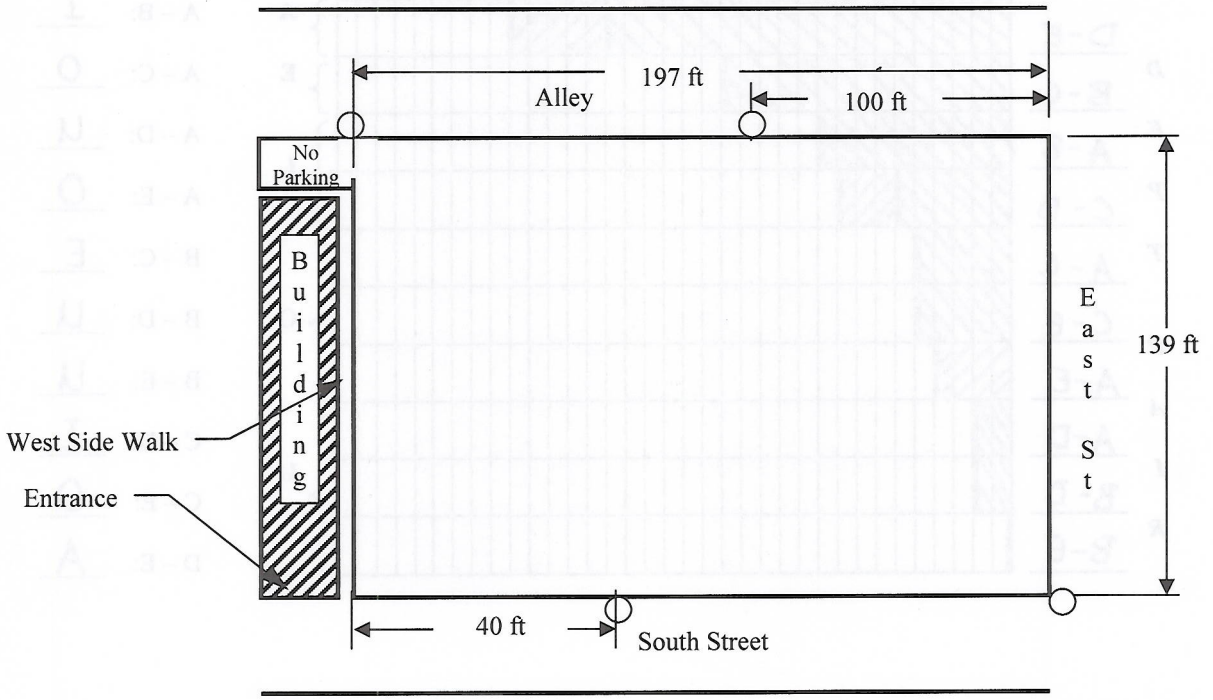
6. (48 pts) The maximum number of cars are to be parked in a single-level parking facility to be constructed in the lot depicted below, and subject to the following constraints:
   a. The alley and side streets at the South and East ends of the lot could serve as cross-aisles for the lot.
   b. 90° parking must use the stall width midpoints, other angles can use the smallest stall widths in a class.
   c. 2% of the stalls are handicapped accessible (use 12' stall width, regardless of angle)
   d. 14 - 20% of the stalls are for compact vehicles.
   e. 10 - 14% of the stalls are for large vehicles (see (b.), above).
   f. Bumpers can overhang the sidewalks to the South and East, but not the West.
   g. Bumpers cannot encroach on the alley, or the garbage truck will hit them!
   h. The remainder of the parking lot is to be used for standard car stalls (see (b.), above).
   i. Any cross aisles in the lot are to be at least 10 ft wide.
   j. Watch for obstructions that would prevent stall use – like 2' diam. utility poles … ○
   k. Each individual car must be able to leave the lot without moving another vehicle.

Fully document the design of your parking lot (module type, parking angle, module width, rows per module, and number of cars per row). Show the row directions in the lot diagram (next page, and give the number of vehicles accommodated:



(Hint: Use your preliminary design on this page, and improve it on the next page)
Use the space below and next page for your calculations and final answer diagram.

-2 WRONG MODULE TYPE
-2 WRONG MODULE WIDTH FOR PARKING ANGLE
-1 INCOMPATIBLE PARKING ANGLES
-1 INCOMPATIBLE BUMPER OVERLAP
-1 NO STALL LOSS PER ROW FOR $\theta \neq 90°$
-1 MISSING CROSS AISLE(S)
-1 MISSING CONSTRAINT (PER CONSTRAINT)
-2 80-86 TOTAL CARS
-3 75-79 TOTAL CARS
-4 70-74 TOTAL CARS
-5 < 70 TOTAL CARS
-5 NO MODULES IN EVIDENCE

TRY E-W W3 MODULES @ 90°: $\frac{197'}{66'} = 2.98$ MODULES, SO TRY $\theta = 85°$ INSTEAD

FINDING PW:

$PW_{HC} = \frac{12'}{\sin(85°)} = 12.046'$ $PW_{cp} = \frac{8'}{\sin(85°)} = 8.031'$ $PW_{LG} = \frac{9'}{\sin(85°)} = 9.034'$ $PW_{STD} = \frac{8.5'}{\sin(85°)} = 8.532'$

FOR WEST ROW, PUT HC & LARGE CARS.

ASSUME 2 HC: $197' - (2)(12.406) = 114.9'$ LEFT

$\frac{114.9'}{9.034'} = \lfloor 12.7 \rfloor - 1 = 11$ LARGE CARS IN REMAINING ROW

FOR EAST ROW PUT COMPACT CARS:

$\frac{139'}{8.031'} = \lfloor 17.3 \rfloor - 1 = 16$ COMPACT CARS

FOR REMAINING ROWS PUT STD CARS:

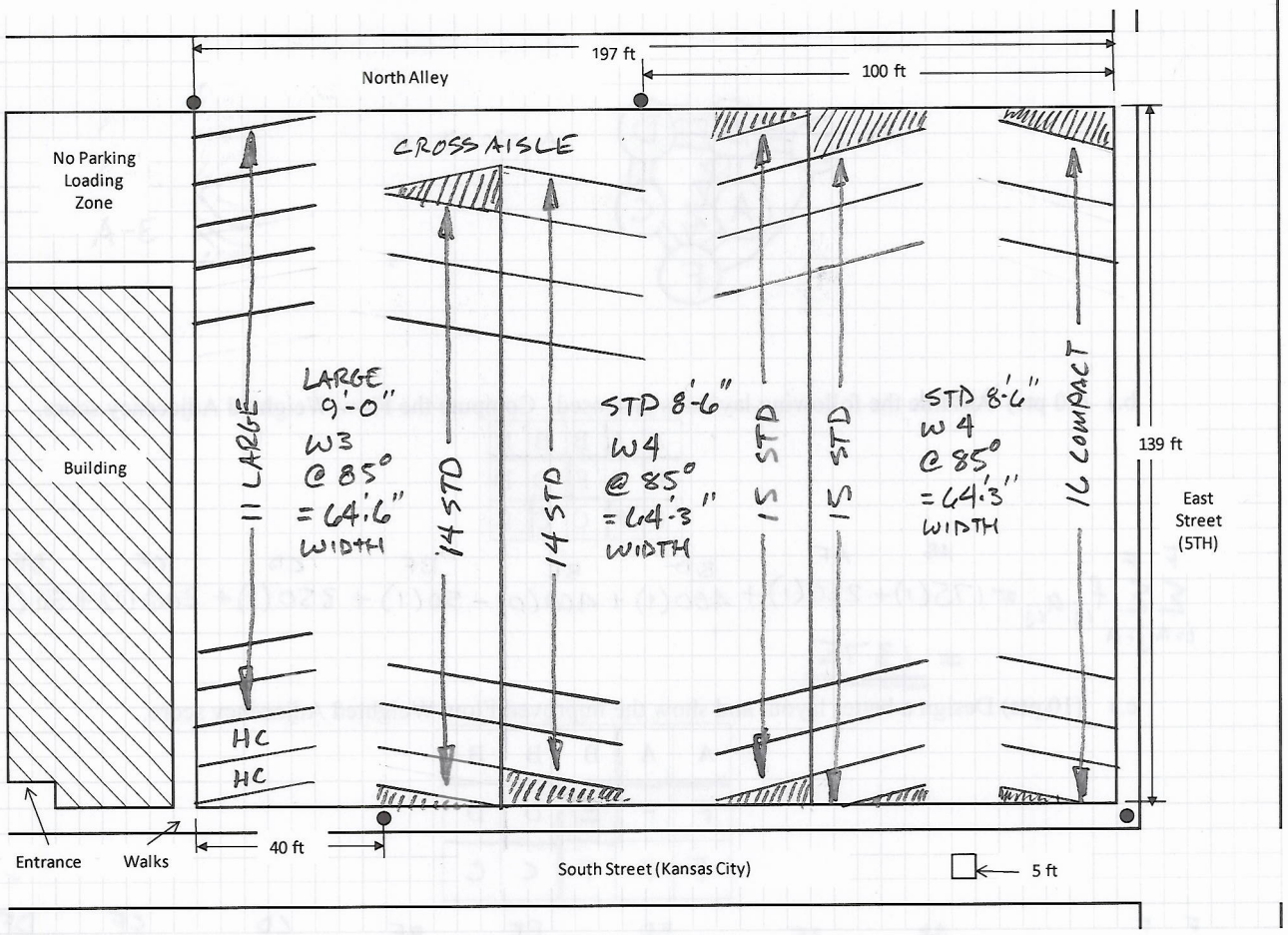
$\frac{139'}{8.532'} = \lfloor 16.3 \rfloor - 1 = 15$ STD CARS PER ROW

NOTE: UTILITY POLE BLOCKS AISLE, SO DROP 2 STD CARS FOR CROSS AISLE

EST CARS IN LOT: $\frac{197'}{8.532'} = \lfloor 16.3 \rfloor - 1 = 15$/ROW

15 (6 ROWS) = 90 CARS

Diagram your solution below. (It does not need to be to scale.) Show where modules go and note module type (W1 .. W4), parking angle (θ), module width (ft-in), car type (HC, std, large, comp) and number of cars of each type in each row.



Total Handicapped Vehicles: 2 (2.3%) Total Compact Cars: 16 (18.4%)

Total Large Cars: 11 (12.6%) Total of all Cars: 87