PARKING AREA DESIGN WORKSHEET

Based on American Concrete Institute Committee 330

CHANEY ENTERPRISES

STEP 1 From the geotechnical report, determine the subgrade bearing capacity (k or CBR value)

Subgrade Soil Types

Type of Subgrade Soil	Support	K Value	CBR
Fine grained soils in which silt and clay-sized paticles predominate	Low	75-120	2.5-3.5
Sands and sand-gravel mixtures with moderate smounts of silt and clay	Meduim	130-170	4.5-7.5
Sands and sand-gravel mixtures relatively free of plastic fines	High	180-220	8.5-12
Cement or fly ash treated bases have k values from 300 to over 500.			

STEP 2 Determine the traffic category and average daily truck traffic

Traffic Categories

Select A, A-1, B, C, or D

1. Car parking areas and access lanes (autos, pickups, and panel trucks only)	Category A
2. Truck access lanes	Category A-1
3. Shopping center entrance and service lanes	Category B
4. Bus parking areas, city and school buses Parking and Interior lanes	Category B
Entrance and exterior lanes	Category C

5. Truck parking areas

Truck Type	Parking Areas and Interior Lanes	Entrance and Exterior Lanes
Single units	Category B	Category C
Multiple units	Category C	Category D

STEP 3 Determine the concrete strength.

In the Washinington, DC metro area, external concrete slabs should be no less than 4,000 psi for freeze-thaw durability. 4,500 psi is recommended per ACI 332-10. Air entrainment is required in freeze-thaw conditions.

STEP 4 Identify the thickness by finding the correct CBR (or k value) box and then finding the intersection of the correct traffic category/volume and concrete compressive strength.

Twenty-Year Design Tickness Recommendations, Inches (No Dowels)

Traffic Category		k=500 (CBR=50) Compressive Strength			k=400 (CBR=38) Compressive Strength			k= 300 (CBR=26) Compressive Strength		
		5000	4500	4000	5000	4500	4000	5000	4500	4000
A	(ADTT*=0, ESAL**=0)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
A-1	(ADTT=1, ESAL=18, 250)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
A-1	(ADTT=10, ESAL=182, 500)	4.0	4.0	4.0	4.0	4.0	4.5	4.0	4.5	4.5
B	(ADTT=25, ESAL=456, 250)	4.0	4.5	4.5	4.5	4.5	5.0	4.5	4.5	5.0
B	(ADTT=300, ESAL=5, 475, 000)	5.0	5.0	5.5	5.0	5.0	5.5	5.0	5.5	5.5
C	(ADTT=100, ESAL=1, 825, 000)	5.0	5.0	5.5	5.0	5.5	5.5	5.5	5.5	6.0
C	(ADTT=300, ESAL=5, 475, 000)	5.0	5.5	5.5	5.5	5.5	6.0	5.5	6.0	6.0
C	(ADTT=700, ESAL=12, 775, 000)	5.5	5.5	6.0	5.5	5.5	6.0	5.5	6.0	6.0
D	(ADTT=700, ESAL=12, 775, 000)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5

Traffic Category		k=200 (CBR=10) Compressive Strength			k=100 (CBR=3) Compressive Strength			k=50 (CBR=2) Compressive Strength		
		5000	4500	4000	5000	4500	4000	5000	4500	4000
A	(ADTT*=0, ESAL**=0)	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0
A-1	(ADTT = 1, ESAL=18,250)	4.0	4.0	4.0	4.0	4.5	4.5	4.5	5.0	5.0
A-1	(ADTT = 10, ESAL=182,500)	4.5	4.5	5.0	4.5	5.0	5.0	5.0	5.5	5.5
B	(ADTT = 25, ESAL=456,250)	5.0	5.0	5.5	5.5	5.5	6.0	6.0	6.0	6.5
B	(ADTT =300, ESAL=5,475,000)	5.5	5.5	6.0	6.0	6.0	6.5	6.5	7.0	7.0
C	(ADTT = 100, ESAL=1,825,000)	5.5	6.0	6.0	6.0	6.5	6.5	6.5	7.0	7.5
C	ADTT = 300, ESAL=5,475,000)	6.0	6.0	6.5	6.5	6.5	7.0	7.0	7.5	7.5
C	(ADTT = 700, ESAL=12,775,000)	6.0	6.5	6.5	6.5	7.0	7.0	7.0	7.5	8.0
D	(ADTT = 700, ESAL=12,775,000)	7.0	7.0	7.0	8.0	8.0	8.0	9.0	9.0	9.0

** ADTT = Average Daily Truck Traffic. Trucks are defined as vehicles with at least six wheels; excludes panel trucks, pickup trucks, and other four wheel vehicles.*

***ESAL = Equivalent Single Axel Load based on a 20 year service life and on ESAL/ Truck factor of 2.5.*

Example:

Soil is sand and gravel mixtures, CBR=3
Traffic Category A-1, ADTT = 1
Concrete strength of 4,000 psi

Result = 4.5 inches

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JOINTING

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Contraction Joints

Contraction joints (*Figure 1*) control cracking caused by restrained shrinkage, loads and other stresses. The joint depth should be AT LEAST 1/4 of the slab thickness. A narrow joint width between 1/10 to 1/8 inches wide is a common way to avoid joint sealing. The jointing pattern should be cut as close to squares as possible (*Figure 5*). Where it is not possible, the length of a panel should not exceed more than 25% of the width. For irregular shaped panels and where angles would be less than 45 degrees, pre-cut wire mesh or fibers may be used to control cracking (*Figure 5, lower right*). Joint spacing is determined by the slab thickness. Generally, the tighter the joint spacing the better. The chart (*Figure 2*) shows a maximum spacing based on slab thickness.

For unrestrained edges, tie bars should be used in the first joint from the slab edge to avoid the risk of the panel becoming separated from the slab (*Figure 5, at the top*). To be safe, abutting asphalt should be considered an unrestrained edge. Unrestrained edges should be thickened to help with load bearing (*Figure 6*).

Construction Joints

For construction joints (*Figure 3*), the adjacent slabs should be tied together or thickened due to the load transfer from one slab to another.

Isolation Joints

Isolation joints should be used to separate the pavement from other structures or fixed objects within or abutting the paved area. This is most common in sign posts, drains and utility access areas. (*Figure 4*)

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Figure 1- Typical contraction joint

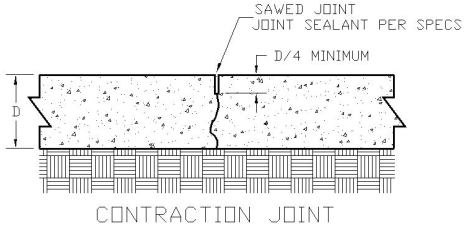

Figure 2 - Spacing between joints

Pavement thickness, in.	Maximum spacing, ft
4, 4.5	10
5, 5.5	12.5
6 or greater	15

Figure 3- Typical construction joints

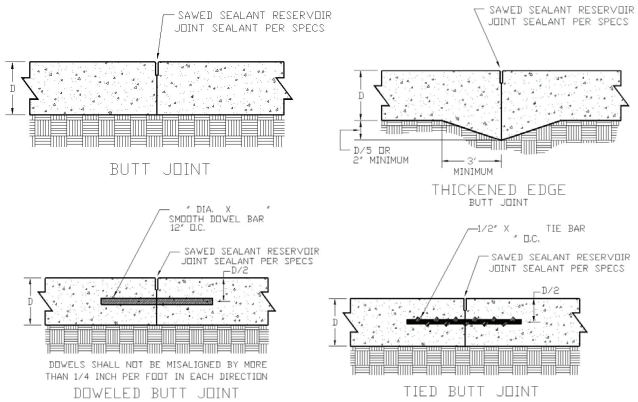

Figure 4- Typical isolation joint

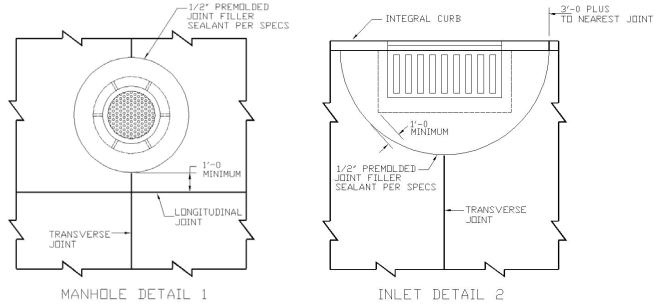

Figure 5- Typical jointing pattern

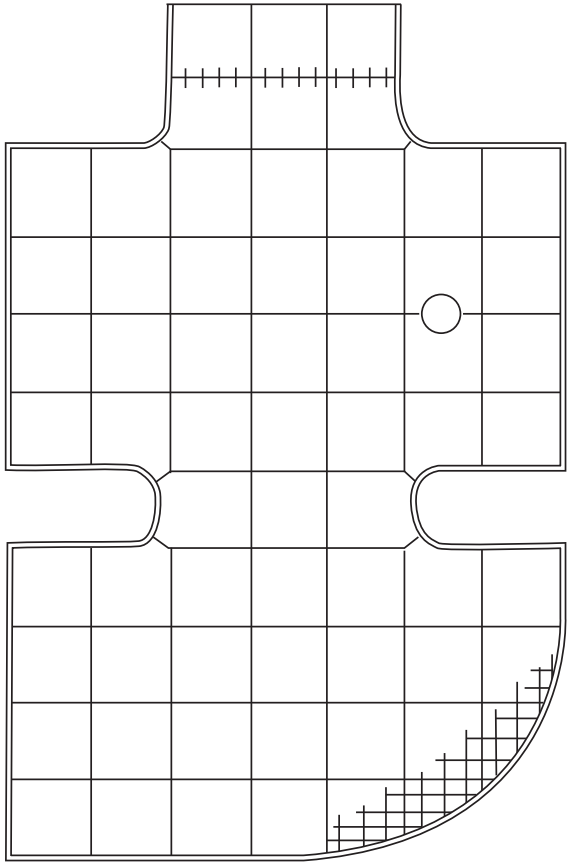

Figure 6- Thicken edge or a reverse curb