

NOTE:

TESTING: THE DEVELOPER/CONTRACTOR SHALL TEST FOR BOTH THE PRESENCE OF "EXPANSIVE SOIL" AND "HIGH SULFATE SOIL" BEFORE PLACING ANY CONCRETE ON PROJECT SITE.

PRESENCE OF EXPANSIVE AND HIGH SULFATE SOIL FOUND: IF AFTER TESTING THE SUBGRADE IS FOUND TO OBTAIN EXPANSIVE AND/OR HIGH SULFATE SOIL THE REGISTERED ENGINEER FOR THE PROJECT SHALL MAKE RECOMMENDATIONS TO THE CITY ENGINEER, FOR REVIEW AND APPROVAL, ON HOW TO ADDRESS THE EXISTING SOIL CONDITIONS. HOWEVER, IT WILL BE THE DEVELOPER/CONTRACTOR'S RESPONSIBILITY TO ADDRESS ANY PROBLEMS THAT MAY STILL OCCUR EVEN IF THE RECOMMENDATIONS ARE APPROVED.

PRESENCE OF EXPANSIVE SOIL: IF EXPANSIVE SOIL IS PRESENT AND IT IS NOT ADDRESSED IT CAN CAUSE THE CONCRETE TO RAISE AND/OR SEPARATE FROM OTHER IMPROVEMENTS. THIS CAN HAPPEN IN A MATTER OF DAYS, WEEKS, OR MONTHS AFTER THE CONCRETE IS PLACED. IF THIS HAPPENS THE CONCRETE WILL HAVE TO BE REMOVED, THE EXPANSIVE SOIL ADDRESSED, AND NEW CONCRETE WILL HAVE TO BE PLACED.

TYPICAL RECOMMENDATIONS TO ADDRESS EXPANSIVE SOIL IS TO BRING THE WATER CONTENT TO ABOVE OPTIMUM, TO NOT "OVER" COMPACT THE MATERIAL, TO REMOVE SOME OF THE EXPANSIVE MATERIAL AND REPLACE IT WITH SOME SORT OF BASE MATERIAL (SAY 6" THICK OF CL 2 OR 3 AGGREGATE BASE) TO HELP KEEP THE SOIL FROM "EXPANDING."

PRESENCE OF HIGH SULFATE SOIL: IF HIGH SULFATE SOIL IS PRESENT AND IT IS NOT ADDRESSED IT CAN CAUSE THE CONCRETE TO LOSE ITS "MORTAR" AND THEN TO HAVE THE CONCRETE AGGREGATES EXPOSED. THIS CAN BECOME NOTICEABLE ALMOST IMMEDIATELY OR MAY BECOME NOTICEABLE OVER TIME. IF THIS HAPPENS THE CONCRETE WILL HAVE TO BE REMOVED, THE HIGH SULFATE SOIL ADDRESSED, AND NEW CONCRETE WILL HAVE TO BE PLACED.

THE CITY OF INDIO ADDRESSES HIGH SULFATE SOIL AS FOLLOWS:

HIGH SULFATE SOIL: HIGH SULFATE SOILS ARE DEFINED AS THOSE SOILS WHERE THE WATER-SOLUBLE SULFATE IN SOIL IS GREATER THAN 0.10 PERCENT. FOR SOILS WITH HIGH SULFATE CONTENT, USE THE FOLLOWING TABLE TO DETERMINE ACTUAL CEMENT CONTENT AND REQUIREMENTS FOR CONCRETE WORK. ATTENTION IS DIRECTED TO THE REQUIREMENTS FOR PROVIDING CLASS III AGGREGATE BASE MATERIAL UNDER CURB AND SIDEWALKS IN THOSE AREAS WHERE THE SOILS REPORT INDICATES THE WATER-SOLUBLE SULFATE IS GREATER THAN 0.20 PERCENT.

Degree of Sulfate Attack	Water-Soluble Sulfate (as SO ₄) in Soil Samples (%)	P.p.m. Sulfate (as SO ₄) in Water Samples	Cement Type	Cement Content Lbs/Cuyd	Aggregate Base Required
Negligible	0.00 to 0.10	0 to 150	II	470	No
Positive	0.10 to 0.20	150 to 1000	II	564	No
Considerable	0.20 to 0.50	1000 to 2000	V	658	Yes*
Severe	Over 0.50	Over 2000	V	705	Yes*

* 6 mil plastic sheeting to be placed under aggregate base for flatwork and curb and gutter.

PLEASE NOTE THAT FOR THE CITY OF INDIO THE MINIMUM CONCRETE TO BE USED IS CLASS 560-C-3250. ALSO, PER "GREENBOOK" SPECIFICATIONS, WITHOUT PRIOR APPROVAL BY THE CITY ENGINEER, ONLY TYPE II AND TYPE V CEMENT IS TO BE USED IN THE ABOVE CONCRETE CLASS. THEREFORE, THE CITY'S STANDARD MINIMUM CONCRETE MIX (CLASS 560-C-3250) IS ESSENTIALLY GOOD FOR UP TO THE SECOND (POSITIVE) "DEGREE OF SULFATE ATTACK" FROM THE ABOVE CHART.

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REV.	DRAWN BY:	APP'D:	DATE:



EXPANSIVE AND/OR HIGH SULFATE SOIL

STANDARD PLAN No.: **175**

MAY 2016