross slope 2%? [**B: Index 301.3(2)(a)**]

    d. On resurfacing and widening projects, is the traveled way cross slope between 1.5% and 3% when necessary to match the existing cross slope? [**B: Index 301.3(2)(b)**]

e. Is the maximum algebraic difference in cross slope:

1) 6% or less between adjacent lanes of opposing traffic for rehabilitation and widening projects? [*U: Index 301.3*]

2) 4% or less between adjacent lanes of opposing traffic for new construction? [**B: Index 301.3(2)**]

3) 4% or less between same direction traffic lanes of divided roadbeds? **[*U: Index 301.3*]**

4) 8% or less between the traveled way and shoulder for new construction and pavement overlay projects? [*U: Index 301.3*]

f. On resurfacing projects, has the entire paved shoulder and traveled way been resurfaced where bicycle traffic is not prohibited? [**B: Indices 625.2(2) and 635. 2(1)**]

g. Are the shoulder widths as specified in Table 302.1 provided? [**B: Index 302.1**]

h. Do the shoulders to the right, on normal tangents, slope away from the traveled way at 2 to 5%? [**B: Index 302.2**]

i. On divided cross sections, do the shoulders to the left slope:

- In the plane of the traveled way when the median is paved or when a roadway crosses a bridge structure? [**B: Index 302.2**]
- At 2% away from the traveled way when the median is depressed? [**B: Index 302.2**]

j. Do the lane drops and the lane width reductions for the through lanes have a minimum length of WV [*U: Index 206.3*]

3. Median Standards:

a. Are the minimum median widths provided, based on facility and place type? [**B: Index 305.1**] and [*U: Index 305.1*]

b. Has the median width been selected to provide the standard shoulder width and horizontal clearance to overcrossing structure columns? [**B: Table 302.1** and **Index 309.1(3)**]

c. Is the use of curb in the median in compliance with the guidance of Topic 303 and Index 405.5(1)? [*U: Index 303.1* and *Table 303.1*]

d. Are emergency passageways located only where decision sight distance is available (see Table 201.7) [*U: Index 405.5(2)*]

e. Are median openings spaced at intervals no closer than 1600 feet? If a median opening falls within 300 feet of an access opening, is it placed opposite of the access opening? [*U: Index 405.5(2)*]

4. Bridges and Grade Separations

   a. At a minimum, does the clear width of each bridge, including grade separation structures, equal the width of the approach roadway (traveled way and paved shoulders)? [**B: Index 208.1**]

   b. Where a bridge is constructed on a 2-lane, 2-way road to replace an existing bridge, is the roadbed width at least 32 feet when the ADT is less than 400 or 40 feet when the ADT is greater than 400 vehicles? [**B: Index 208.1(1)(a) and Index 307.2**]

   c. Where the approach shoulder width is less than 4 feet, is the minimum offset on each side 4 feet and has this decision been documented in accordance with Index 82.2? [**B: Index 208.1(1)(b)**]

   d. Is the cross slope on all structures the same as that of the roadway that approaches them? [*Index 208.2*, **B: Index 301.3**, and **B**: **Index 302.2**]

   e. Are bridge medians less than 36 feet wide on multilane divided highways decked? [*U: Index 208.3*]

   f. If sidewalks are proposed on structures, are they at least 6 feet wide? **[B: Index 208.4]**

   g. Are embankment end slopes at open ended structures on all highways no steeper than 1½:1?
   (See Index 208.5)

   h. Has protective screening been provided along new overcrossing structure sidewalks in urban areas? [*U: Index 208.10(2)*]

5. Side (Cut & Fill) Slopes:

   a. On new construction, widening, or other slope modifications, are embankment (fill) slopes 4:1 or flatter? [*U: Index 304.1(a)*] If embankment slopes steeper than 4:1 are included within the project, has the District Landscape Architect and District Stormwater Coordinator approved the nonstandard side slopes per Index 304.1(b)? If side slopes steeper than 2:1 are included within the project, has District Maintenance approved the nonstandard side slopes per Index 304.1(c)?

   b. Is a uniform catch point of at least 18 feet used in light grading areas where normal slopes catch less than 18 feet from the edge of shoulder? [*U: Index 304.1*]

   c. Where appropriate, has snow removal been considered in slope design?
   (See Index 304.1)

   d. Is there a minimum clearance of at least 10 feet between the right of way lines and the catch points for the cut/fill slopes? [Index 304.2]

   e. Is all slope benching and cut widening designed in accordance with Index 304.3 and the Geotechnical Design Report? (See Indices 113.1, 304.1(c), and 304.3)

   f. Have the contour grading plans been prepared? Are the slopes rounded?
   (See Index 304.4)

g. Are "steps" designed into the cut slopes to encourage revegetation with native plants? (See Index 304.5)

6. Frontage Roads:

   a. Is the minimum paved 2-lane cross section width including 4-foot shoulders without curb and gutter 32 feet if 12-foot lanes are to be provided and 30 feet if 11-foot lanes are to be provided? **[B: Index 310.1]**

   b. Is the minimum paved 2-lane cross section width, including 5-foot shoulders and curb and gutter 34 feet if 12-foot lanes are to be provided and 32 feet if 11-foot lanes are to be provided? **[B: Index 310.1]**

   c. In urban areas and in mountainous terrain, is the width of the outer separation a minimum of 26 feet from the edge of traveled way to edge of traveled way? [*U: Index 310.2*]

   d. In rural areas, other than mountainous terrain, is the outer separation a minimum of 40 feet wide from edge of traveled way to edge of traveled way? [*U: Index 310.2*]

7. Right of Way:

   a. If the project requires right of way acquisition, have future project needs and the ability to meet all design standards, without exceptions, been taken into consideration during the establishment of the new right of way lines for this project?

   b. Have stormwater storage and treatment features been incorporated? Are they within the right of way?

8. Clearances:

   a. Horizontal

      1) Have all fixed objects that are necessary highway features within the Clear Recovery Zone (CRZ) been eliminated, moved, shielded, redesigned to be made yielding or shielded in accordance with HDM Index 309.1(2)(a)? [*U: Index 309.1(2)(a)*]

      2) Are discretionary fixed objects, as defined in HDM Index 309.1(2)(b), proposed on highways located beyond the CRZ at a minimum of 52 feet horizontally or 8 feet vertically up-slope from the planned ultimate edge of traveled way? If not, have they been made breakaway or shielded behind existing guardrail, barrier or other safety devices? [*U: Index 309.1(2)(b)*]

      3) If fixed objects are placed within the CRZ, has the minimum horizontal clearance (i.e., standard shoulder width, but not less than 4 feet) been provided to unshielded fixed objects, either yielding or unyielding? Has a minimum horizontal clearance of 10 feet been provided to walls? [**B: Index 309.1(3)(a)**, **Index 309.1(3)(b), and Index 309.1(3)(c)**]

      4) Have the horizontal Stopping Sight Distance requirements been met where it is planned to use the minimum horizontal clearance to objects, barriers, walls, or cut slopes? [**B: Index 309.1(1)**]

5) Where noise barriers are located 15 feet or less from the ETW, has the noise barrier been placed on a safety shape barrier? [**B: Index 1102.2**]

6) In areas without curbs, has the face of Type 60 concrete barrier been constructed integrally at the base of any retaining, pier, or abutment wall facing traffic that is 15 feet or less from the edge of traveled way (right or left of traffic and measured from the face of the wall)? [*U: Index 309.1(3)*]

7) For bridge deck widening projects, has the HQ Transportation Permit Program provided the minimum width of roadway openings between temporary K-rail? (See Index 309.1(3))

b. Vertical

1) For all construction except overlay projects, is the minimum vertical clearance over the roadbed of the State facility (freeways and expressways) 16 feet 6 inches?
[**B: Index 309.2(1)(a)]**

2) Is the minimum clearance over the roadbed of the State facility (freeways and expressways) for an overlay project 16 feet? [**B: Index 309.2(1)(b)]**

3) Is the minimum vertical clearance over the traveled way of a conventional highway, parkway or local facility 15 feet over the traveled way and 14 feet 6 inches over the shoulders of all portions of the roadbed? [**B: Index 309.2(1)(c)]**

4) Is a minimum vertical clearance of 23 feet 4 inches provided above railroad tracks where freight cars are operated? Is a minimum vertical clearance of 19 feet provided above railroad tracks on which freight cars are not operated? [*U: 309.5(1)*]

5) Is the vertical clearance to pedestrian overcrossings 2 feet greater than the standard clearance provided for major structures on the facility?
[**B: Index 309.2(2)**]

6) Do all sign structures have a minimum vertical clearance of 18 feet over the roadbed of the State facility?
[**B: Index 309.2(2)**]

7) Is the rural interstate or single rating facility in urban areas a subset of the Interstate System described in Table 309.2B and Figure 309.2? If yes, does the vertical clearance meet the minimum clearance for freeways and expressways in Index 309.2(1)? **[B: Index 309.2(3), Table 309.2B and Figure 309.2]**

8) If Federal-aid funding is to be used, are all structures within the Federal-aid participation vertical clearance limits? (See Index 309.2(5))

9) If the existing vertical clearance is to be modified, has the Regional Permit Manager been informed of the decision? (See Indices 309.2(4) and 204.8(5))

c. Tunnels

1) On conventional highways, is the minimum vertical clearance 15 feet over any point of the traveled way and 14 feet 6 inches above the gutter at the curb line? On freeways and expressways, is the minimum vertical clearance 16 feet 6 inches? **[B: Index 309.3(2)]**

2) In one-way tunnels on conventional highways is the minimum side clearance from the edge of the traveled way 4 feet 6 inches on the left and 6 feet on the right? For two-way tunnels, is the clearance 6 feet on each side? **[B: Index 309.3(1)]**

d. Elevated Structures

Is the minimum horizontal clearance between elevated highway structures and adjoining building or other structures 15 feet for single-deck structures and 20 feet for double-deck structures? [**B: Index 309.4**]

e. Airway - Highway

1) When construction is planned near an airport or heliport (civil or military), have the airway-highway clearance requirements been met or exceeded? (See Topic 207)

2) If applicable, have the procedures for submitting the clearance data been followed? (See Index 207.3)

f. Railroad

1) Have the minimum clearances between railroads and structures been provided? (See Index 309.5)

2) If a railroad is involved, or is in the vicinity of the project, has the railroad and the Public Utilities Commission granted project approval? (See Index 309.5(4))

2.6 At-Grade Intersections

1. Is the intersection configuration consistent with Intersection Control Evacuation and Traffic Analysis? (See Index 401.5(2))
2. Are skewed intersections greater than 75 degrees (90 degrees preferred)? If not, has mitigation been provided for the affected intersection design features? [*U: Index 403.3*] and (See Figure 403.3A and 403.3B)
3. Is striping used in lieu of curbs to delineate islands adjacent to high-speed traffic? (See Index 405.4(2))
4. Truck turn templates:
   a. Has the STAA truck turn template been used in the design of all interchanges (i.e., ramp intersections) and intersections on the National Network and on routes leading to and from designated Service and Terminal Access routes? [*U: Index 404.4(1)*]

b. Has the California truck turn template been used after concurrence from the District Truck Manager in the design of interchanges and intersections that cannot feasibly accommodate the STAA design vehicle? [*U: Index 404.4(2)(b)*]

5. Sight Distance Requirements:

   a. Are corner sight distances provided at each unsignalized intersection per the equation specified and with the time gap as indicated in Table 405.1A? [*U: Index 405.1(2)(a)(b)*]

   b. Are corner sight distances provided at each signalized intersection equal to the stopping sight distance provided in Table 201.1?
   [*U: Index 405.1(2)(b)]*

   c. During the determination of corner sight distance at an intersection, was a minimum of 10 feet plus the shoulder width of the major road, but not less than15 feet, used for driver set back on the minor road?
   [*U: Index 405.1(2)(a)*]

   d. For private road and rural driveway intersections, does the measured corner sight distance equal or exceed the stopping sight distance? [*U: Index 405.1(2)(c)*]

   e. At intersections where a State highway route turns or crosses another State highway, is decision sight distance given in Table 201.7 provided? [*U: Index 405.1(3)*]

   f. Is minimum stopping sight distance provided at intersections including private road connections? (Index 201.1)

6. Channelization:

   Is turn lane design consistent with the Traffic Operations Analysis?

   a. Are lane widths for both single and double left-turn lanes 12 feet on State highways? On conventional highways, are lanes 11 feet for speeds less than or equal to 40 miles per hour and AADTT less than 250 per lane in urban, city or town centers (rural main streets)? [**B: Index 405.2(2)(a)**]

   b. Do the approach taper and deceleration lane designs meet or exceed the minimum lengths recommended (See Figure 405.2A, B and C, and Tables 405.2A and B)? Has storage length been considered (See Indices 405.2(2)(d) and 405.2(2)(e))?

   c. If the project includes a two-way left-turn lane, is the lane 14 feet wide? If not, is the lane the preferred 12 feet wide? [**B: Index 405.2(4)**]

   d. Do right-turn lane widths satisfy the minimum lane and shoulder width requirements? Is the shoulder width adjacent to any right-turn lane at least 4 feet? [**B: Index 405.3(2)(a)**]

   e. At off-ramp terminals, are the ramps perpendicular to the cross road?
   (See Index 502.2)

   f. Are traffic islands at least 50 square feet in area? If curved and elongated, are median islands a minimum of 4 feet wide and 20 feet long? (Index 405.4(1))

g. Have pedestrian refuge islands been provided (at unsignalized intersections in rural city/town centers (rural main streets), suburban or urban areas) between opposing traffic where pedestrians are allowed to cross 2 or more through traffic lanes in one direction of travel at marked or unmarked crosswalks? [*U: Index 405.4(3)*]

h. If traffic islands are to be used as pedestrian refuge, they must be large enough to provide a minimum of 6 feet in the direction of pedestrian travel, without exception. [Index 405.4(3), absolute requirement Index 82.1(2)]

i. Have through lanes and right-turn-only lanes been separated with a 4-foot width when bikes are permitted, or minimum 6-foot widths where posted speed is greater than 40 miles per hour? [*U: Index 403.6(1)*]

j. Have optional right-turn lanes been avoided where right-turn-only lanes are located on roads where bicycle travel is permitted? [*U: Index 403.6(1)*]

7. Is curb use consistent with the posted speed and location of the facility? [*U: Index 303.1*] (See Table 303.1)

8. Are median openings spaced at least 1,600 feet apart? Have median openings within 300 feet of an access opening or street intersection been shifted to be directly opposite such intersections? [*U: Index 104.5* and *Index 405.5 (2)*]

9. Have emergency passageways been located only where decision sight distance is available? [*U: Index 405.5(2)*] (See Table 201.7)

10. On expressways - -
Are access openings spaced at least ½-mile from an adjacent public road intersection or to another private road access opening that is wider than 30 feet? [*U: Index 205.1 (1)*] Is stopping sight distance provided? [**B: Index 205.1**]

11. Do urban driveway designs meet the width, spacing, and surfacing requirements of Design Information Bulletin 82, the District's permit drawings, and the construction details of the Standard Plans? (See Index 205.3)

12. For driveways on frontage roads and in rural areas, do the proposed driveway widths accommodate the turning radius of the design vehicle for the driveway? (See Index 205.4)

13. On signal installation projects, on two-lane highways, where widening is needed for adequate operation of the intersection, have the minimum design requirements of Figure 405.9 been met or exceeded? (See Index 405.9)

14. Do public road intersections comply with Figure 405.7? Have the appropriate corner radii been selected? (See Indices 405.7 and 405.8)

2.7 Interchange Design Criteria

1. Is the minimum interchange spacing **[B: Index 501.3]:**
   a. One mile in urban areas?
   b. Two miles outside of urban areas?
   c. Two miles between freeway-to-freeway interchanges and other interchanges?

d. Three miles between interchanges on Interstates outside of urban areas?

2. Has the FHWA been requested to conceptually approve new interchanges and modifications to existing interchanges on the Interstate highway system? (See index 503.2)
(FHWA Interstate System Access Information Guide;
http://www.fhwa.dot.gov/design/memos/100831.cfm)

3. Are all traffic movements provided for at each proposed local road interchange so as to minimize the possibility of wrong-way movements? In other words, have isolated ramps and partial interchanges been avoided? [**B: Index 502.2**]

4. Have all movements been provided at freeway-to-freeway interchanges?
(See Index 502.3(2)(c))

5. Do loop connectors have radii in the range of 150 feet to 200 feet?
(See Index 502.3(2)(e))

6. Do direct connectors have minimum radii of 850 feet? Radii of at least 1,150 feet is desirable. (See Index 502.3(2)(e))

7. Has each interchange design been reviewed by the Project Delivery Coordinator and/or District Design Liaison, District Traffic Engineer or Designee, other Headquarters staff, and the FHWA Transportation Engineer as appropriate? (See Index 503.2)

8. Has decision sight distance as given in Table 201.7 been provided at all freeway exits and branch connectors? [*U: Index 504.2(4)(a)*]

   Has the minimum decision sight distance of 600 feet been provided at secondary exits on collector-distributor roads? [*U: Index 504.2(4)(a)*]

9. Is the maximum ramp profile grade 8% or less? A maximum grade of 9% is allowed on descending entrance ramps (except loops) and ascending exit ramps. The 1% steeper grade should be avoided on descending loops to minimize overdriving of the ramp. (See Indices 504.2(5) and 504.3(8)) and [*U: Index 204.3*]

10. Is the maximum profile grade on freeway-to-freeway direct connections 6%? [*A: Index 504.4(3)*]

11. Is the vertical curve beyond the nose of each freeway exit designed to provide a minimum 50 mph stopping sight distance? [*U: Index 504.2(5)(a)*]

12. Does the on-ramp profile approximately parallel the mainline profile for at least 100 feet prior to the inlet nose to provide visibility that facilitates merging?
(See Index 504.2(5)(b))

13. For ascending off-ramps joining a crossroad, if the ramp ends in a crest vertical curve, does the last 50 feet of ramp have a profile grade of 5% or less? [*U: Index 504.2(5)(a)*]

14. For descending off-ramps, is the sag vertical curve length at the ramp terminal at least 100 feet? [*U: Index 504.2(5)(a)*]

15. At overcrossing interchanges, do all the ramps intersect the crossroad where the profile grade of the overcrossings is 4% or less? [*U: Index 504.3(3)*]
16. For left-turn maneuvers from an off-ramp at unsignalized ramp intersections, is the corner sight distance criteria met per Index 405.1 provided? [*U: Index 504.3(3)*]
17. Is a minimum of 400 feet (500 feet is preferred) provided between each ramp intersection and the adjacent local street intersection curb return to curb return? [**B: Index 504.3(3)**] and [*U: Index 504.3(3)*]
18. At freeway entrances and exits, is 5% the maximum algebraic difference in pavement cross slope between adjacent traffic lanes, or between a traffic lane and the adjacent gore area? [*U: Index 504.2(5)*]
19. Where ramps have curve radii of 300 feet or less with a central angle greater than 60 degrees, as mentioned in Index 504.3(1)(b), have they been widened for trucks in accordance with Table 504.3? [**B: Index 504.3(1)(b)**]
20. Does each freeway entrance and exit ramp, excluding direct connections with median HOV lanes, express Toll lanes or BRT lanes, connect to the right of through traffic? HOV "drop" ramps may enter and exit the Freeway from the median. [**B: Index 504.2(1)**]
21. Does each entrance and exit design conform to the standard designs illustrated in Figures 504.2A-B (single lane), and Figure 504.3K (two-lane entrances and exits), and/or Figure 504.4 (diverging branch connections)?
    [**B: Index 903.5(1)** and **Index 904.3(1)**] and [*U: Index 504.2(2)* and *Index 107.1*]
22. Has the need for an auxiliary lane to facilitate the merging of trucks been considered where the physical and traffic conditions cited in Index 504.2(5)(b) are present?
    [*U: Index 504.2(5)(b)*]
23. Where a cut slope restricts visibility on an exit ramp, and cut widening is not feasible, has an auxiliary lane been provided in advance of the exit? [*U: Index 504.2(3)*]
24. Has a design speed of 50 mph been provided at the exit nose of ramps or branch connections? [*U: Index 504.2(4)(a)*]
25. Prior to the first curve of a freeway exit, has the standard deceleration length, "DL," been provided in accordance with Figure 504.2B? Has "DL" been provided for the first curve after the exit from a collector-distributor road? [**B: Index 504.2(2)**] and [*U: Index 504.2(2)*]
26. Where exit ramps are preceded by or located on sustained and significant downgrades or followed by a descending loop or hook ramp, has additional "DL" distance been provided (See AASHTO Policy on Geometric Design of Highways and Streets (Green Book))? (See Index 504.2(2))
27. If the exit nose is located downstream of the 23 feet dimension, is the maximum paved width between the mainline and ramp shoulder edges 20 feet? [*U: Index 504.2(2)*]

28. Is the design speed at the inlet nose consistent with the approach alignment? For branch connections, or diamond ramps with a high-speed alignment, is the design speed at the inlet nose at least 50 mph? [*U: Index 504.2(4)(b)*]

29. Is the design speed on each branch connection a minimum of 50 mph? [*U: Index 504.4(2)*] [Metered connectors **B: 504.3(2)(d)**]

30. If smaller radius curves, with lower design speeds, are used, is the vertical sight distance consistent with the speeds of the approaching vehicles? [*U: Index 504.4(2)*]

31. Does the design for each ramp terminus ending at an intersection where all traffic is expected to make a turning movement provide for a minimum design speed of 25 mph? [*U: Index 504.3(1)(a)*]

    When a "through" movement is provided at the ramp terminus, is the ramp design speed at least equal to or in excess of the design speed of the facility for which the through move is provided? [*U: Index 504.3(1)(a)*]

32. On a single lane ramp where additional lanes are provided near the entrance ramp intersection, is the lane drop accomplished over a distance equal to WV? Is the lane dropped on the right? [*U: Index 504.3(5)*]

33. Where the length of any single-lane ramp exceeds 1,000 feet, has an additional lane been provided to permit passing maneuvers? [*U: Index 504.3(5)*]

34. Excluding ramp metering retrofit projects, is the lane drop taper on a two-lane entrance ramp equal to 50:1? (See Index 504.3)

35. Where design year traffic volumes exceed 1,500 equivalent passenger cars per hour, has a two-lane exit ramp been provided? [*U: Index 504.3(6)*]

36. Has a 1,300-foot length of auxiliary lane been provided prior to each two-lane exit ramp? [*U: Index 504.3(6)*]

37. Where the design year volumes range between 900 to 1500 vehicles per hour (vph), has a single lane exit been designed with provisions for the addition of a second lane and a standard auxiliary lane? [*U: Index 504.3(6)*]

38. Is there at least 1,000 feet between successive on-ramps? If not, does the upstream ramp add an auxiliary lane such that the downstream ramp merges with the auxiliary lane in a standard 50:1 (longitudinal to lateral) convergence? [*U: Index 504.3(9)*]

39. Is there at least 1,000 feet between successive exit ramps on freeways? Also, is there at least 600 feet between successive exit ramps from collector-distributor roads? [*U: Index 504.3(10)*]

40. Are curbs avoided on the high side of ramps or in exit ramp gore areas except at collector distributor roads? (See Index 504.3(11))

41. On Freeway-to-Freeway connectors:

    a. Where the design hourly volume exceeds 1,500 equivalent passenger cars per hour (pcph), has a branch connection been provided? [*U: Index 504.4(6)*]

b. Where the design hourly volume ranges between 900 and 1,500 pcph, has a single lane connection been proposed with provisions for adding an additional lane? [*U: Index 504.4(5)*]

c. Have single lane connectors that are longer than 1,000 feet been widened to two lanes with a minimum of 5-foot shoulders to facilitate passing? [**B: Index 504.4(4)(a)**, *U:* Indexes *504.4(5)*

d. Are the lengths of all lane drop tapers not less than WV? [*U: Index 504.4(7)*]

42. Are merging and diverging branch connections designed in accordance with Figures 504.3K and 504.4, respectively? [*U: Index 504.4(6)*]

43. At all branch merges, has a 2,500-foot length of auxiliary lane been provided beyond the merge of one lane of the inlet, except where noted? [*U: Index 504.4(6)*]

44. At a diverging branch connection (See Figure 504.4), has a 2,500-foot length of auxiliary lane been provided in advance of the exit? [*U: Index 504.4(6)*]

45. Where the weaving distance between successive entrance and exit ramps is less than 2,000 feet (See Figure 504.2A), has an auxiliary lane been provided between these ramps? [Index 504.5]

46. Have the basic number of lanes been maintained through each local Interchange? [*U: Index 504.6*]

47. Where a reduction in mainline traffic volume is sufficient to warrant a decrease in the basic number of lanes, is the lane drop located beyond the influence of the interchange, at least ½ mile from nearest inlet or exit nose, and does the lane drop occur on the right lane on a tangent with a straight or sag profile? (See Index 504.6)

48. Has ramp metering been discussed with the District Traffic Unit? (See Index 504.3(2))

49. Where multi-lane ramps are metered, is the lane drop taper past the meter limit line:

    a. 50 to 1 or greater? (See Index 504.3(2)(c))

    b. 30 to 1 or greater (depending on approach geometry and speed)? [*U: Index 504.3(2)(c)*]

    c. 15 to 1 or greater? [**B: Index 504.3(2)(c)**]

50. Have access rights been acquired along Interchange ramps to their junction with the nearest public road? At these junctions, does the access control extend at least 50 feet beyond the end of the curb return, ramp radius, or taper? [**B: Index 504.8**]

51. For new construction, does the access control extend 100 feet beyond the end of curb return or ramp radius in urban areas and 300 feet in rural areas, or as far as necessary to ensure that entry onto the facility does not impair operational characteristics? [*U: Index 504.8*]

    Does freeway fencing, or equivalent access control, extend to the limit of legal access control on local streets at ramp termini? [*U: Index 701.2(1)*]

52. Have access rights been acquired on the opposite side of the local road from ramp terminals? [**B: Index 504.8**]

2.8 Utilities

1. Do the existing utility facilities that are to remain, or are to be relocated in access-controlled freeways and expressways have a formal exception granted from the Chief of the Headquarters Division of Design for any existing or proposed longitudinal or facility encroachments (for example: poles, aerial lines, manholes, vaults, pull boxes, etc.)? (See Project Development Procedures Manual - Chapter 17)
2. Do all utilities within the project limits comply with the "Utility Policy" (See Project Development Procedures Manual - Chapter 17)? If not, has a formal exception been granted from the Chief of the Headquarters Division of Design for variances to the Utility Policy?
3. Before a project can be certified as Ready to List (RTL) for advertising, the Project Engineer must certify that the project conforms to the "Utility Policy"; has the "Project Engineer's Certification of Utility Facilities" been completed?
   (See the Project Development Procedures Manual - Chapter 17)