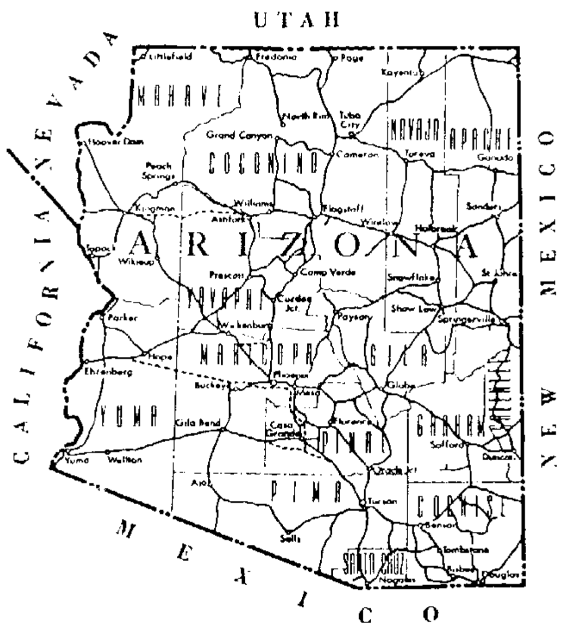

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
PLANS SERVICES

ROADWAY STANDARDS

FOR USE IN

OFFICE AND FIELD

"D"

1978

HIGHWAY PLANS SERVICES

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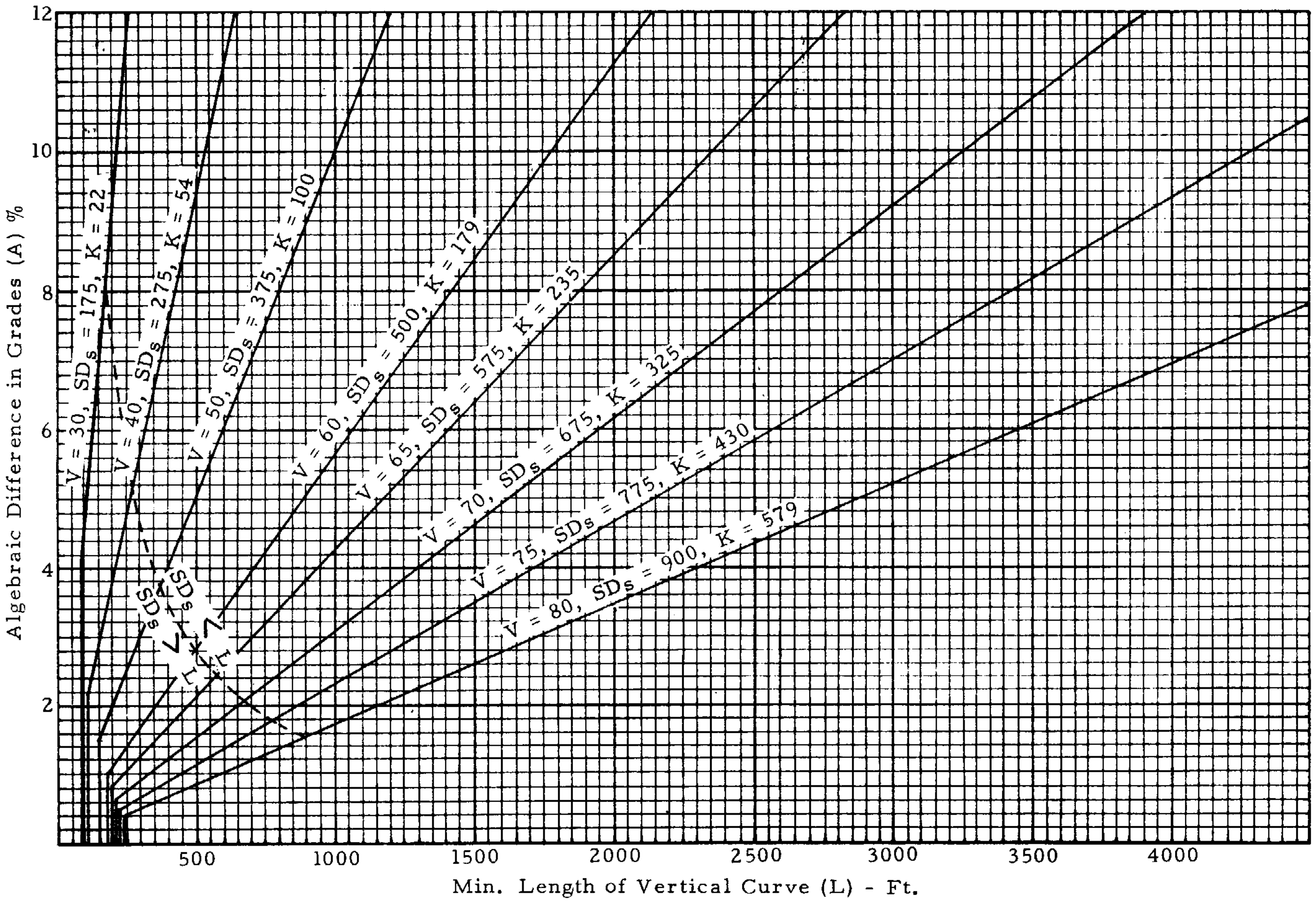
Design Speed	Assumed Speed For Wet Pvmt. Condition	Perception & Brake Reaction		Coefficient of Friction	Braking Distance on Level	Safe Stopping Distance (SD_s)	
		Time	Distance			Computed	Rounded
M.P.H.	M.P.H.	Sec.	Ft.	f	Ft.	Ft.	Ft.
30	28	2.5	103	.36	73	176	175
40	36	2.5	132	.33	131	263	275
50	45	2.5	165	.31	218	383	375
60	54	2.5	198	.30	324	522	500
65	58	2.5	213	.30	374	587	575
70	63	2.5	231	.29	456	687	675
75	67	2.5	246	.28	534	780	775
80	72	2.5	264	.27	640	904	900

Note: Applicable only to essentially level roadways. See Sec. 7-09 of Geometric Design Manual for maximum grade rates as related to design speed.

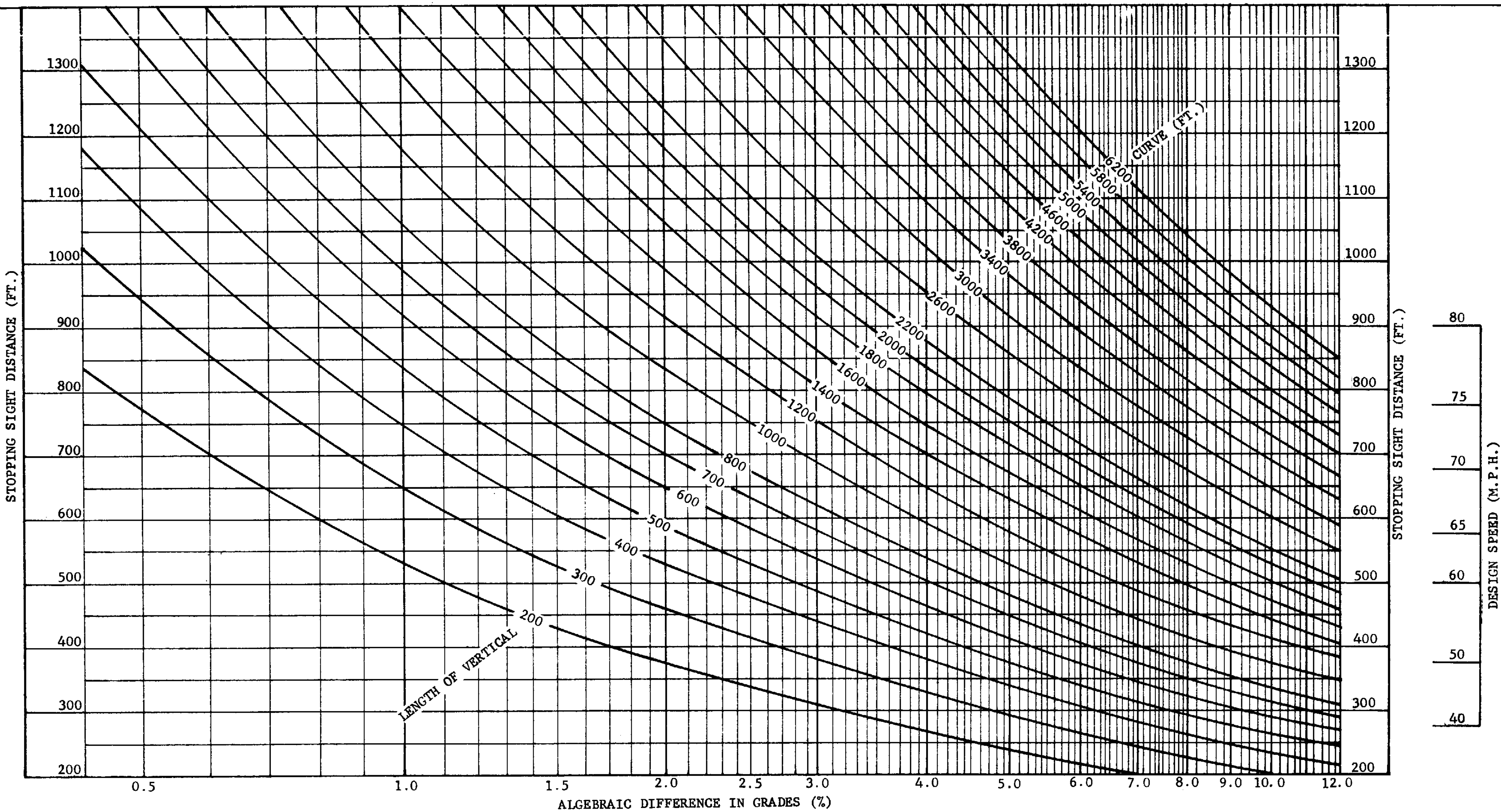
DESIGN APPROVED / APPROVED FOR DISTRIBUTION	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
	STOPPING DISTANCE	PLAN NO. D-51.10



Height of Eye = 3.75'
Height of Object = 0.5'
V = Design Speed - M.P.H.
SD_s = Safe Stopping Distance - Ft.
K = Length of Vertical Curve per % of A - Ft.
$L = A(SD_s)^2/1398$ - Ft.
L = KA - Ft.
L (min.) = 800' for primary and secondary highways;
3V for all other highways.

For SD_s values when L and A are given, see Std. D-1.03

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	LENGTH STANDARDS CREST VERTICAL CURVES	PLAN NO. D-51.20

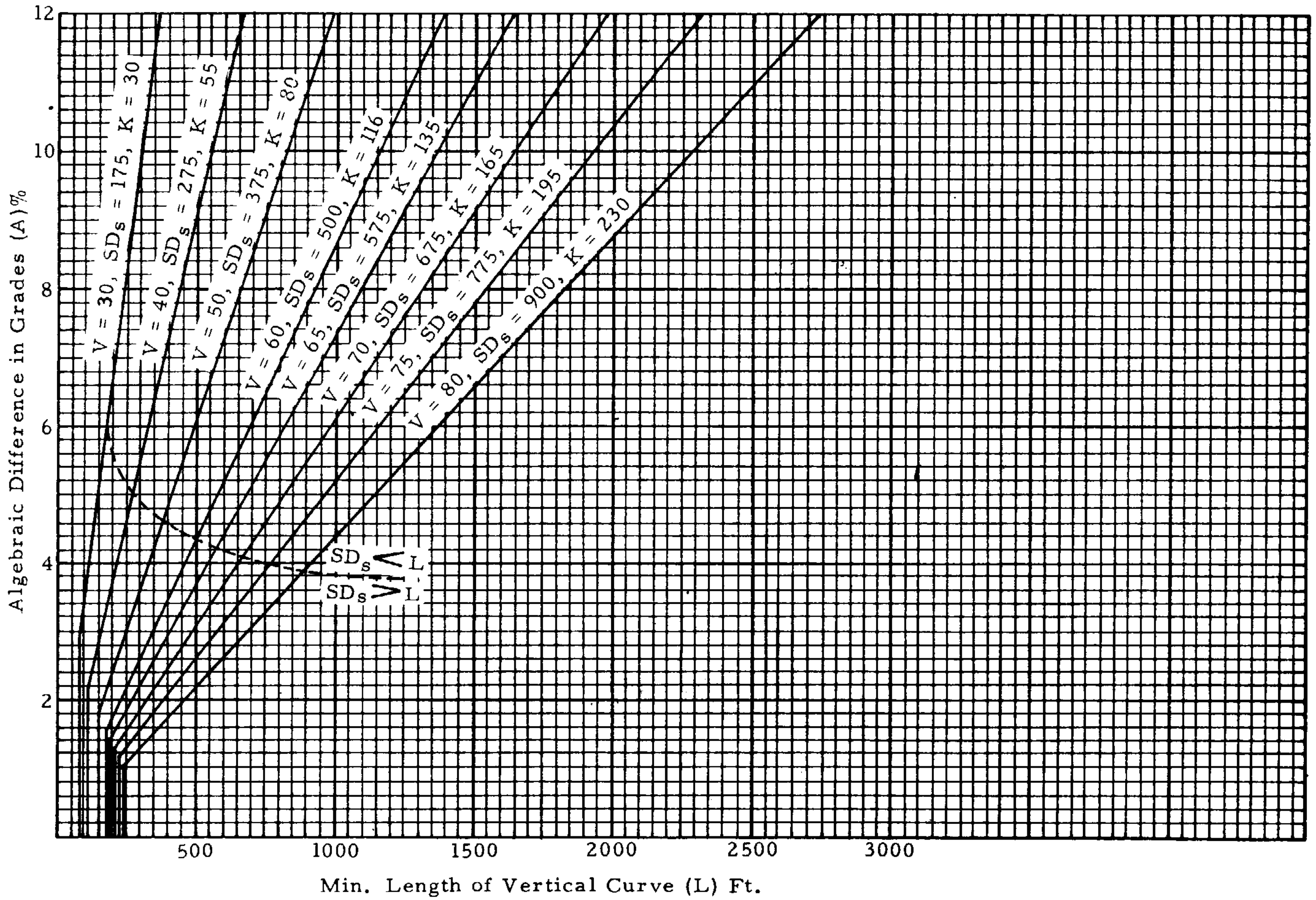


$SD_s = \sqrt{1398L/A}$

L (min.) = 1000' for interstate highways;
800' for primary and secondary highways;
3V for all other highways.

Note: This Chart Valid Only For $L < S$

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV DATE 4/78
APPROVED FOR DISTRIBUTION	STOPPING SIGHT DISTANCE CREST VERTICAL CURVES	PLAN NO. D-51.30



V = Design Speed - M. P. H.

SD_s = Safe Stopping Distance - Ft.

= Light Beam Distance - Ft.

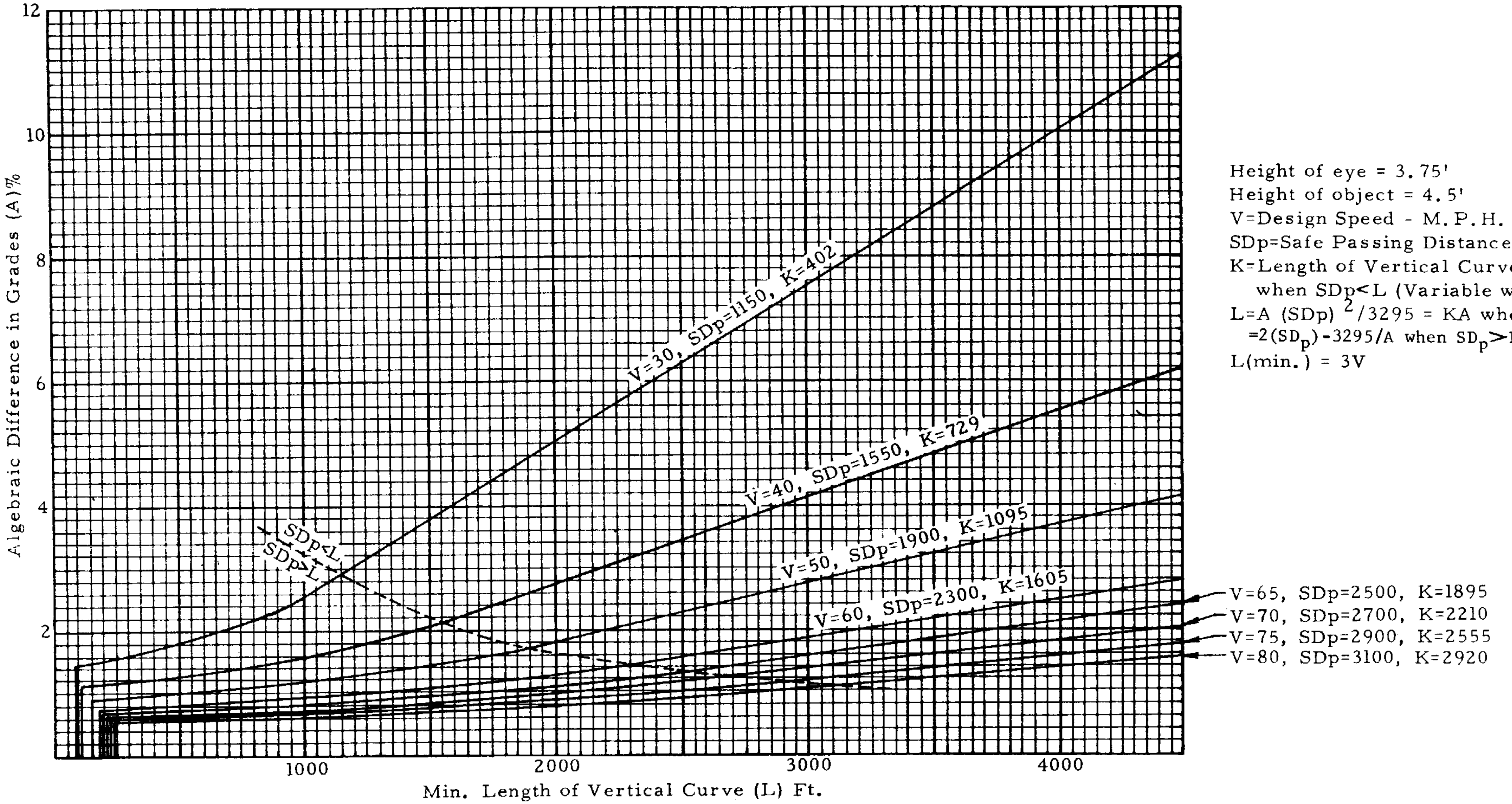
K = Length of Vertical Curve per % of A - Ft.

$$L = \frac{A(SD_s)^2}{400 + 3.5\,SD_s} \text{ - Ft.}$$

L = KA

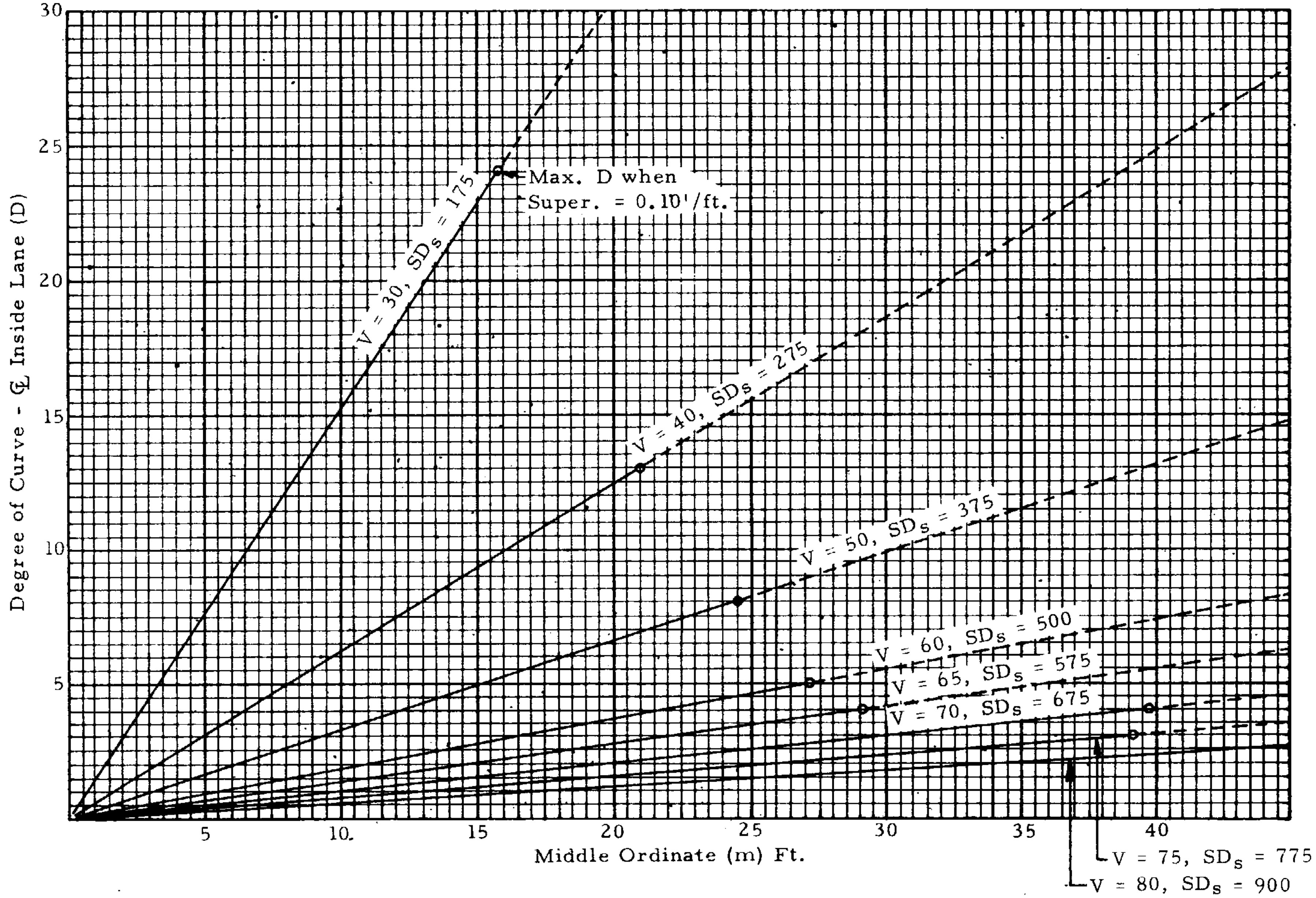
L (min.) = 1000' for Interstate Highways;
800' for primary and secondary highways;
3V for all other highways.

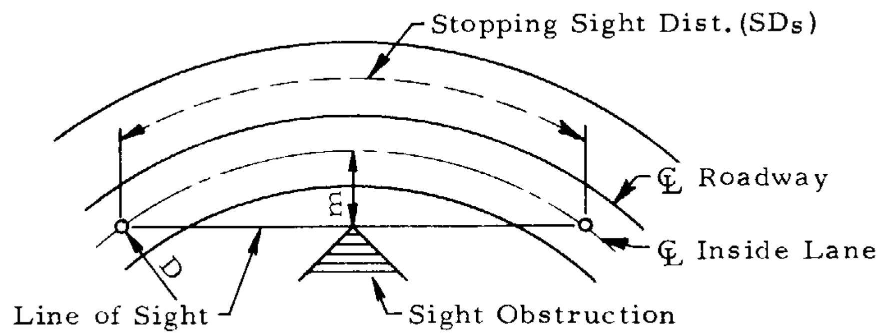
DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	LENGTH STANDARDS SAG VERTICAL CURVES	PLAN NO. D-51.40



Height of eye = 3.75'
Height of object = 4.5'
V=Design Speed - M.P.H.
SDp=Safe Passing Distance - Ft.
K=Length of Vertical Curve per % of A when SDp<L (Variable when SDp>L)
$L = A\,(SDp)^2/3295 = KA$ when SDp<L
$= 2(SD_p) - 3295/A$ when $SD_p > L$
L(min.) = 3V

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	PASSING SIGHT DISTANCE CREST VERTICAL CURVES	PLAN NO. D-51.50

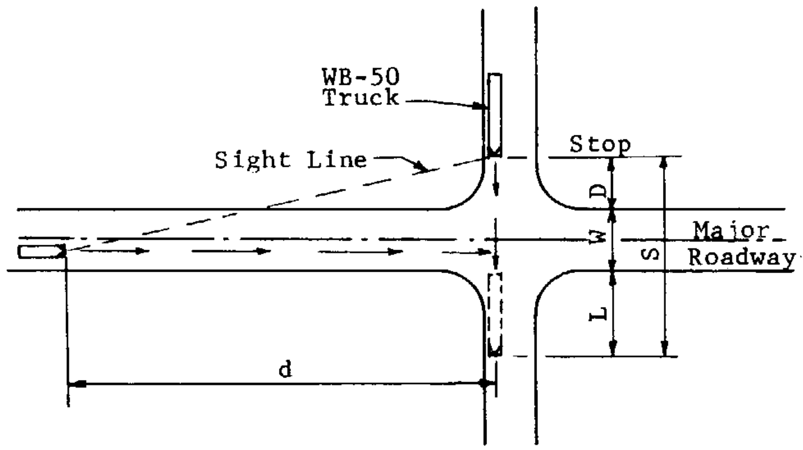




$$m = \frac{5730}{D} \text{vers} \frac{SD_s\ D}{200}$$

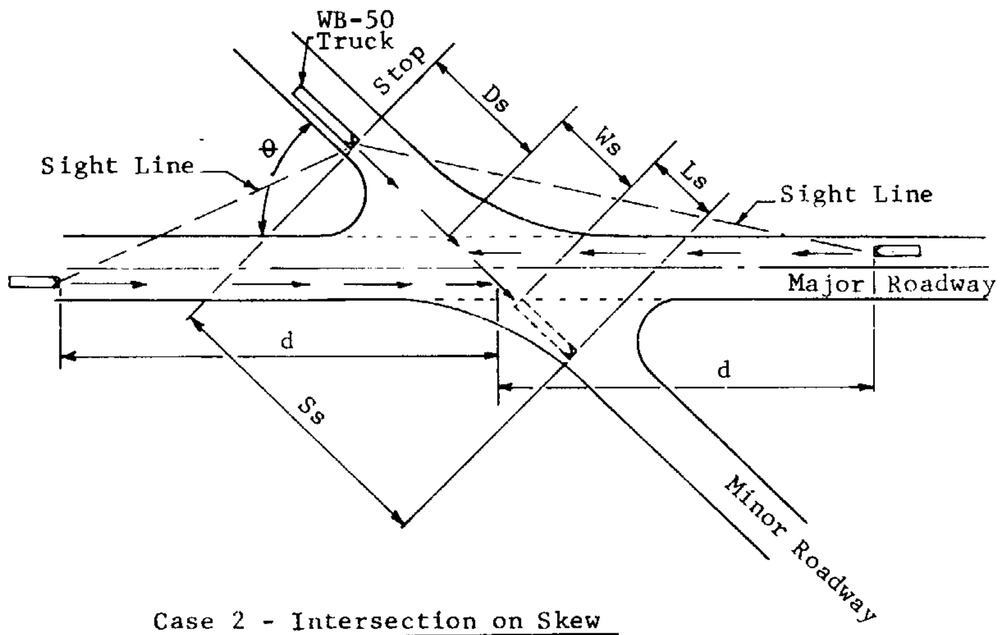
V=Design Speed M. P. H.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	STOPPING SIGHT DISTANCE HORIZONTAL CURVES	PLAN NO. D-51.60



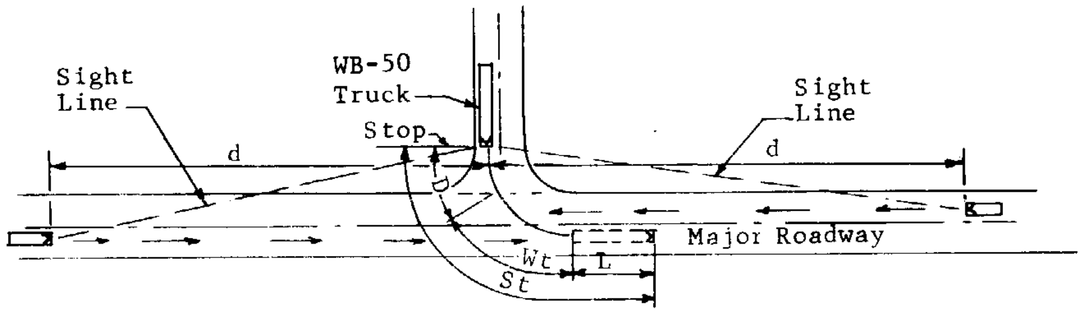
Case 1 - Normal Intersection

Case 1:
$d = 1.47V(2+4.8+0.065)$



Case 2 - Intersection on Skew

Case 2:
$d = 1.47V(2+4.8+0.06\ Ss/\sin\theta)$



Case 3 - "T" or Ramp-Crossroad Intersection

Case 3:
$d = 1.47V(2+4.8+0.06\ St)$

ta adjustment for grade effect

Grade, %	-4	-2	0	+2	+4
Factor	0.8	0.9	1.0	1.2	1.7

TABLE 1

FORMULA

Basic formula: $d=1.47V(J+ta)$
d= min. sight distance along major roadway, ft., based on 3.75 ft. eye height and 4.5 object height.
D,Dt= distance from front of stopped vehicle to edge of traffic lane, ft. = 6
$Ds= 10/\sin\theta$.
J= sum of perception and gear shifting time for stopped vehicle preparing to enter or cross major roadway, sec.= 2
L,Lt= overall length of WB-50 truck, ft.=55
$Ls= 55/\sin\theta$
S= D+W+L, ft.
Ss= Ds+Ws+Ls, ft.
St=D+Wt+L, ft.
*ta= time for stopped vehicle to accelerate and traverse an S distance, sec. =0.06S,Ss or St+4.8
V= design speed of major roadway, mph
W= major roadway width, ft.
Ws= major roadway width/sin θ, ft.
Wt= distance traveled by stopped vehicle within major roadway width when left turning into major roadway and beginning entrance to traffic lane, ft.=1.18W
*See Table 1 for ta adjustment for grade effect.

DESIGN NOTE

Sight line should be free of obstructions such as buildings, bridge superstructures, underpass columns or cut slopes. In addition, any major roadway horizontal or vertical curvature should provide the required unobstructed sight distance.
Where any restriction in the required sight distance or any obstruction in the sight line cannot be eliminated through design, additional traffic control is required.

For additional data see Section 9-03.7 of Geometric Design Manual.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV.DATE 4/78
APPROVED FOR DISTRIBUTION	SIGHT DISTANCE STOP INTERSECTION	PLAN NO. D-51.70

BASIC PROCEDURE

GIVEN: Terrain Class, Design Speed, ADT (Average Daily Traffic), K (Design Hour Factor), T (% Trucks & Recreation Vehicle) and D (% Directional Distribution Factor) or % Passing Sight Distance > 1500 Ft.

FIND: The geometric design standard (roadway with the minimum cross section) that satisfies the given criteria.

STEPS

1. Compute DHV in 100's = ADT x K x 0.01
2. Enter the table in the appropriate terrain class column.
3. Within the terrain class column find the appropriate T (% Trucks) column.
4. Within the appropriate D or % Passing Sight Distance column find the range of smallest DHV values which will satisfy the value for DHV as computed in Step 1. Note that both given design speed and either D or % Passing Sight Distance must be satisfied.
5. The minimum geometric design standard is indicated by the "R" number associated with the result of Step 4.
6. The details of the geometric design standard found in Step 5 are shown on Std. D-52.20

Note: All DHV's computed in these procedures are two-way.

EXAMPLE NO. 1

GIVEN: Terrain = Rolling, Design Speed = 60 mph, ADT = 6000, K = 8%, T = 5%, Passing Sight Distance = 60% > 1500 Feet.

Solution:

1. DHV = 6000 x 0.08 x 0.01 = 4.8
2. Enter "Rolling" terrain class column.
3. Within the above column find the T% column group which contains the given value of 5% (0% to 9% group).
4. Within the column group found in Step 3 find that column which contains the % passing sight distance value of 60%.
5. Within the above column find the range of smallest DHV which contains the value 4.8 (from Step 1).
6. The "R" number to the left is found to be R3, the geometrics for which may be found on Std. D-52.20

Comment:

It will be noticed that cross section R5 will also satisfy the DHV criteria if a 50 mph design speed is permissable. A re-evaluation of the basic criteria may find such a revision advisable.

MULTI-LANE

	Terrain		Level									Rolling									Mountainous								
	% Trucks (T)	Max	9			15			20			9			15			20			9			15			20		
		Min	0			10			16			0			10			16			0			10			16		
	% Directional Distribution D	Max	60	70	80	60	70	80	60	70	80	60	70	80	60	70	80	60	70	80	60	70	80	60	70	80	60	70	80
		Min	50	61	71	50	61	71	50	61	71	50	61	71	50	61	71	50	61	71	50	61	71	50	61	71	50	61	71
R1	Design Speed		80 mph (Level of Service B)									70 mph (Level of Service B)									60 mph (Level of Service C)								
R1	DHV Range (100's)	Max	32	27	24	29	24	21	28	24	20	31	26	22	25	21	18	23	19	17	21	18	15	13	11	10	11	9	8
R1		Min	23	20	17	22	19	16	21	18	15	20	17	15	16	14	12	14	12	11	10	9	8	9	8	7	8	7	6
R2	Design Speed		70 mph (Level of Service B)									60 mph (Level of Service B)									50 mph (Level of Service C)								
R2	DHV Range (100's)	Max	22	19	16	21	18	15	20	17	14	19	16	14	15	13	11	13	11	10	17	14	12	10	8	7	8	6	5
R2		Min	17	14	12	16	13	12	15	13	11	12	10	9	11	9	8	10	8	7	8	7	6	6	5	5	5	5	4

2-LANE

	Terrain		Level									Rolling									Mountainous								
	% Trucks (T)	Max	9			15			20			9			15			20			9			15			20		
		Min	0			10			16			0			10			16			0			10			16		
R3	% Passing Sight Dist.		100	80	60	100	80	60	100	80	60	80	60	40	80	60	40	80	60	40	60	40	20	60	40	20	60	40	20
R3	Design Speed		70 mph (Level of Service B)									60 mph (Level of Service B)									50 mph (Level of Service C)								
R3	DHV Range (100's)	Max	7.5	7.0	6.5	6.5	6.0	5.5	6.2	5.5	5.2	6.0	5.1	4.1	4.2	3.5	2.9	3.6	3.1	2.5	8.0	6.4	4.7	4.2	3.4	2.5	3.2	2.6	1.9
R3		Min	6.0	5.5	5.0	5.5	5.2	4.7	5.2	4.6	4.4	3.9	3.4	2.7	3.3	2.8	2.3	3.0	2.6	2.0	3.9	3.2	2.3	3.0	2.4	1.8	2.6	2.1	1.5
R4	% Passing Sight Dist.		100	80	60	100	80	60	100	80	60	80	60	40	80	60	40	80	60	40	40	20	0	40	20	0	40	20	0
R4	Design Speed		70 mph (Level of Service B)									60 mph (Level of Service B)									50 mph (Level of Service C)								
R4	DHV Range (100's)	Max	7.2	6.7	6.1	6.4	5.9	5.4	6.0	5.6	5.0	5.5	4.7	3.7	4.1	3.5	2.8	3.5	3.1	2.4	5.4	4.0	2.6	3.2	2.4	1.5	2.5	1.9	1.2
R4		Min	5.7	5.3	4.8	5.4	5.0	4.5	5.0	4.7	4.3	3.6	3.1	2.5	3.1	2.7	2.2	2.8	2.4	2.0	3.0	2.2	1.4	2.3	1.7	1.1	2.0	1.5	1.0
R5	% Passing Sight Dist.		100	80	60	100	80	60	100	80	60	80	60	40	80	60	40	80	60	40	40	20	0	40	20	0	40	20	0
R5	Design Speed		60 mph (Level of Service B)									50 mph (Level of Service C)									40 mph (Level of Service D)								
R5	DHV Range (100's)	Max	5.4	4.7	4.0	4.7	4.1	3.6	4.5	3.9	3.4	6.9	6.2	5.0	5.1	4.5	3.7	4.5	4.0	3.2	5.6	4.4	2.4	3.0	2.3	1.3	2.3	1.8	1.0
R5		Min	4.3	3.7	3.2	4.0	3.5	3.0	3.8	3.3	2.8	4.6	4.1	3.3	4.0	3.6	2.9	3.6	3.2	2.6	2.7	2.1	1.1	2.1	1.6	0.9	1.8	1.4	0.7

EXAMPLE NO. 2

GIVEN: Terrain = Rolling, Design Speed = 70 mph, ADT = 22000, K = 11%, T = 8%, D = 55%.

Solution:

1. DHV = 22000 x 0.11 x 0.01 = 24
2. Enter "Rolling" terrain class column.
3. Within the above column find the T% column group which contains the given value of 8% (0% - 9% group).
4. Within the column group found in Step 3 find that column which contains the D value of 55% (50% - 60% column).
5. Within the above column find the range of smallest DHV which contains the value 24 (from Step 1).
6. The "R" number to the left is found to be R1, the geometrics for which may be found on Std. D-52.20

GENERAL NOTES

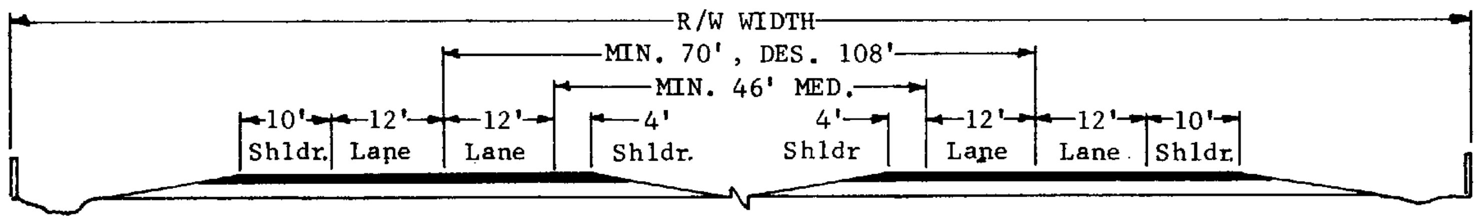
The procedures will in some instances yield results which can be satisfied by more than one design standard. Final selection will require careful consideration of factors such as operation, economics, local influences, etc.

Note that multi-lane vs. 2-lane standards are differentiated by directional distribution vs. % passing sight distance > 1500 feet.

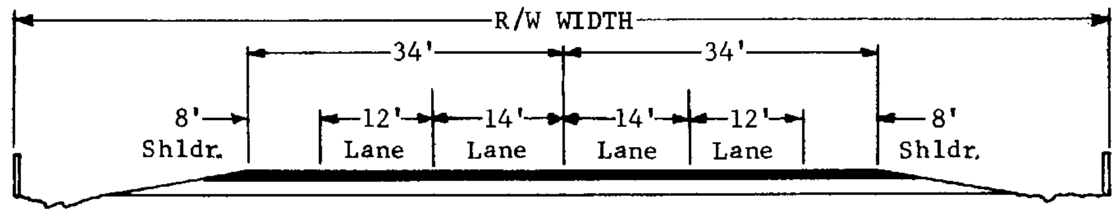
All DHV's computed in these procedures are two-way.

RURAL & RURAL CHARACTER HIGHWAYS

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	GEOMETRIC DESIGN SELECTION TABLE & PROCEDURES	PLAN NO. D-52.10



R1



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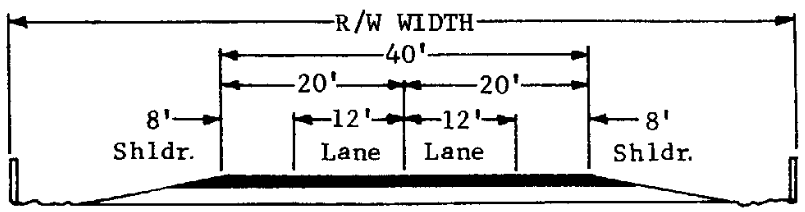

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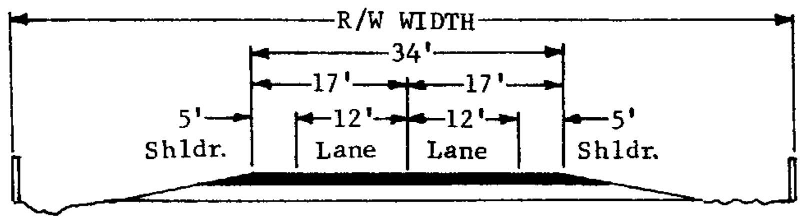

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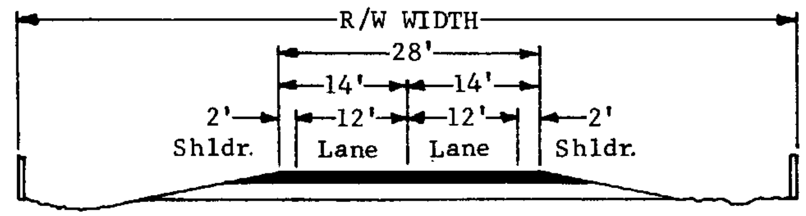


R5

Design Cross Section	R1			R2			R3			R4			R5		
Number of Traffic Lanes	4-DIVIDED			4-UNDIVIDED			2			2			2		
Terrain	LEVEL	ROLL.	MTN.	LEVEL	ROLL.	MTN.	LEVEL	ROLL.	MTN.	LEVEL	ROLL.	MTN.	LEVEL	ROLL.	MTN.
Median Width & Roadway Width	See Cross Sections Above and Sections 8-11 and 8-12 of Design Manual														
Design Speed - m.p.h.	80	70	60	80	70	60	70	60	50	70	60	50	60	50	40
Maximum Curvature - Degrees	See Standards D-6.04, 6.05 & 6.06														
Desirable Maximum Curvature - Degrees	1	2	4	1	2	4	2	4	6	2	4	6	6	8	14
Minimum Stopping Sight Distance - Eye to 6" Object	900	675	500	900	675	500	675	500	375	675	500	375	500	375	275
Passing Sight Distance - Eye to Eye	-	-	-	3100	2700	2300	2700	2300	1900	2700	2300	1900	2300	1900	1550
Maximum Grade - %	3	4	6	3	4	6	3	4	6	4	6	8	4	6	8
Desirable Maximum Grade - %	2	3	4	2	3	4	3	4	4	3	5	6	3	5	7
Minimum R/W Width - Ft.	260	260	260	200	200	200	200	200	200	100	100	100	100	100	100
Desirable Minimum R/W Width - Ft.	308	308	308	250	250	250	250	250	250	200	200	200	-	-	-

GENERAL NOTES

LEVEL TERRAIN: Any combination of geometric design elements that permits trucks to maintain speeds that equal or approach speeds of passenger cars.

ROLLING TERRAIN: Any combination of geometric design elements that causes trucks to reduce speed substantially below that of passenger cars on some sections of the highway but which does not involve sustained crawl speeds by trucks for any substantial distance.

MOUNTAINOUS TERRAIN: Any combination of geometric design elements that will cause trucks to operate at crawl speed for considerable distances or at frequent intervals.

DESIRABLE is the standard to be attained if physical features permit.

PASSING SIGHT DISTANCES less than those tabulated are permitted but are to be avoided if possible.

ROADWAY WIDTH on structures shall be increased by two feet on each side for geometric design standards R1 through R4. For geometric design standard R5 the structure width may be greater than the approach roadway, but in no case shall it be less.

CURVE SUPERELEVATION shall be in accordance with standards D-56.10 through D-56.40.

For Geometric Design Standard Selection Procedure, see Standard D-52.10.

RURAL & RURAL CHARACTER HIGHWAYS

DESIGN APPROVED

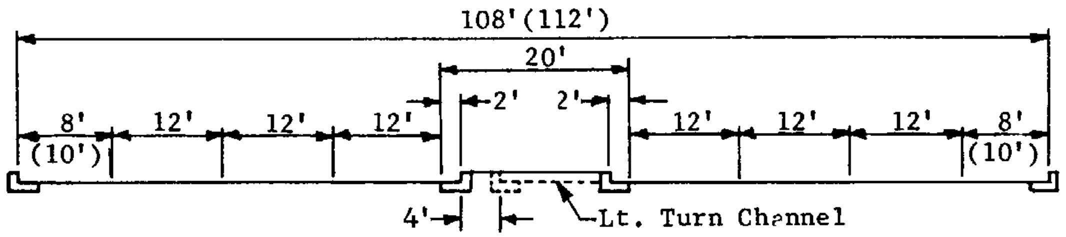
APPROVED FOR DISTRIBUTION

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

REV. 4/78

GEOMETRIC DESIGN STANDARDS

DRAWING NO. D-52.20



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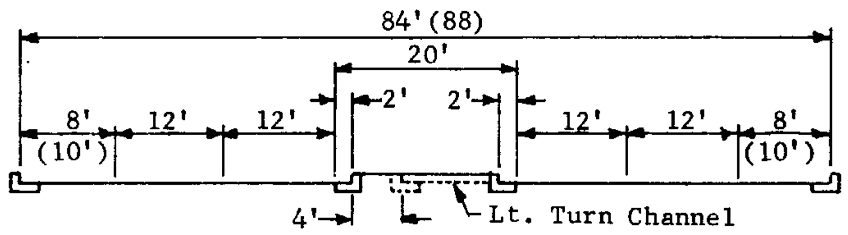

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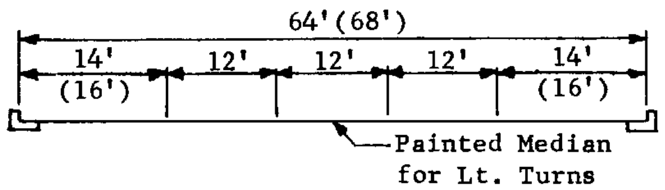

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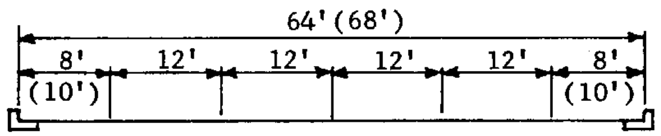

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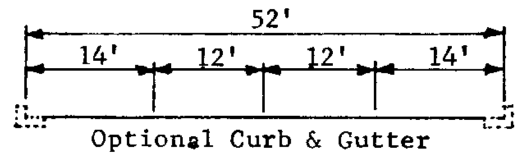


U5

Design Cross Section	U1		U2		U3		U4		U5	
Location	Urban	Suburban	Urban	Suburban	Urban	Suburban	Urban	Suburban	Urban	Suburban
Number of Traffic Lanes	6	6	4	4	4	4	4	4	4	4
Traffic Lane Width - Ft.	12	12	12	12	12	12	12	12	12	12
Median Width - Ft.	20	20	20	20	12	12	-	-	-	-
Minimum Outer Lane Width - Ft.	8	8	8	8	14	14	8	8	14	14
Minimum Desirable Outer Lane Width - Ft.	10	10	10	10	16	16	10	10	14	14
Minimum Roadway Width Inci. Paved Shoulders - Ft.	108	108	84	84	64	64	64	64	52	52
Minimum Desirable Roadway Width Incl. Paved Shoulders - Ft.	112	112	88	88	68	68	68	68	52	52
Design Speed - mph	30-50	40-60	30-50	40-60	30-50	40-60	30-50	40-60	30-50	40-60
Maximum Curvature - Degrees	8	6	8	6	8	6	8	6	8	6
Desirable Maximum Curvature - Degrees	7	5	7	5	7	5	7	5	7	5
Minimum Curb Return Radius - Ft.	20	20	20	20	20	20	20	20	20	20
Minimum Stopping Sight Distance - Eye to 6" Object	375	500	375	500	375	500	375	500	375	500
Maximum Grade - %	6	6	6	6	6	6	6	6	6	6
Desirable Maximum Grade - %	4	4	4	4	4	4	4	4	4	4
Minimum R/W Width - Ft.	135	135	100	100	90	90	90	90	80	80
Desirable Minimum R/W Width - Ft.	300	300	250	250	200	200	200	200	190	190

DESIRABLE is the standard to be attained if physical features permit.
ROADWAY WIDTH on structures shall match that of approach roadway.
CURVE SUPERELEVATION shall be in accordance with standards D-56.10 through D-56.40 subject to adjustments necessary to assuring reasonable ingress and egress to adjacent properties.

For Geometric Design Standard Selection Procedure, see Standard D-52.30.

URBAN & SUBURBAN HIGHWAYS

DESIGN APPROVED	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV 4/78
APPROVED FOR DISTRIBUTION	GEOMETRIC DESIGN STANDARDS	DRAWING NO. D-52.40

	Location	Urban (30-50 mph)									Suburban (40-60 mph)								
	% Trucks	0 - 5			6 - 10			11 - 15			0 - 5			6 - 10			11 - 15		
	Directional Distribution	50 to 60	61 to 70	71 to 80	50 to 60	61 to 70	71 to 80	50 to 60	61 to 70	71 to 80	50 to 60	61 to 70	71 to 80	50 to 60	61 to 70	71 to 80	50 to 60	61 to 70	71 to 80
U1	Turn & Park Criteria	60% Green Time, Lt. Turn Arrow, Turns: 10% Lt., 10% Rt. No Parking in Outer Lanes. Distress Only.																	
U1	Design Hourly Volume (100's)	40 to 32	32 to 27	28 to 24	37 to 29	31 to 25	26 to 22	35 to 27	28 to 24	25 to 21	37 to 29	31 to 25	26 to 22	35 to 28	28 to 24	24 to 21	33 to 26	27 to 23	23 to 20
U2	Turn & Park Criteria	60% Green Time, Lt. Turn Arrow, Turns: 10% Lt., 10% Rt. No Parking in Outer Lanes. Distress Only.																	
U2	Design Hourly Volume (100's)	31 to 25	25 to 21	22 to 19	30 to 24	24 to 20	21 to 18	28 to 22	23 to 19	20 to 17	30 to 24	24 to 20	21 to 18	28 to 22	23 to 19	20 to 17	27 to 21	22 to 18	19 to 16
U3	Turn & Park Criteria	60% Green Time, Lt. Turn Arrow, Turns: 10% Lt., 10% Rt. No Parking in Outer Lanes, Distress Only.																	
U3	Design Hourly Volume (100's)	26 to 21	22 to 18	19 to 16	25 to 20	20 to 17	17 to 15	23 to 18	19 to 16	16 to 14	25 to 20	20 to 17	17 to 15	23 to 19	19 to 16	17 to 14	22 to 17	18 to 15	16 to 13
U4	Turn & Park Criteria	50% Green Time, Turns: 10% Lt., 10% Rt. Parking in Outer Lanes.																	
U4	Design Hourly Volume (100's)	17 to 14	14 to 12	12 to 10	16 to 13	13 to 11	11 to 10	15 to 12	13 to 11	11 to 9	16 to 13	13 to 11	11 to 10	15 to 12	13 to 11	11 to 9	15 to 12	12 to 10	10 to 9
U5	Turn & Park Criteria	50% Green Time, Turns: 10% Lt., 10% Rt. No Parking in Outer Lanes.																	
U5	Design Hourly Volume (100's)	18 to 14	15 to 12	13 to 11	17 to 14	14 to 12	12 to 10	16 to 13	13 to 11	11 to 10	17 to 14	14 to 12	12 to 10	16 to 13	13 to 11	11 to 10	15 to 12	13 to 11	11 to 9

PROCEDURE

GIVEN: Design Speed, ADT (Average Daily Traffic), K (Design Hour Factor), T (% Trucks), D (Directional Distribution) and whether classified as Urban or Suburban.

FIND: The Geometric Design Standard (roadway with the minimum cross section) that satisfies the given criteria

STEPS

1. Compute DHV in 100's
   = ADT x K x 0.01.
2. Enter the table in the appropriate urban or suburban column.
3. Within the location class column find the appropriate T (% Trucks) column.
4. Within the appropriate D (% Directional Distribution) column, find the range of smallest DHV values which will satisfy the DHV value computed in Step 1. Note that the given design speed must be satisfied.
5. The minimum Geometric Design Standard is indicated by the "U" number associated with the results of Step 4.
6. The details for the Geometric Design Standard found in Step 5 are shown in Standard D-52.40.

Note:
All DHV's computed in these procedures are two-way.

EXAMPLE

GIVEN: Location Class = Suburban
Design Speed = 55 mph
ADT = 18,500
K = 12%
T = 7%
D = 55%

1. DHV = 18,500 x 12 x 0.01 = 22
2. Enter Suburban column.
3. Within the above column, find the T% group which contains the given T value (6% to 10% column).
4. Within the column group found in Step 3 find the column which contains the D value of 55% (50% to 60% column).
5. Within the above column group, find the smallest DHV range which contains the value 22 (from Step 1).
6. The "U" number to the left is found to be U3, the geometrics for which may be found on Standard D-52.40.

GENERAL NOTES

The procedures may in some instances yield results which can be satisfied by more than one geometric standard. Final selection will require careful consideration of factors such as operation, economics, local influences, etc.

A capacity analysis should be performed in those instances where the variables (% green time, % turning movements, etc.) are known to differ appreciably from the average values tabulated.

Standard U5 may be modified to serve in situations where it appears that two through traffic lanes would be adequate into the near future and it has been determined that on street parking would be temporarily acceptable. Under these conditions the cross section would be composed of two 16 foot traffic lanes with two 10 foot parking lanes. Traffic carrying capability would be determined by multiplying the appropriate U5 tabular design hourly volume by 65%.

URBAN & SUBURBAN HIGHWAYS

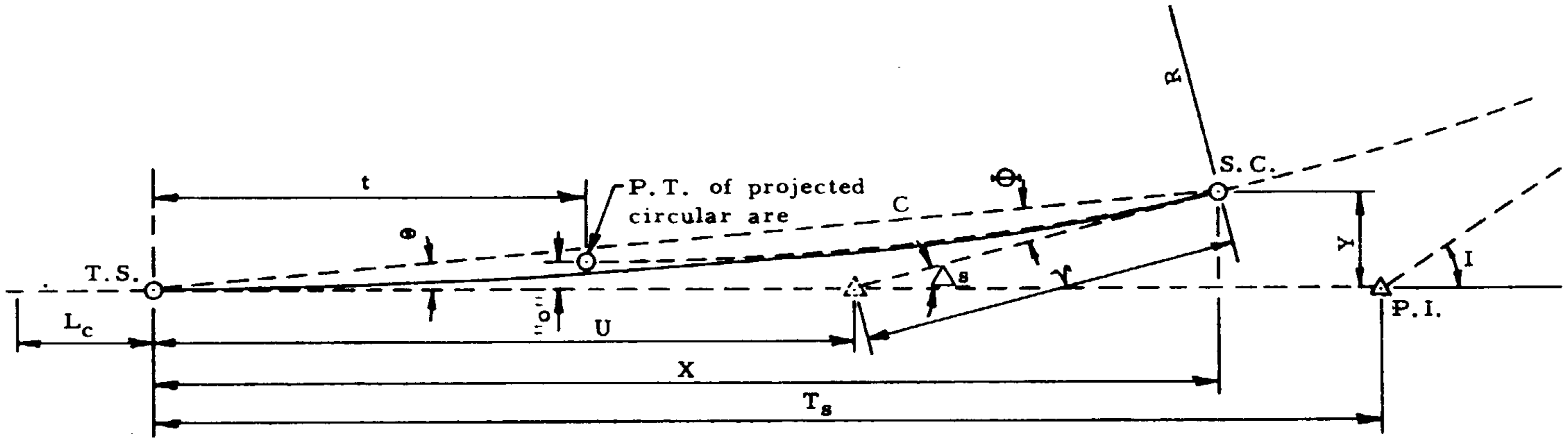
DESIGN APPROVED
APPROVED FOR DISTRIBUTION

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

REV. 4/78

GEOMETRIC DESIGN SELECTION
TABLE & PROCEDURES

DRAWING NO. D-52.30



Determine values of L_s and a, for design speed and D, from Drwg. Nos. D-6.05 through D-6.11. These values may be checked by the following applicable formulae.

L_s(sta.)= Spiral distance from T.S. to S.C.=D/a

a(degrees)=Rate of change in degree of curvature per 100' of spiral=D/L_s

D(degrees)=Degree of curvature of circular curve $=aL_s=5729.58/R$

R(ft.)=Radius of circular curve=5729.58/D

"o"(ft.)=Radial offset=$0.0727aL_s^3$

t(ft.)=$50L_s-0.000127a^2L_s^5$

Δ_s(degrees)=Full spiral deviation angle=$\frac{1}{2}aL_s^2$ $=\frac{1}{2}DL_s=\frac{1}{2}(D^2/a)=L_s/2(D)$

Θ(degrees)=Full spiral deflection angle at T. S. $=(1/3\Delta_s)^{●}=1/6aL_s^{2●}=1/6DL_s^{●}=1/6D^2/a^{●}$

Φ(degrees)=Full spiral deflection angle at S.C. $=\Delta_s-\Theta$

C(ft.)=$100\ L_s-0.00034a^2L_s^5$

V(ft.)=$C\sin\Theta/\sin\Delta_s$

U(ft.)=$C\sin\Phi/\sin\Delta_s$

X(ft.)=$C\cos\Theta$

Y(ft.)=$C\sin\Theta$

T_s(ft.)= $[(\tan\frac{1}{2}I)(R+\text{"o"})]+t$

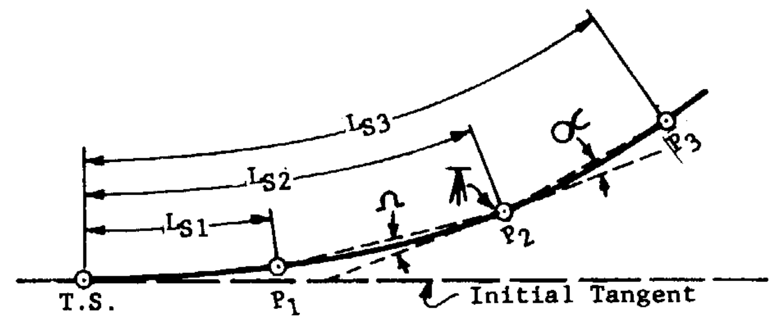
SPIRAL FORMULAE

Reduce Θ formulae values by C_n according to the following table:

Δ_s	C_n	Δ_s	C_n	Δ_s	C_n
16°	0.2'	31°	1.6'	46°	5.1'
17	0.3	32	1.7	47	5.5
18	0.3	33	1.9	48	5.8
19	0.4	34	2.1	49	6.2
20	0.4	35	2.3	50	6.6
21	0.5	36	2.5	51	7.0
22	0.6	37	2.7	52	7.4
23	0.6	38	2.9	53	7.9
24	0.7	39	3.1	54	8.3
25	0.8	40	3.4	55	8.8
26	0.9	41	3.6	56	9.3
27	1.0	42	3.9	57	9.8
28	1.2	43	4.2	58	10.3
29	1.3	44	4.5	59	10.8
30	1.4	45	4.8	60	11.4

● VALUES OF C_n IN Θ DETERMINATION FORMULAE

(C_n is negligible and may be ignored for Δ_s values less than 16°.)

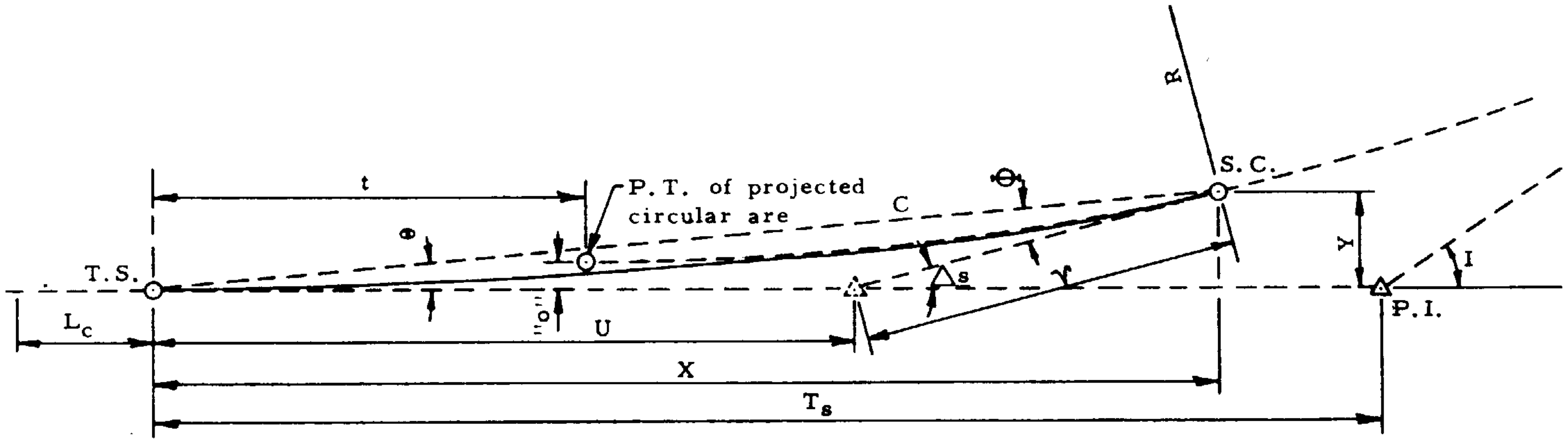


$\alpha=\frac{1}{2}aL_{S2}(L_{S3}-L_{S2})+1/6a(L_{S3}-L_{S2})^2$

$\Omega=\frac{1}{2}aL_{S2}(L_{S2}-L_{S1})-1/6a(L_{S2}-L_{S1})^2$

DEFLECTION ANGLE FORMULAE FOR SET-UP AT POINT ON SPIRAL

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	FULL TRANSITION SPIRAL	PLAN NO. D-55.10



Determine values of L_s and a, for design speed and D, from Drwg. Nos. D-6.05 through D-6.11. These values may be checked by the following applicable formulae.

L_s(sta.) = Spiral distance from T.S. to S.C. = D/a

a(degrees) = Rate of change in degree of curvature per 100' of spiral = D/L_s

D(degrees) = Degree of curvature of circular curve $= aL_s = 5729.58/R$

R(ft.) = Radius of circular curve = 5729.58/D

"o"(ft.) = Radial offset $= 0.0727aL_s^3$

t(ft.) $= 50L_s - 0.000127a^2L_s^5$

Δ_s(degrees) = Full spiral deviation angle $= \frac{1}{2}aL_s^2$ $= \frac{1}{2}DL_s = \frac{1}{2}(D^2/a) = L_s/2(D)$

Θ(degrees) = Full spiral deflection angle at T. S. $= (1/3\Delta_s)^{\text{●}} = 1/6aL_s^{2\,\text{●}} = 1/6DL_s^{\text{●}} = 1/6D^2/a^{\text{●}}$

Φ(degrees) = Full spiral deflection angle at S.C. $= \Delta_s - \Theta$

C(ft.) $= 100\,L_s - 0.00034a^2L_s^5$

V(ft.) $= C\sin\Theta/\sin\Delta_s$

U(ft.) $= C\sin\Phi/\sin\Delta_s$

X(ft.) $= C\cos\Theta$

Y(ft.) $= C\sin\Theta$

T_s(ft.) $= [(\tan\frac{1}{2}I)(R+\text{"o"})] + t$

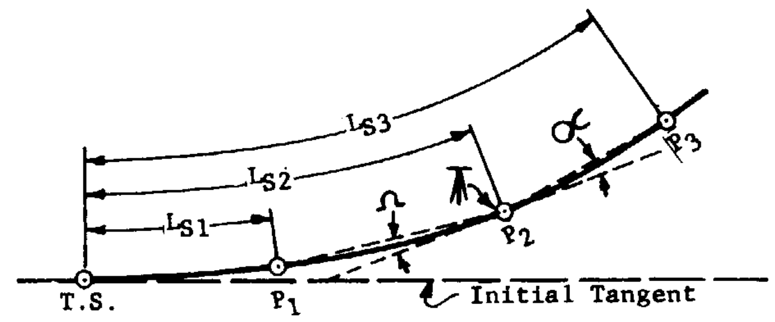
SPIRAL FORMULAE

Reduce Θ formulae values by C_n according to the following table:

Δ_s	C_n	Δ_s	C_n	Δ_s	C_n
16°	0.2'	31°	1.6'	46°	5.1'
17	0.3	32	1.7	47	5.5
18	0.3	33	1.9	48	5.8
19	0.4	34	2.1	49	6.2
20	0.4	35	2.3	50	6.6
21	0.5	36	2.5	51	7.0
22	0.6	37	2.7	52	7.4
23	0.6	38	2.9	53	7.9
24	0.7	39	3.1	54	8.3
25	0.8	40	3.4	55	8.8
26	0.9	41	3.6	56	9.3
27	1.0	42	3.9	57	9.8
28	1.2	43	4.2	58	10.3
29	1.3	44	4.5	59	10.8
30	1.4	45	4.8	60	11.4

● VALUES OF C_n IN Θ DETERMINATION FORMULAE

(C_n is negligible and may be ignored for Δ_s values less than 16°.)



$\alpha = \frac{1}{2}aL_{S2}(L_{S3}-L_{S2}) + 1/6a(L_{S3}-L_{S2})^2$

$\Omega = \frac{1}{2}aL_{S2}(L_{S2}-L_{S1}) - 1/6a(L_{S2}-L_{S1})^2$

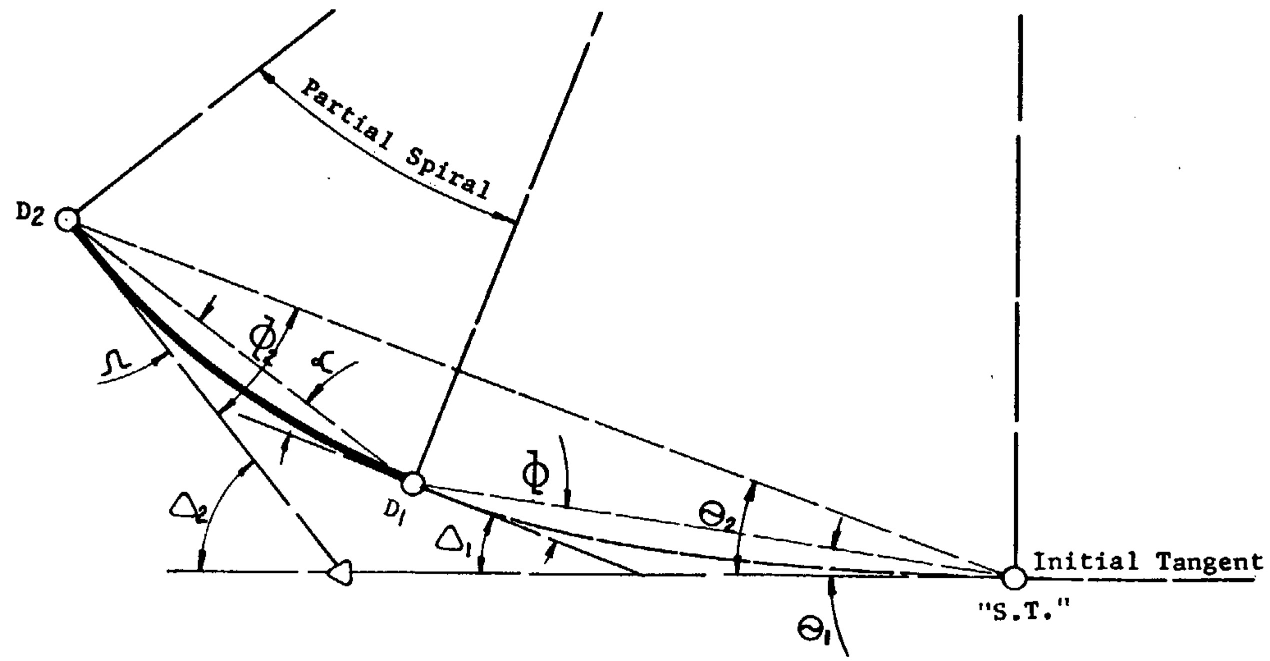
DEFLECTION ANGLE FORMULAE FOR SET-UP AT POINT ON SPIRAL

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	FULL TRANSITION SPIRAL	PLAN NO. D-55.10

Select L_s and a from Drwg. No. D-6.05 through D-6.11 for the specified design speed and $D=D_2$. These values may be checked by the applicable following formulae.

L_s(sta.)=Length of spiral from D_2 to S.T.=D_2/a
a(degrees)=Rate of change in degree of curvature per 100' of spiral=$D_1/L_1=D_2/L_s$
Θ(degrees)=Deflection for spiral having values of a and $L_s-L_1=1/6a(L_s-L_1)^2$
L_1(sta.)=Length of spiral from D_1 to S.T.=D_1/a
L_s-L_1(sta.)=Length of spiral from D_2 to $D_1=D_2-D_1/a$
D_1(degrees)=Culminating degree of curvature at $D_1=aL_1=D_2-a(L_s-L_1)$
D_2(degrees)=Culminating degree of curvature at $D_2=aL_s=D_1+a(L_s-L_1)$
α(degrees)$=\frac{1}{2}aL_1(L_s-L_1)+1/6a(L_s-L_1)^2=\frac{1}{2}D_1\left[\frac{D_2-D_1}{a}\right]+1/6a\left[\frac{D_2-D_1}{a}\right]^2=\frac{1}{2}D\ (L_s-L_1)+\Theta$

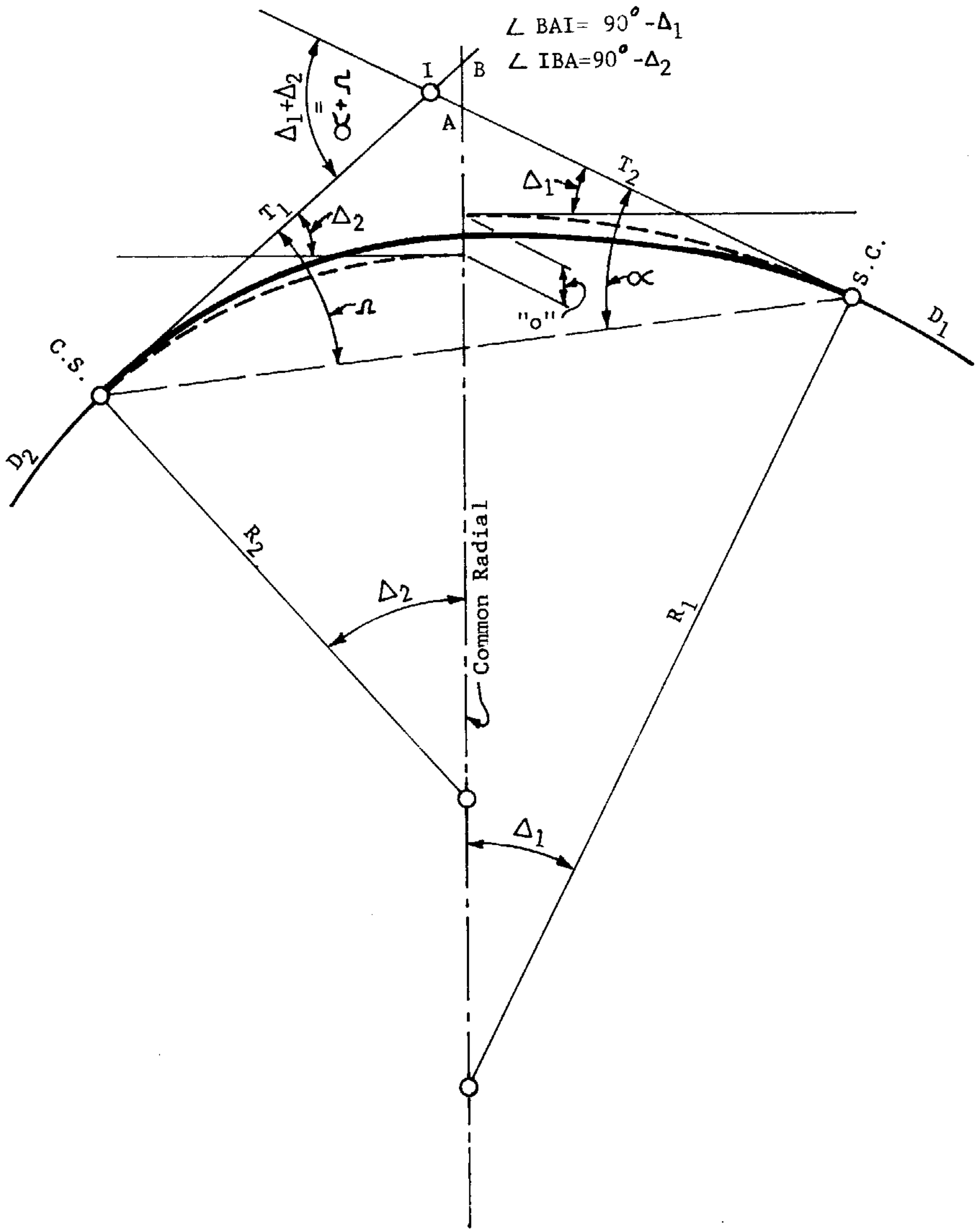
Ω(degrees)$=\frac{1}{2}aL_s(L_s-L_1)-1/6a(L_s-L_1)^2$
$=\frac{1}{2}D_2\left[\frac{D_2-D_1}{a}\right]-1/6a\left[\frac{D_2-D_1}{a}\right]^2$
$=\frac{1}{2}D_2(L_s-L_1)-\Theta$



<u>Example</u>:
Given: $D_1=2^\circ$, $D_2=3^\circ$ and design speed = 70 M.P.H.
Find: Length of partial spiral (L_s-L_1), Θ and Ω.

<u>Solution</u>:
From Drwg. No. D-6.10; L =3.5 and a=0 51'25"=0.857 .
$L_s-L_1=3-2/0.857=1.1669$
$L_1=2/0.857=2.3331$
$L_s=2.3331+1.1669=3.5$ (check).
$\alpha=\frac{1}{2}(0.857)(3.3331)(1.1669)+1/6(0.857)(1.1669)^2=1.3616=1^\circ\ 21'42''$.
$\Omega=\frac{1}{2}(0.857)(3.5)(1.1669)-1/6(0.857)\left[\frac{3-2}{0.857}\right]^2=1.5555=1^\circ\ 33'20''$

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV DATE 4/78
APPROVED FOR DISTRIBUTION	PARTIAL TRANSITION SPIRAL	PLAN NO. D-55.20



Intermediate Spiral Transition is basically the same as Partial Transition Spiral illustrated by Drwg. No. D-6.02.

Select L_s and a from Drwg. No. D-6.05 through Drwg. No. D-6.11 for design speed and $D=D_1-D_2$. These values are applied throughout the following formulae.

L_s(sta.)=$(D_2-D_1)/a$

a(degrees)=$(D_2-D_1)L_s$

D_p(sta.)=Degree of curvature at any point on spiral.
=D_2-(a)(distance in sta. from C.S. to point).
=D_1+(a)(distance in sta. from S.C. to point).

"o" (ft.)=$0.0727(D_2-D_1)\left(\frac{D_2-D_1}{a}\right)^2$

Ω (degrees)=$1/2\ D_2\left(\frac{D_2-D_1}{a}\right)-1/6\ a\left(\frac{D_2-D_1}{a}\right)^2$

α (degrees)=$1/2\ D_1\left(\frac{D_2-D_1}{a}\right)+1/6a\left(\frac{D_2-D_1}{a}\right)^2$

To calculate deflections and spiral distance to any point on spiral, substitute D_p for D_1 or D_2

Δ_1 = (degrees)=$D_1(L_s/2)$
Δ_2 = (degrees)=$D_2(L_s/2)$
AB=R_2 in feet (exsec. Δ_2)-R_1 in feet (exsec. Δ_1)-"O"
AI (ft.)=AB$\left[\frac{\cos\Delta_2}{\sin(\Delta_1+\Delta_2)}\right]$
BI(ft.)=AB$\left[\frac{\cos\Delta_1}{\sin(\Delta_1+\Delta_2)}\right]$
T_1(ft.)=R_1in feet $(\tan\Delta_1)$ + AI
T_2(ft.)=R_2in feet $(\tan\Delta_2)$ - BI

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	SPIRAL TRANSITION COMPOUND CURVES	PLAN NO. D-55.30

	V=30				V=40				V=50				V=60			
D	e	a	Lc	Ls	e	a	Lc	Ls	e	a	Lc	Ls	e	a	Lc	Ls
0-15	NC	-	0	0	NC	-	0	0	NC	-	0	0	NC	-	0	0
0-30	NC	-	0	0	NC	-	0	0	NC	-	0	0	RC	1/3	75	150
0-45	NC	-	0	0	NC	-	0	0	RC	1/2	50	150	.021	1/2	75	150
1-00	NC	-	0	0	RC	1	50	100	.020	2/3	50	150	.027	2/3	75	150
1-30	RC	1 1/2	50	100	.020	1 1/2	50	100	.028	1	50	150	.036	1	75	150
2-00	RC	2	50	100	.026	2.0	50	100	.035	1 1/3	50	150	.044	1	75	200
2-30	.020	2 1/2	50	100	.031	2 1/2	50	100	.040	1 2/3	50	150	.050	1 1/4	75	200
3-00	.023	3	50	100	.035	2 1/2	50	120	.044	2	50	150	.054	1 1/2	75	200
3-30	.026	3 1/2	50	100	.038	2 1/2	50	140	.048	2	50	175	.057	1 2/3	75	210
4-00	.029	4	50	100	.041	2 2/3	50	150	.051	2	50	200	.059	1 2/3	75	240
5-00	.034	5	50	100	.046	3 1/3	50	150	.056	2 1/2	50	200	.060	2	75	250
6-00	.038	6	50	100	.050	4	50	150	.059	3	50	200				
7-00	.041	7	50	100	.054	4 2/3	50	150	.060	3 1/2	50	200				
8-00	.043	8	50	100	.056	5	50	160								
9-00	.046	7 1/2	50	120	.058	5	50	180								
10-00	.048	6 2/3	50	150	.059	5	50	200								
11-00	.050	6 7/8	50	160	.060	5 1/2	50	200								
12-00	.052	7 1/2	50	160												
13-00	.053	8 1/8	50	160												
14-00	.055	8 3/4	50	160												
16-00	.058	10	50	160												
18-00	.059	10	50	180												
20-00	.060	10	50	200												
	D max. = 20°				D max. = 11°				D max. = 7°				D max. = 5°			

	V=65				V=70				V=80			
D	e	a	Lc	Ls	e	a	Lc	Ls	e	a	Lc	Ls
0-15	NC	-	0	0	NC	-	0	0	RC	1/8	100	200
0-30	RC	1/3	75	100	RC	1/3	75	150	.023	1/4	100	200
0-45	.023	1/2	75	150	.026	1/2	75	150	.033	1/3	100	225
1-00	.029	1/2	75	200	.033	1	75	200	.041	1/3	100	300
1-30	.040	3/4	75	200	.044	3/4	75	200	.053	1/2	100	300
2-00	.048	1	75	200	.052	1	75	200	.059	2/3	100	300
2-30	.053	1 1/4	75	200	.057	1	75	250	.060	2/3	100	375
3-00	.057	1 1/4	75	240	.060	1	75	300				
3-30	.059	1 1/4	75	280								
4-00	.060	1 1/3	75	300								
	D max. = 4°				D max. = 3°				D max. = 2° 30'			

Use spirals below heavy line, circular curves above.

NOTE: Tabular Lc and Ls values are for a 1 or 2 lane roadway with the axis of rotation at the construction ℄ or either edge.

For Lc and Ls values for other lane multiples and for super distribution data, see Std. D-6.02

Interpolate for values not shown.

Use judgment combined with local climatic information in the choice of a maximum superelevation for borderline roadway elevations.

a = Increase in degree of curvature per 100' of spiral
D = Degree of curvature
e = Superelevation in ft./ft.
Lc = Normal crown runoff in feet
Ls = Superelevation runoff in feet
NC = Maintain normal crown
RC = Remove adverse crown and superelevate to normal crown slope

For elevations over 6000'
Definite Snow & Ice Conditions
Max. Super. = 0.06 ft/ft.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	CURVATURE, SUPERELEVATION & SUPERELEVATION TRANSITION	PLAN NO. D-56.10

	V=30				V=40				V=50				V=60				V=65				V=70				V=80			
D	e	a	Lc	Ls	e	a	Lc	Ls	e	a	Lc	Ls	e	a	Lc	Ls	e	a	Lc	Ls	e	a	Lc	Ls	e	a	Lc	Ls
0-15	NC	-	0	0	NC	-	0	0	NC	-	0	0	NC	-	0	0	NC	-	0	0	NC	-	0	0	RC	1/4	100	200
0-30	NC	-	0	0	NC	-	0	0	NC	-	0	0	RC	1/3	75	150	RC	1/3	75	150	RC	1/3	75	150	.024	1/3	100	200
0-45	NC	-	0	0	NC	-	0	0	RC	1/2	50	150	.022	1/2	75	150	.025	1/2	75	150	.029	1/2	75	150	.036	1/3	100	225
1-00	NC	-	0	0	RC	1	50	100	.021	2/3	50	150	.029	2/3	75	150	.033	2/3	75	150	.038	2/3	75	150	.047	1/3	100	300
1-30	RC	1-1/2	50	100	.021	1-1/2	50	100	.030	1	50	150	.040	1	75	150	.046	1	75	150	.053	1	75	150	.065	1/2	100	300
2-00	RC	2	50	100	.027	2	50	100	.038	1-1/3	50	150	.051	1-1/3	75	150	.057	1	75	200	.065	1	75	200	.076	2/3	100	300
2-30	.021	2-1/2	50	100	.033	2-1/2	50	100	.046	1-2/3	50	150	.060	1-1/4	75	200	.066	1-1/4	75	200	.073	1	75	250	.080	2/3	100	375
3-00	.025	3	50	100	.038	2-1/2	50	120	.053	2	50	150	.067	1-1/2	75	200	.073	1-1/3	75	225	.078	1	75	300				
3-30	.028	3-1/2	50	100	.043	2-1/2	50	140	.058	2	50	175	.073	1-2/3	75	210	.077	1-1/4	75	280	.080	1	75	350				
4-00	.032	4	50	100	.047	3-1/3	50	140	.063	2	50	200	.077	1-2/3	75	240	.079	1-1/3	75	300								
5-00	.038	5	50	100	.055	3-1/3	50	150	.071	2-1/2	50	200	.080	1-2/3	75	300	.080	1-2/3	75	300								
6-00	.043	5	50	120	.061	3-3/4	50	160	.077	3	50	200																
7-00	.048	5	50	140	.067	4	50	175	.079	3-1/3	50	210																
8-00	.052	5-1/3	50	150	.071	4	50	200	.080	3-1/3	50	240																
9-00	.056	6	50	150	.075	4-1/2	50	200																				
10-00	.059	6-1/4	50	160	.077	5	50	200																				
11-00	.063	6-7/8	50	160	.079	5	50	220																				
12-00	.066	7-1/2	50	160	.080	5	50	240																				
13-00	.068	6-1/2	50	200																								
14-00	.070	7	50	200																								
16-00	.074	8	50	200																								
18-00	.077	9	50	200																								
20-00	.079	10	50	200																								
22-00	.080	10	50	220																								

V=30: D max. = 22°

V=40: D max. = 12°

V=50: D max. = 8°

V=60: D max. = 5°

V=65: D max. = 5°

V=70: D max. = 3°-30'

V=80: D max. = 2°-30'

Use spirals below heavy line, circular curves above.

NOTE: Tabular Lc and Ls values are for a 1 or 2 lane roadway with the axis of rotation at the construction ℄ or either edge.

For Lc and Ls values for other lane multiples and for super distribution data, see Std. D-6.02

Interpolate for values not shown.

Use judgment combined with local climatic information in the choice of a maximum superelevation for borderline roadway elevations.

a = Increase in degree of curvature per 100' of spiral
D = Degree of curvature
e = Superelevation in ft./ft.
Lc = Normal crown runoff in feet
Ls = Superelevation runoff in feet
NC = Maintain normal crown
RC = Remove adverse crown and superelevate to normal crown slope

For elevations from 4000' to 6000'
Possible Snow & Ice Conditions
Max. Super. - 0.08 ft/ft.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	CURVATURE, SUPERELEVATION & SUPERELEVATION TRANSITION	PLAN NO. D-56.20

V=30

D	e	a	Lc	Ls
0-15	NC	-	0	0
0-30	NC	-	0	0
0-45	NC	-	0	0
1-00	NC	-	0	0
1-30	RC	1 1/2	50	100
2-00	RC	2	50	100
2-30	.021	2-1/2	50	100
3-00	.025	3	50	100
3-30	.029	3-1/2	50	100
4-00	.033	4	50	100
5-00	.040	5	50	100
6-00	.046	5	50	120
7-00	.053	5	50	140
8-00	.059	5-1/3	50	150
9-00	.064	6	50	150
10-00	.068	6-1/4	50	160
11-00	.073	6-7/8	50	160
12-00	.077	7-1/2	50	160
13-00	.080	6-1/2	50	200
14-00	.083	7	50	200
16-00	.089	8	50	200
18-00	.093	9	50	200
20-00	.097	10	50	200
22-00	.099	10	50	220
24-00	.100	10	50	240
25-00	.100	10	50	250

D max. = 25°

V=40

D	e	a	Lc	Ls
0-15	NC	-	0	0
0-30	NC	-	0	0
0-45	NC	-	0	0
1-00	RC	1	50	100
1-30	.021	1-1/2	50	100
2-00	.028	2	50	100
2-30	.034	2-1/2	50	100
3-00	.040	2-1/2	50	120
3-30	.046	2-1/2	50	140
4-00	.051	3-1/3	50	140
5-00	.061	3-1/3	50	150
6-00	.070	3-3/4	50	160
7-00	.077	4	50	175
8-00	.084	4	50	200
9-00	.089	4-1/2	50	200
10-00	.093	5	50	200
11-00	.097	5	50	220
12-00	.099	5	50	240
13-00	.100	5	50	260

D max. = 13°

V=50

D	e	a	Lc	Ls
0-15	NC	-	0	0
0-30	NC	-	0	0
0-45	RC	1/2	50	150
1-00	.023	2/3	50	150
1-30	.033	1	50	150
2-00	.042	1-1/3	50	150
2-30	.051	1-2/3	50	150
3-00	.059	2	50	150
3-30	.067	2	50	175
4-00	.073	2	50	200
5-00	.084	2-1/2	50	200
6-00	.092	2-1/2	50	240
7-00	.098	2-1/2	50	280
8-00	.100	2-1/2	50	320

D max. = 8°

V=60

D	e	a	Lc	Ls
0-15	NC	-	0	0
0-30	RC	1/2	75	150
0-45	.024	2/3	75	150
1-00	.032	2/3	75	150
1-30	.046	1	75	150
2-00	.058	1-1/4	75	160
2-30	.069	1-1/4	75	200
3-00	.079	1-1/2	75	200
3-30	.087	1-1/4	75	280
4-00	.093	1-1/3	75	300
5-00	.099	1-2/3	75	300
6-00	.100	1-2/3	75	360

D max. = 6°

V=65

D	e	a	Lc	Ls
0-15	NC	-	0	0
0-30	RC	1/3	75	150
0-45	.027	1/2	75	150
1-00	.035	2/3	75	150
1-30	.052	1	75	150
2-00	.066	1	75	200
2-30	.077	1	75	250
3-00	.087	1	75	300
3-30	.093	1	75	350
4-00	.098	1	75	400
5-00	.100	1	75	500

D max. = 5°

V=70

D	e	a	Lc	Ls
0-15	NC	-	0	0
0-30	RC	1/3	75	150
0-45	.029	1/2	75	150
1-00	.039	2/3	75	150
1-30	.058	3/4	75	200
2-00	.074	1	75	200
2-30	.086	1	75	250
3-00	.094	1	75	300
3-30	.099	2/3	75	375
4-00	.100	1	75	400

D max. = 4°

V=80

D	e	a	Lc	Ls
0-15	RC	1/4	100	200
0-30	.024	1/3	100	200
0-45	.036	1/3	100	225
1-00	.048	1/3	100	300
1-30	.071	1/2	100	300
2-00	.089	2/3	100	300
2-30	.099	2/3	100	375
3-00	.100	2/3	100	450

D max. = 3°

Use spirals below heavy line, circular curves above.

NOTE: Tabular Lc and Ls values are for a 1 or 2 lane roadway with the axis of rotation at the construction ℄ or either edge.

For Lc and Ls values for other lane multiples and for super distribution data, see Std. D-6.02

Interpolate for values not shown.

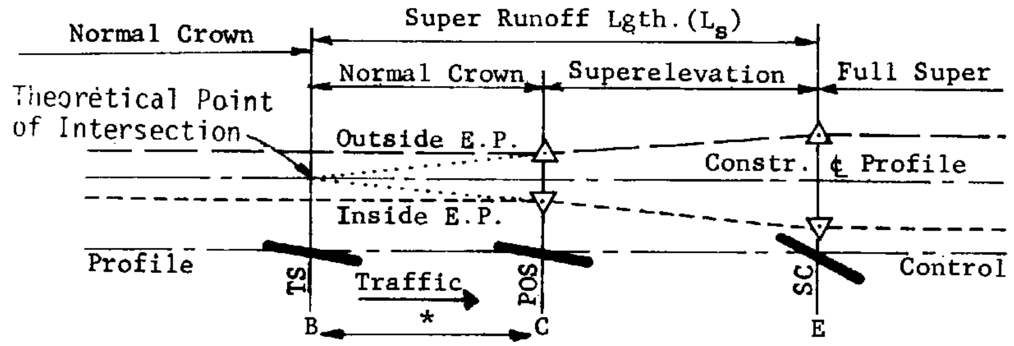
Use judgment combined with local climatic information in the choice of a maximum superelevation for borderline roadway elevations.

a = Increase in degree of curvature per 100' of spiral
D = Degree of curvature
e = Superelevation in ft./ft.
Lc = Normal crown runoff in feet
Ls = Superelevation runoff in feet
NC = Maintain normal crown
RC = Remove adverse crown and superelevate to normal crown slope

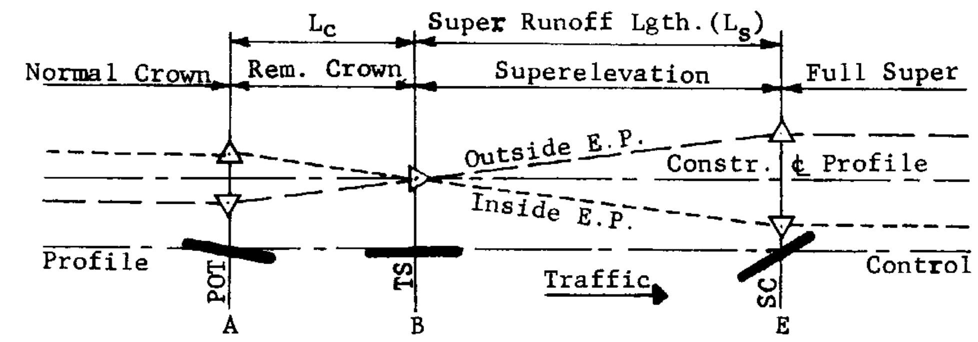
For elevations under 4000'

No Snow & Ice Conditions
Max. Super. = 0.10 ft/ft.

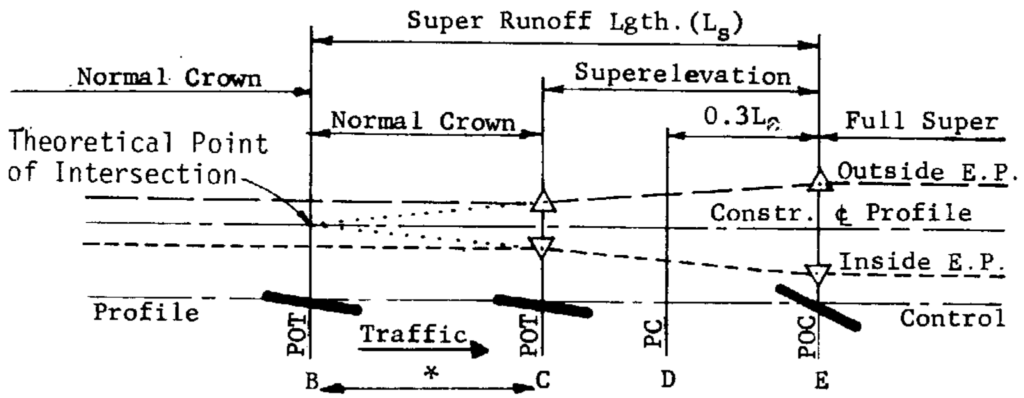
DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	CURVATURE, SUPERELEVATION & SUPERELEVATION TRANSITION	PLAN NO. D-56.30



Spiral Curve Transition

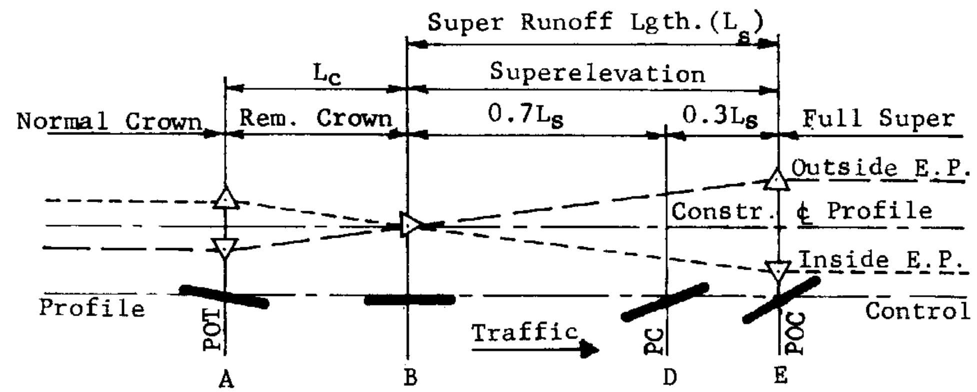


Spiral Curve Transition



Circular Curve Transition

1-WAY RDWY. AXIS OF ROTATION AT CONSTR. ¢
HIGH POINT OF NORMAL CROWN ON OUTSIDE OF CURVE
RIGHT TURNING ROADWAY



Circular Curve Transition

1-WAY RDWY. AXIS OF ROTATION AT CONSTR. ¢
HIGH POINT OF NORMAL CROWN ON INSIDE OF CURVE
LEFT TURNING ROADWAY

A is point at which adverse crown removal begins.
B is point at which superelevation transition begins.
C is point of equality between superelevation and normal crown.
D is P.C. location for circular curve transition.
E is the point at which full superelevation is reached.

GENERAL NOTES

Round edge profile intersections with vertical curves having length in feet equal to V in m.p.h.

For main roadway curves without spirals, L_c and L_s are the same as for spiraled curves but with 0.7 L_s on tangent and 0.3 L_s on curve.

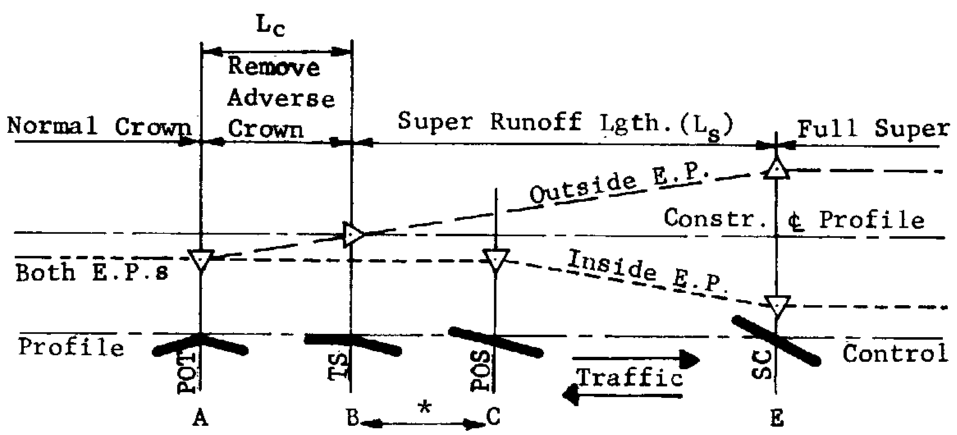
For other single axis main roadway widths, modify Std. D-6.04 and D-6.05 tabular L_c and L_s values as follows:

3-lanes, increase 20% to nearest 25'.
4-lanes, " 50% " " " .
6-lanes, " 100% " " " .

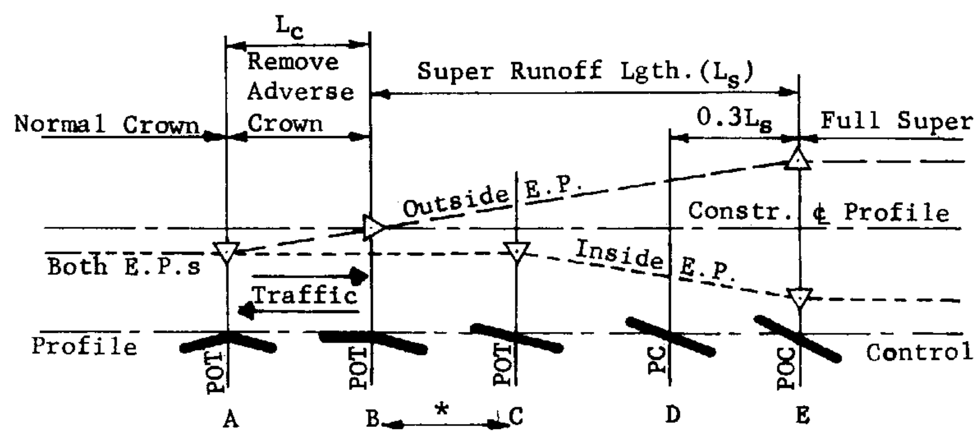
For ramps, reduce Std. D-6.04, D-6.05 and D-6.06 L_c and L_s values by 30% to nearest 10'

For modified values, compute spiral variables using Std. D-6.01 formulae.

*Distance BC = $(NC)(L_s)/e$



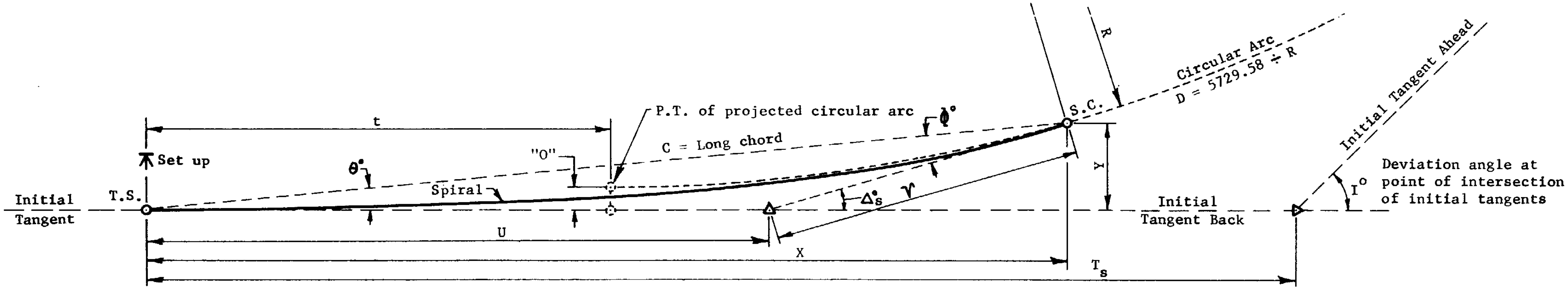
Spiral Curve Transition



Circular Curve Transition

2-WAY RDWY. AXIS OF ROTATION AT ¢
(FOR OPPOSITE DEFLECTING CURVE, E.P. PROFILES ARE REVERSED)

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE
APPROVED FOR DISTRIBUTION	SUPERELEVATION DISTRIBUTION	4-78
		PLAN NO. D-56.40



L_s	D	R	"O"	t	Δ°_s	θ°	ϕ°	ν	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0- 1-53	183346.49	0.00	12.50	0- 0-14	0- 0- 5	0- 0- 9	8.33	16.67	25.00	25.00	0.00
50	0- 3-45	91673.25	0.00	25.00	0- 0-56	0- 0-19	0- 0-37	16.67	33.33	50.00	50.00	0.00
75	0- 5-38	61115.50	0.00	37.50	0- 2- 7	0- 0-42	0- 1-24	25.00	50.00	75.00	75.00	0.02
100	0- 7-30	45836.62	0.01	50.00	0- 3-45	0- 1-15	0- 2-30	33.33	66.67	100.00	100.00	0.04
125	0- 9-23	36669.30	0.02	62.50	0- 5-52	0- 1-57	0- 3-54	41.67	83.33	125.00	125.00	0.07
150	0-11-15	30557.75	0.03	75.00	0- 8-26	0- 2-49	0- 5-38	50.00	100.00	150.00	150.00	0.12
175	0-13- 8	26192.36	0.05	87.50	0-11-29	0- 3-50	0- 7-39	58.33	116.67	175.00	175.00	0.19
200	0-15- 0	22918.31	0.07	100.00	0-15- 0	0- 5- 0	0-10- 0	66.67	133.33	200.00	200.00	0.29

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED

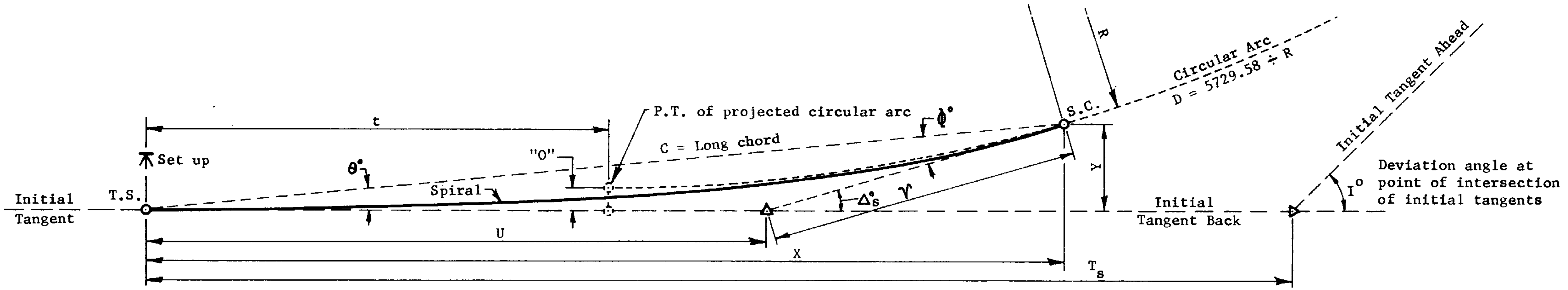
APPROVED FOR DISTRIBUTION

ARIZONA
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD PLANS

REV. DATE 4/78

TRANSITION SPIRAL TABLE FOR a=1/8

PLAN NO. D-57.05



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0- 3-45	91673.25	0.00	12.50	0- 0-28	0- 0- 9	0- 0-19	8.33	16.67	25.00	25.00	0.00
50	0- 7-30	45836.62	0.00	25.00	0- 1-53	0- 0-38	0- 1-15	16.67	33.33	50.00	50.00	0.01
75	0-11-15	30557.75	0.01	37.50	0- 4-13	0- 1-24	0- 2-49	25.00	50.00	75.00	75.00	0.03
100	0-15- 0	22918.31	0.02	50.00	0- 7-30	0- 2-30	0- 5- 0	33.33	66.67	100.00	100.00	0.07
125	0-18-45	18334.65	0.04	62.50	0-11-43	0- 3-54	0- 7-49	41.67	83.33	125.00	125.00	0.14
150	0-22-30	15278.87	0.06	75.00	0-16-53	0- 5-38	0-11-15	50.00	100.00	150.00	150.00	0.25

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

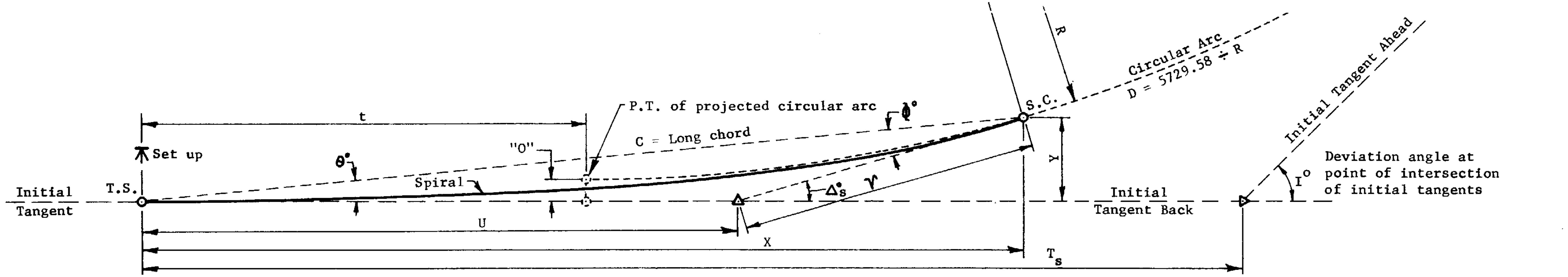
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION TABLE FOR a=1/4	PLAN NO. D-57.10



L_s	D	R	"O"	t	Δ°_s	θ°	ϕ°	ν	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0- 5- 0	68754.94	0.00	12.50	0- 0-37	0- 0-12	0- 0-25	8.33	16.67	25.00	25.00	0.00
50	0-10- 0	34377.47	0.00	25.00	0- 2-30	0- 0-50	0- 1-40	16.67	33.33	50.00	50.00	0.01
75	0-15- 0	22918.31	0.01	37.50	0- 5-37	0- 1-52	0- 3-45	25.00	50.00	75.00	75.00	0.04
100	0-20- 0	17188.73	0.02	50.00	0-10- 0	0- 3-20	0- 6-40	33.33	66.67	100.00	100.00	0.10
125	0-25- 0	13750.99	0.05	62.50	0-15-37	0- 5-12	0-10-25	41.67	83.33	125.00	125.00	0.19
150	0-30- 0	11459.16	0.08	75.00	0-22-30	0- 7-30	0-15- 0	50.00	100.00	150.00	150.00	0.33
175	0-35- 0	9822.13	0.13	87.50	0-30-37	0-10-12	0-20-25	58.33	116.67	175.00	175.00	0.52
200	0-40- 0	8594.37	0.19	100.00	0-40- 0	0-13-20	0-26-40	66.67	133.33	200.00	200.00	0.78
225	0-45- 0	7639.44	0.28	112.50	0-50-37	0-16-52	0-33-45	75.00	150.00	225.00	225.00	1.10
250	0-50- 0	6875.49	0.38	125.00	1- 2-30	0-20-50	0-41-40	83.34	166.67	250.00	249.99	1.52
275	0-55- 0	6250.45	0.50	137.50	1-15-37	0-25-12	0-50-25	91.67	183.34	274.99	274.99	2.02
300	1- 0- 0	5729.58	0.65	150.00	1-30- 0	0-30- 0	1- 0- 0	100.01	200.01	299.99	299.98	2.62
325	1- 5- 0	5288.84	0.83	162.49	1-45-37	0-35-12	1-10-25	108.34	216.68	324.99	324.97	3.33
350	1-10- 0	4911.07	1.04	174.99	2- 2-30	0-40-50	1-21-40	116.68	233.35	349.98	349.96	4.16
375	1-15- 0	4583.66	1.28	187.49	2-20-37	0-46-52	1-33-45	125.02	250.02	374.97	374.94	5.11
400	1-20- 0	4297.18	1.55	199.99	2-40- 0	0-53-20	1-46-40	133.36	266.69	399.96	399.91	6.20
425	1-25- 0	4044.41	1.86	212.48	3- 0-37	1- 0-12	2- 0-25	141.71	283.37	424.95	424.88	7.44
450	1-30- 0	3819.72	2.21	224.97	3-22-30	1- 7-30	2-15- 0	150.05	300.05	449.93	449.84	8.83
475	1-35- 0	3618.68	2.60	237.47	3-45-37	1-15-12	2-30-25	158.40	316.73	474.91	474.80	10.39
500	1-40- 0	3437.75	3.03	249.96	4-10- 0	1-23-20	2-46-40	166.76	333.42	499.88	499.74	12.12
525	1-45- 0	3274.04	3.51	262.44	4-35-37	1-31-52	3- 3-45	175.12	350.11	524.85	524.66	14.03
550	1-50- 0	3125.22	4.03	274.93	5- 2-30	1-40-50	3-21-40	183.48	366.80	549.81	549.57	16.12
575	1-55- 0	2989.35	4.61	287.41	5-30-37	1-50-12	3-40-25	191.85	383.50	574.76	574.47	18.42
600	2- 0- 0	2864.79	5.23	299.89	6- 0- 0	2- 0- 0	4- 0- 0	200.23	400.21	599.71	599.34	20.93

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

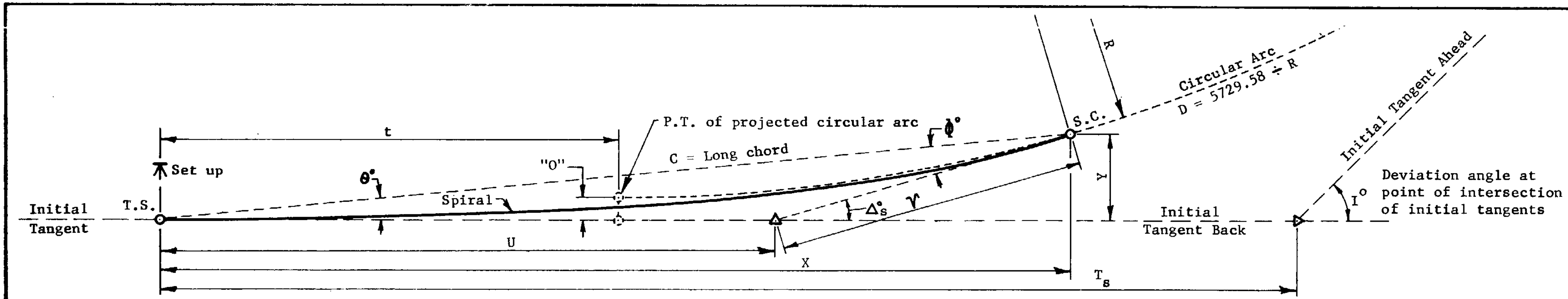
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=1/3	PLAN NO. D-57.12



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	ν	U	C	X	Y
C0	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0- 7-30	45836.62	0.00	12.50	0- 0-56	0- 0-19	0- 0-37	8.33	16.67	25.00	25.00	0.00
50	0-15- 0	22918.31	0.00	25.00	0- 3-45	0- 1-15	0- 2-30	16.67	33.33	50.00	50.00	0.02
75	0-22-30	15278.87	0.02	37.50	0- 8-26	0- 2-49	0- 5-38	25.00	50.00	75.00	75.00	0.06
100	0-30- 0	11459.16	0.04	50.00	0-15- 0	0- 5- 0	0-10- 0	33.33	66.67	100.00	100.00	0.15
125	0-37-30	9167.32	0.07	62.50	0-23-26	0- 7-49	0-15-37	41.67	83.33	125.00	125.00	0.28
150	0-45- 0	7639.44	0.12	75.0C	0-33-45	0-11-15	0-22-30	50.00	100.00	150.00	150.00	0.49
175	0-52-30	6548.09	0.19	87.50	0-45-56	0-15-19	0-30-37	58.33	116.67	175.00	175.00	0.78
200	1- 0- 0	5729.58	0.29	100.00	1- 0- 0	0-20- 0	0-40- 0	66.67	133.34	200.00	199.99	1.16
225	1- 7-30	5092.96	0.41	112.50	1-15-56	0-25-19	0-50-38	75.00	150.00	225.00	224.99	1.66
250	1-15- 0	4583.66	0.57	125.00	1-33-45	0-31-15	1- 2-30	83.34	166.67	249.99	249.98	2.27
275	1-22-30	4166.97	0.76	137.50	1-53-26	0-37-49	1-15-37	91.68	183.34	274.99	274.97	3.02
300	1-30- 0	3819.72	C.98	149.99	2-15- 0	0-45- 0	1-30- 0	100.02	200.01	299.98	299.95	3.93
325	1-37-30	3525.89	1.25	162.49	2-38-26	0-52-49	1-45-37	108.36	216.69	324.97	324.93	4.99
350	1-45- 0	3274.04	1.56	174.98	3- 3-45	1- 1-15	2- 2-30	116.70	233.37	349.96	349.90	6.23
375	1-52-30	3055.77	1.92	187.48	3-30-56	1-10-19	2-20-38	125.05	250.05	374.94	374.86	7.67
400	2- 0- 0	2864.79	2.33	199.97	4- 0- 0	1-20- 0	2-40- 0	133.40	266.73	399.91	399.80	9.31
425	2- 7-30	2696.27	2.79	212.46	4-30-56	1-30-19	3- 0-37	141.76	283.42	424.88	424.74	11.16
450	2-15- 0	2546.48	3.31	224.94	5- 3-45	1-41-15	3-22-30	150.12	300.11	449.84	449.65	13.25
475	2-22-30	2412.45	3.90	237.42	5-38-26	1-52-49	3-45-37	158.49	316.81	474.79	474.54	15.58
500	2-30- 0	2291.83	4.54	249.90	6-15- 0	2- 5- 0	4-10- 0	166.87	333.52	499.73	499.40	18.17

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

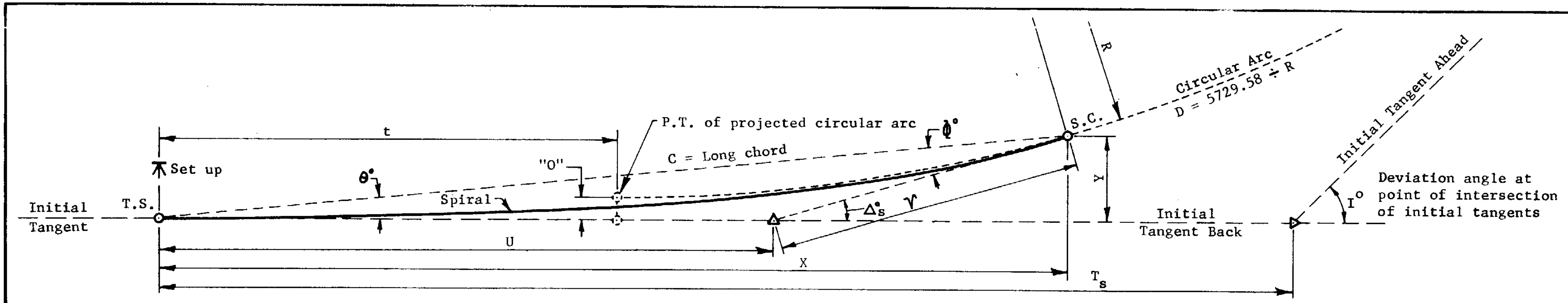
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=1/2	PLAN NO. D-57.15



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0-10- 0	34377.47	0.00	12.50	0- 1-15	0- 0-25	0- 0-50	8.33	16.67	25.00	25.00	0.00
50	0-20- 0	17188.73	0.01	25.00	0- 5- 0	0- 1-40	0- 3-20	16.67	33.33	50.00	50.00	0.02
75	0-30- 0	11459.16	0.02	37.50	0-11-15	0- 3-45	0- 7-30	25.00	50.00	75.00	75.00	0.08
100	0-40- 0	8594.37	0.05	50.00	0-20- 0	0- 6-40	0-13-20	33.33	66.67	100.00	100.00	0.19
125	0-50- 0	6875.49	0.09	62.50	0-31-15	0-10-25	0-20-50	41.67	83.33	125.00	125.00	0.38
150	1- 0- 0	5729.58	0.16	75.00	0-45- 0	0-15- 0	0-30- 0	50.00	100.00	150.00	150.00	0.65
175	1-10- 0	4911.07	0.26	87.50	1- 1-15	0-20-25	0-40-50	58.34	116.67	175.00	174.99	1.04
200	1-20- 0	4297.18	0.39	100.00	1-20- 0	0-26-40	0-53-20	66.67	133.34	200.00	199.99	1.55
225	1-30- 0	3819.72	0.55	112.50	1-41-15	0-33-45	1- 7-30	75.01	150.01	224.99	224.98	2.21
250	1-40- 0	3437.75	0.76	124.99	2- 5- 0	0-41-40	1-23-20	83.34	166.68	249.99	249.97	3.03
275	1-50- 0	3125.22	1.01	137.49	2-31-15	0-50-25	1-40-50	91.69	183.35	274.98	274.95	4.03
300	2- 0- 0	2864.79	1.31	149.99	3- 0- 0	1- 0- 0	2- 0- 0	100.03	200.03	299.96	299.92	5.24
325	2-10- 0	2644.42	1.66	162.48	3-31-15	1-10-25	2-20-50	108.38	216.71	324.95	324.88	6.66
350	2-20- 0	2455.53	2.08	174.97	4- 5- 0	1-21-40	2-43-20	116.73	233.39	349.92	349.82	8.31
375	2-30- 0	2291.83	2.56	187.46	4-41-15	1-33-45	3- 7-30	125.09	250.08	374.89	374.75	10.22
400	2-40- 0	2148.59	3.10	199.94	5-20- 0	1-46-40	3-33-20	133.45	266.78	399.85	399.65	12.40
425	2-50- 0	2022.20	3.72	212.42	6- 1-15	2- 0-25	4- 0-50	141.83	283.48	424.79	424.53	14.88
450	3- 0- 0	1909.86	4.42	224.90	6-45- 0	2-15- 0	4-30- 0	150.22	300.20	449.72	449.37	17.66
475	3-10- 0	1809.34	5.19	237.36	7-31-15	2-30-25	5- 0-50	158.62	316.93	474.63	474.18	20.76

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

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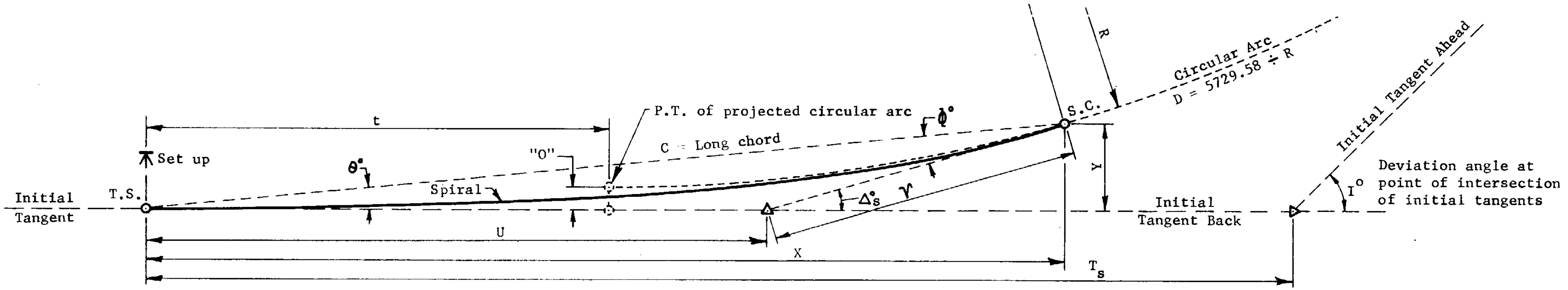
APPROVED FOR DISTRIBUTION

ARIZONA
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD PLANS

REV. DATE 4/78

TRANSITION SPIRAL TABLE
FOR a=2/3

PLAN NO. D-57.17



L_s	D	R	"O"	t	$\Delta_s°$	$\theta°$	$\phi°$	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0-11-15	30557.75	0.00	12.50	0- 1-24	0- 0-28	0- 0-56	8.33	16.67	25.00	25.00	0.00
50	0-22-30	15278.87	0.01	25.00	0- 5-38	0- 1-53	0- 3-45	16.67	33.33	50.00	50.00	0.03
75	0-33-45	10185.92	0.02	37.50	0-12-39	0- 4-13	0- 8-26	25.00	50.00	75.00	75.00	0.09
100	0-45- 0	7639.44	0.05	50.00	0-22-30	0- 7-30	0-15- 0	33.33	66.67	100.00	100.00	0.22
125	0-56-15	6111.55	0.11	62.50	0-35- 9	0-11-43	0-23-26	41.67	83.33	125.00	125.00	0.43
150	1- 7-30	5092.96	0.18	75.00	0-50-38	0-16-53	0-33-45	50.00	100.00	150.00	150.00	0.74
175	1-18-45	4365.39	0.29	87.50	1- 8-54	0-22-58	0-45-56	58.34	116.67	175.00	174.99	1.17
200	1-30- 0	3819.72	0.44	100.00	1-30- 0	0-30- 0	1- 0- 0	66.67	133.34	199.99	199.99	1.75

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

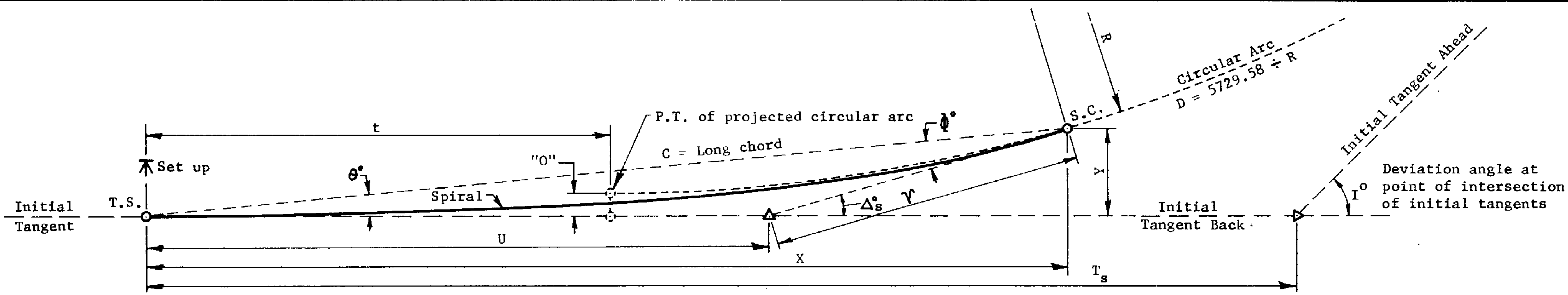
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=3/4	PLAN NO. D-57.20



L_s	D	R	"O"	t	$\Delta°_s$	$\theta°$	$\phi°$	γ	U	C	X	Y
00	00-00-00	CC.00	0.00	0.0C	0C-00-C0	00-00-00	00-00-C0	0.00	0.00	0.00	0.00	0.00
25	0-15- 0	22918.31	0.00	12.50	0- 1-53	0- 0-38	0- 1-15	8.33	16.67	25.00	25.00	0.00
5C	0-30- 0	11459.16	0.01	25.0C	0- 7-30	0- 2-30	0- 5- 0	16.67	33.33	50.00	50.C0	0.04
75	0-45- 0	7639.44	0.03	37.50	0-16-53	0- 5-38	0-11-15	25.00	50.00	75.00	75.00	0.12
100	1- 0- 0	5729.58	0.07	50.0C	0-30- 0	0-10- 0	0-20- 0	33.33	66.67	100.00	100.00	0.29
125	1-15- 0	4583.66	0.14	62.50	0-46-53	0-15-38	0-31-15	41.67	83.33	125.00	125.00	0.57
150	1-30- 0	3819.72	0.25	75.00	1- 7-30	0-22-3C	0-45- 0	50.0C	100.00	150.00	149.99	0.98
175	1-45- 0	3274.04	0.39	87.50	1-31-53	0-30-38	1- 1-15	58.34	116.67	174.99	174.99	1.56
200	2- 0- 0	2864.79	0.58	100.00	2- 0- 0	0-40- 0	1-20- 0	66.68	133.34	199.99	199.98	2.33
225	2-15- 0	2546.48	0.83	112.49	2-31-53	0-50-38	1-41-15	75.02	150.01	224.98	224.96	3.31
250	2-30- 0	2291.83	1.14	124.99	3- 7-30	1- 2-30	2- 5- 0	83.36	166.69	249.97	249.93	4.54
275	2-45- 0	2083.48	1.51	137.48	3-46-53	1-15-38	2-31-15	91.71	183.37	274.95	274.88	6.05
300	3- 0- 0	1909.86	1.96	149.97	4-30- 0	1-30- 0	3- 0- 0	100.06	200.06	299.92	299.81	7.85
325	3-15- 0	1762.95	2.50	162.45	5-16-53	1-45-38	3-31-15	108.43	216.76	324.88	324.72	9.98
350	3-30- 0	1637.02	3.12	174.93	6- 7-30	2- 2-30	4- 5- 0	116.80	233.46	349.82	349.60	12.46
375	3-45- 0	1527.89	3.83	187.41	7- 1-53	2-20-38	4-41-15	125.20	250.18	374.75	374.43	15.33
400	4- 0- 0	1432.39	4.65	199.87	8- 0- 0	2-40- 0	5-20- 0	133.60	266.92	399.65	399.22	18.59
425	4-15- 0	1348.14	5.58	212.32	9- 1-53	3- 0-38	6- 1-15	142.03	283.67	424.53	423.94	22.30

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

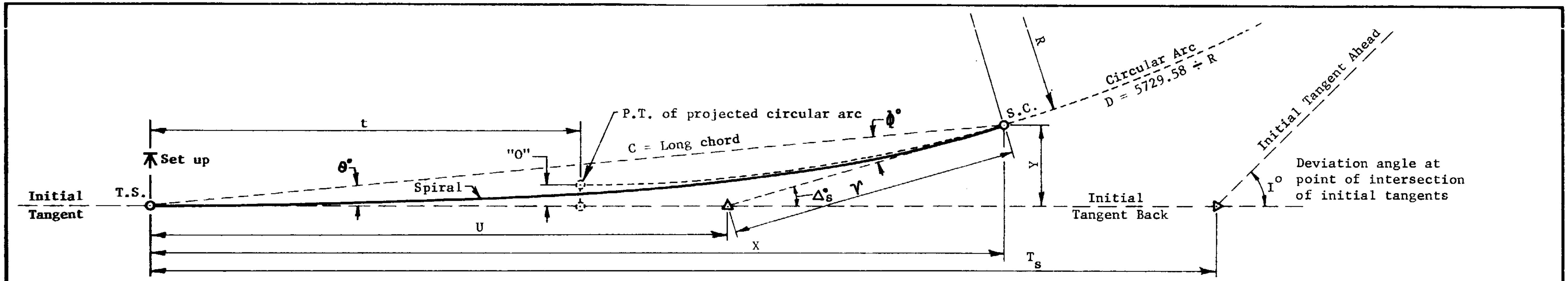
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=1	PLAN NO. D-57.22



Ls	D	R	"O"	t	Δ°s	θ°	Φ°	ν	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
10	0- 7-30	45836.62	0.00	5.00	0- 0-22	0- 0- 8	0- 0-15	3.33	6.67	10.00	10.00	0.00
20	0-15- 0	22918.31	0.00	10.00	0- 1-30	0- 0-30	0- 1- 0	6.67	13.33	20.00	20.00	0.00
30	0-22-30	15278.87	0.00	15.00	0- 3-22	0- 1- 8	0- 2-15	10.00	20.00	30.00	30.00	0.01
40	0-30- 0	11459.16	0.01	20.00	0- 6- 0	0- 2- 0	0- 4- 0	13.33	26.67	40.00	40.00	0.02
50	0-37-30	9167.32	0.01	25.00	0- 9-23	0- 3- 8	0- 6-15	16.67	33.33	50.00	50.00	0.05
60	0-45- 0	7639.44	0.02	30.00	0-13-30	0- 4-30	0- 9- 0	20.00	40.00	60.00	60.00	0.08
70	0-52-30	6548.09	0.03	35.00	0-18-22	0- 6- 8	0-12-15	23.33	46.67	70.00	70.00	0.12
80	1- 0- 0	5729.58	0.05	40.00	0-24- 0	0- 8- 0	0-16- 0	26.67	53.33	80.00	80.00	0.19
90	1- 7-30	5092.96	0.07	45.00	0-30-22	0-10- 8	0-20-15	30.00	60.00	90.00	90.00	0.27
100	1-15- 0	4583.66	0.09	50.00	0-37-30	0-12-30	0-25- 0	33.33	66.67	100.00	100.00	0.36
110	1-22-30	4166.97	0.12	55.00	0-45-22	0-15- 8	0-30-15	36.67	73.33	110.00	110.00	0.48
120	1-30- 0	3819.72	0.16	60.00	0-54- 0	0-18- 0	0-36- 0	40.00	80.00	120.00	120.00	0.63
130	1-37-30	3525.89	0.20	65.00	1- 3-22	0-21- 8	0-42-15	43.33	86.67	130.00	130.00	0.80
140	1-45- 0	3274.04	0.25	70.00	1-13-30	0-24-30	0-49- 0	46.67	93.34	140.00	139.99	1.00
150	1-52-30	3055.77	0.31	75.00	1-24-23	0-28- 8	0-56-15	50.00	100.00	150.00	149.99	1.23
160	2- 0- 0	2864.79	0.37	80.00	1-36- 0	0-32- 0	1- 4- 0	53.34	106.67	159.99	159.99	1.49
170	2- 7-30	2696.27	0.45	85.00	1-48-22	0-36- 8	1-12-15	56.67	113.34	169.99	169.98	1.79
180	2-15- 0	2546.48	0.53	90.00	2- 1-30	0-40-30	1-21- 0	60.01	120.01	179.99	179.98	2.12
190	2-22-30	2412.45	0.62	95.00	2-15-22	0-45- 8	1-30-15	63.34	126.68	189.99	189.97	2.49
200	2-30- 0	2291.83	0.73	99.99	2-30- 0	0-50- 0	1-40- 0	66.68	133.35	199.98	199.96	2.91
210	2-37-30	2182.70	0.84	104.99	2-45-22	0-55- 8	1-50-15	70.02	140.02	209.98	209.95	3.37
220	2-45- 0	2083.48	0.97	109.99	3- 1-30	1- 0-30	2- 1- 0	73.35	146.69	219.97	219.94	3.87
230	2-52-30	1992.90	1.11	114.99	3-18-22	1- 6- 8	2-12-15	76.69	153.36	229.97	229.92	4.42
240	3- 0- 0	1909.86	1.26	119.98	3-36- 0	1-12- 0	2-24- 0	80.03	160.03	239.96	239.91	5.03
250	3- 7-30	1833.46	1.42	124.98	3-54-23	1-18- 8	2-36-15	83.37	166.70	249.95	249.88	5.68
260	3-15- 0	1762.95	1.60	129.98	4-13-30	1-24-30	2-49- 0	86.72	173.38	259.94	259.86	6.39
270	3-22-30	1697.65	1.79	134.97	4-33-22	1-31- 8	3- 2-15	90.06	180.05	269.92	269.83	7.15
280	3-30- 0	1637.02	1.99	139.97	4-54- 0	1-38- 0	3-16- 0	93.40	186.73	279.91	279.79	7.98

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

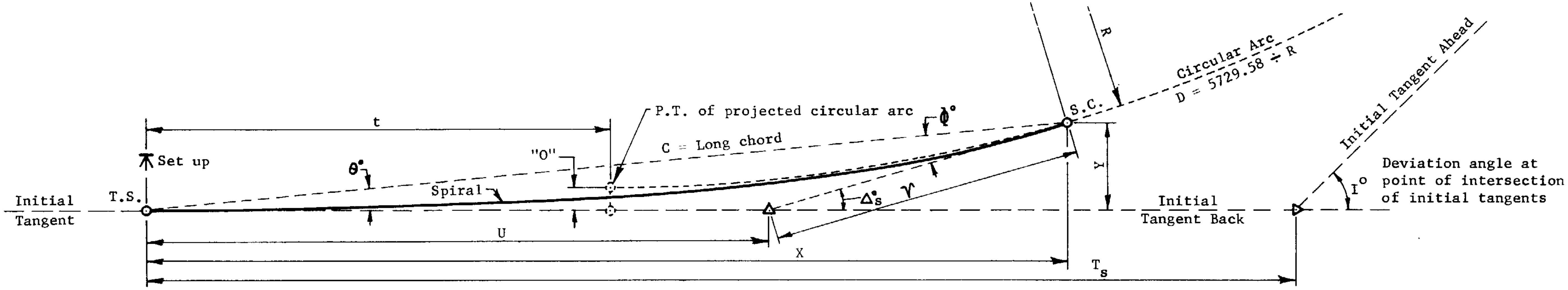
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=1-1/4	PLAN NO. D-57.25



L_s	D	R	"O"	t	Δ°_s	θ°	ϕ°	ν	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0-20- 0	17188.74	0.00	12.50	0- 2-30	0- 0-50	0- 1-40	8.33	16.67	25.00	25.00	0.01
50	0-40- 0	8594.37	0.01	25.00	0-10- 0	0- 3-20	0- 6-40	16.67	33.33	50.00	50.00	0.05
75	1- 0- 0	5729.58	0.04	37.50	0-22-30	0- 7-30	0-15- 0	25.00	50.00	75.00	75.00	0.16
100	1-20- 0	4297.18	0.10	50.00	0-40- 0	0-13-20	0-26-40	33.33	66.67	100.00	100.00	0.39
125	1-40- 0	3437.75	0.19	62.50	1- 2-30	0-20-50	0-41-40	41.67	83.33	125.00	125.00	0.76
150	2- 0- 0	2864.79	0.33	75.00	1-30- 0	0-30- 0	1- 0- 0	50.00	100.00	150.00	149.99	1.31
175	2-20- 0	2455.53	0.52	87.50	2- 2-30	0-40-50	1-21-40	58.34	116.67	174.99	174.98	2.08
200	2-40- 0	2148.59	0.78	99.99	2-40- 0	0-53-20	1-46-40	66.68	133.35	199.98	199.96	3.10
225	3- 0- 0	1909.86	1.10	112.49	3-22-30	1- 7-30	2-15- 0	75.03	150.02	224.97	224.92	4.42
250	3-20- 0	1718.87	1.51	124.98	4-10- 0	1-23-20	2-46-40	83.38	166.71	249.94	249.87	6.06
275	3-40- 0	1562.61	2.02	137.46	5- 2-30	1-40-50	3-21-40	91.74	183.40	274.90	274.79	8.06
300	4- 0- 0	1432.39	2.62	149.95	6- 0- 0	2- 0- 0	4- 0- 0	100.11	200.11	299.85	299.67	10.46
325	4-20- 0	1322.21	3.33	162.42	7- 2-30	2-20-50	4-41-40	108.50	216.82	324.78	324.51	13.30
350	4-40- 0	1227.77	4.16	174.88	8-10- 0	2-43-20	5-26-40	116.91	233.56	349.68	349.29	16.61
375	5- 0- 0	1145.92	5.11	187.33	9-22-30	3- 7-30	6-15- 0	125.35	250.32	374.55	373.99	20.42

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

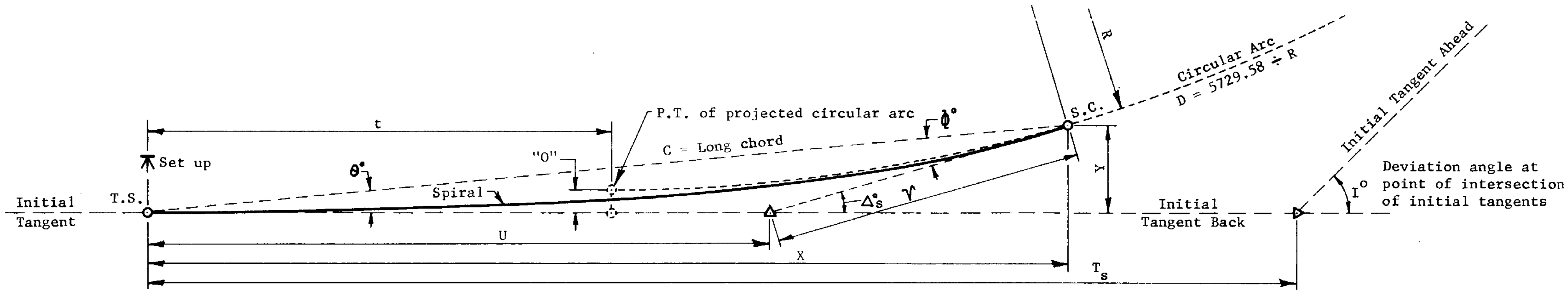
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=1-1/3	PLAN NO. D-57.27



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0-22-30	15278.87	0.00	12.50	0- 2-49	0- 0-56	0- 1-53	8.33	16.67	25.00	25.00	0.01
50	0-45- 0	7639.44	0.01	25.00	0-11-15	0- 3-45	0- 7-30	16.67	33.33	50.00	50.00	0.05
75	1- 7-30	5092.96	0.05	37.50	0-25-19	0- 8-26	0-16-53	25.00	50.00	75.00	75.00	0.18
100	1-30- 0	3819.72	0.11	50.00	0-45- 0	0-15- 0	0-30- 0	33.33	66.67	100.00	100.00	0.44
125	1-52-30	3055.77	0.21	62.50	1-10-19	0-23-26	0-46-53	41.67	83.34	125.00	124.99	0.85
150	2-15- 0	2546.48	0.37	75.00	1-41-15	0-33-45	1- 7-30	50.00	100.00	149.99	149.99	1.47
175	2-37-30	2182.70	0.58	87.50	2-17-49	0-45-56	1-31-53	58.34	116.68	174.99	174.97	2.34
200	3- 0- 0	1909.86	0.87	99.99	3- 0- 0	1- 0- 0	2- 0- 0	66.69	133.35	199.98	199.95	3.49

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

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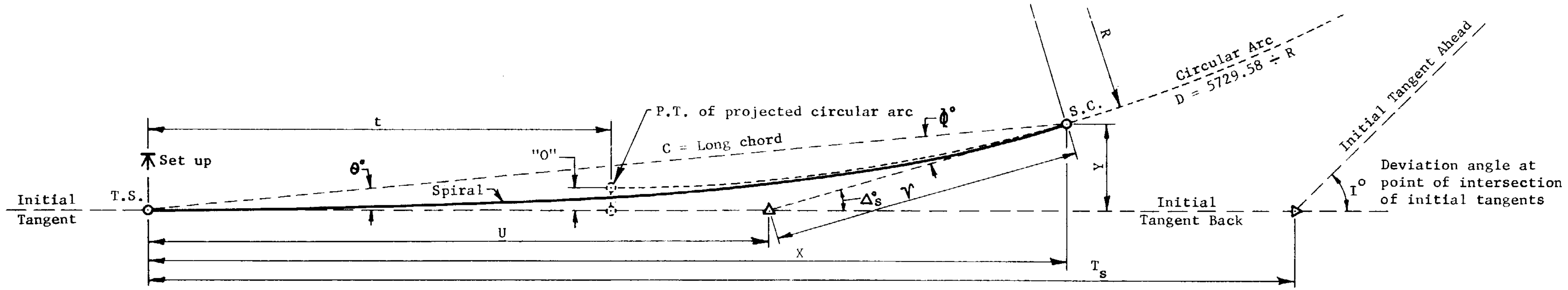
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD PLANS

REV. DATE 4/78

SPIRAL TRANSITION TABLE
FOR a=1-1/2

PLAN NO. D-57.30



L_s	D	R	"O"	t	Δ_s°	θ°	ϕ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
10	0-10- 0	34377.48	0.00	5.00	0- 0-30	0- 0-10	0- 0-20	3.33	6.67	10.00	10.00	0.00
20	0-20- 0	17188.74	0.00	10.00	0- 2- 0	0- 0-40	0- 1-20	6.67	13.33	20.00	20.00	0.00
30	0-30- 0	11459.16	0.00	15.00	0- 4-30	0- 1-30	0- 3- 0	10.00	20.00	30.00	30.00	0.01
40	0-40- 0	8594.37	0.01	20.00	0- 8- 0	0- 2-40	0- 5-20	13.33	26.67	40.00	40.00	0.03
50	0-50- 0	6875.50	0.02	25.00	0-12-30	0- 4-10	0- 8-20	16.67	33.33	50.00	50.00	0.06
60	1- 0- 0	5729.58	0.03	30.00	0-18- 0	0- 6- 0	0-12- 0	20.00	40.00	60.00	60.00	0.10
70	1-10- 0	4911.07	0.04	35.00	0-24-30	0- 8-10	0-16-20	23.33	46.67	70.00	70.00	0.17
80	1-20- 0	4297.19	0.06	40.00	0-32- 0	0-10-40	0-21-20	26.67	53.33	80.00	80.00	0.25
90	1-30- 0	3819.72	0.09	45.00	0-40-30	0-13-30	0-27- 0	30.00	60.00	90.00	90.00	0.35
100	1-40- 0	3437.75	0.12	50.00	0-50- 0	0-16-40	0-33-20	33.33	66.67	100.00	100.00	0.48
110	1-50- 0	3125.23	0.16	55.00	1- 0-30	0-20-10	0-40-20	36.67	73.33	110.00	110.00	0.65
120	2- 0- 0	2864.79	0.21	60.00	1-12- 0	0-24- 0	0-48- 0	40.00	80.00	120.00	119.99	0.84
130	2-10- 0	2644.42	0.27	65.00	1-24-30	0-28-10	0-56-20	43.34	86.67	130.00	129.99	1.07
140	2-20- 0	2455.53	0.33	70.00	1-38- 0	0-32-40	1- 5-20	46.67	93.34	139.99	139.99	1.33
150	2-30- 0	2291.83	0.41	75.00	1-52-30	0-37-30	1-15- 0	50.01	100.01	149.99	149.98	1.64
160	2-40- 0	2148.59	0.50	80.00	2- 8- 0	0-42-40	1-25-20	53.34	106.67	159.99	159.98	1.99
170	2-50- 0	2022.20	0.60	84.99	2-24-30	0-48-10	1-36-20	56.68	113.34	169.99	169.97	2.38
180	3- 0- 0	1909.86	0.71	89.99	2-42- 0	0-54- 0	1-48- 0	60.01	120.01	179.98	179.96	2.83
190	3-10- 0	1809.34	0.83	94.99	3- 0-30	1- 0-10	2- 0-20	63.35	126.68	189.98	189.95	3.32
200	3-20- 0	1718.87	0.97	99.99	3-20- 0	1- 6-40	2-13-20	66.69	133.35	199.97	199.93	3.88
210	3-30- 0	1637.02	1.12	104.99	3-40-30	1-13-30	2-27- 0	70.03	140.03	209.96	209.91	4.49
220	3-40- 0	1562.61	1.29	109.98	4- 2- 0	1-20-40	2-41-20	73.37	146.70	219.95	219.89	5.16
230	3-50- 0	1494.67	1.47	114.98	4-24-30	1-28-10	2-56-20	76.71	153.38	229.94	229.86	5.90
240	4- 0- 0	1432.40	1.68	119.97	4-48- 0	1-36- 0	3-12- 0	80.06	160.05	239.92	239.83	6.70
250	4-10- 0	1375.10	1.89	124.97	5-12-30	1-44-10	3-28-20	83.40	166.73	249.91	249.79	7.57
260	4-20- 0	1322.21	2.13	129.96	5-38- 0	1-52-40	3-45-20	86.75	173.41	259.89	259.75	8.52
270	4-30- 0	1273.24	2.38	134.95	6- 4-30	2- 1-30	4- 3- 0	90.10	180.10	269.86	269.70	9.54
280	4-40- 0	1227.77	2.66	139.94	6-32- 0	2-10-40	4-21-20	93.46	186.78	279.84	279.64	10.63
290	4-50- 0	1185.43	2.96	144.93	7- 0-30	2-20-10	4-40-20	96.82	193.47	289.81	289.57	11.81
300	5- 0- 0	1145.92	3.27	149.91	7-30- 0	2-30- 0	5- 0- 0	100.18	200.16	299.77	299.49	13.08
310	5-10- 0	1108.95	3.61	154.90	8- 0-30	2-40-10	5-20-20	103.54	206.86	309.73	309.39	14.43
320	5-20- 0	1074.30	3.97	159.88	8-32- 0	2-50-40	5-41-20	106.91	213.56	319.68	319.29	15.86
330	5-30- 0	1041.74	4.35	164.86	9- 4-30	3- 1-30	6- 3- 0	110.29	220.27	329.63	329.17	17.40
340	5-40- 0	1011.10	4.76	169.84	9-38- 0	3-12-40	6-25-20	113.67	226.97	339.57	339.04	19.02
350	5-50- 0	982.21	5.20	174.81	10-12-30	3-24-10	6-48-20	117.05	233.69	349.50	348.89	20.74
360	6- 0- 0	954.93	5.65	179.79	10-48- 0	3-36- 0	7-12- 0	120.44	240.41	359.43	358.72	22.57

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

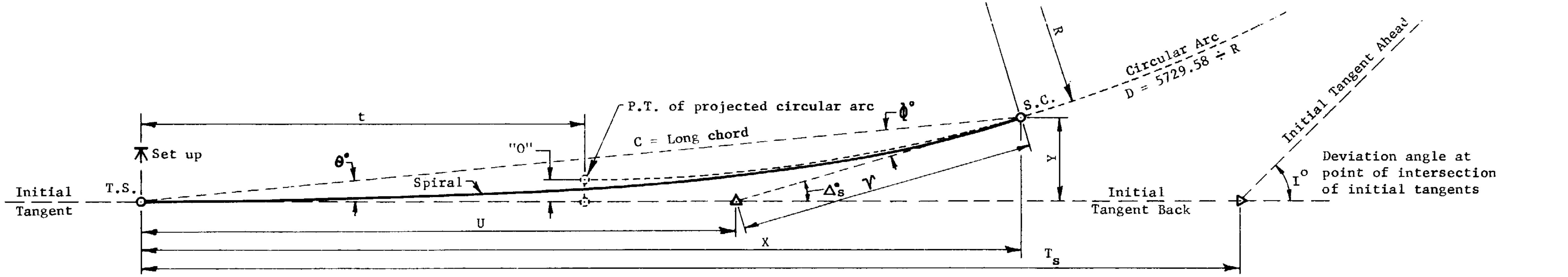
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV DATE 4/78
APPROVED FOR DISTRIBUTION	SPIRAL TRANSITION TABLE FOR a=1-2/3	PLAN NO. D-57.32



L_s	D	R	"O"	t	$\Delta_s°$	$\theta°$	$\phi°$	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0-30- 0	11459.16	0.00	12.50	0- 3-45	0- 1-15	0- 2-30	8.33	16.67	25.00	25.00	0.01
50	1- 0- 0	5729.58	0.02	25.00	0-15- 0	0- 5- 0	0-10- 0	16.67	33.33	50.00	50.00	0.07
75	1-30- 0	3819.72	0.06	37.50	0-33-45	0-11-15	0-22-30	25.00	50.00	75.00	75.00	0.25
100	2- 0- 0	2864.79	0.15	50.00	1- 0- 0	0-20- 0	0-40- 0	33.33	66.67	100.00	100.00	0.58
125	2-30- 0	2291.83	0.28	62.50	1-33-45	0-31-15	1- 2-30	41.67	83.34	125.00	124.99	1.14
150	3- 0- 0	1909.86	0.49	75.00	2-15- 0	0-45- 0	1-30- 0	50.01	100.01	149.99	149.98	1.96
175	3-30- 0	1637.02	0.78	87.49	3- 3-45	1- 1-15	2- 2-30	58.35	116.68	174.98	174.95	3.12
200	4- 0- 0	1432.39	1.16	99.98	4- 0- 0	1-20- 0	2-40- 0	66.70	133.36	199.96	199.90	4.65
225	4-30- 0	1273.24	1.66	112.47	5- 3-45	1-41-15	3-22-30	75.06	150.06	224.92	224.82	6.62
250	5- 0- 0	1145.92	2.27	124.95	6-15- 0	2- 5- 0	4-10- 0	83.44	166.76	249.87	249.70	9.08
275	5-30- 0	1041.74	3.02	137.42	7-33-45	2-31-15	5- 2-30	91.83	183.49	274.79	274.52	12.09
300	6- 0- 0	954.93	3.93	149.88	9- 0- 0	3- 0- 0	6- 0- 0	100.26	200.24	299.67	299.26	15.68
325	6-30- 0	881.47	4.99	162.32	10-33-45	3-31-15	7- 2-30	108.72	217.02	324.51	323.89	19.93
350	7- 0- 0	818.51	6.23	174.73	12-15- 0	4- 5- 0	8-10- 0	117.22	233.85	349.29	348.40	24.87
375	7-30- 0	763.94	7.67	187.12	14- 3-45	4-41-15	9-22-30	125.78	250.73	373.99	372.74	30.56

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

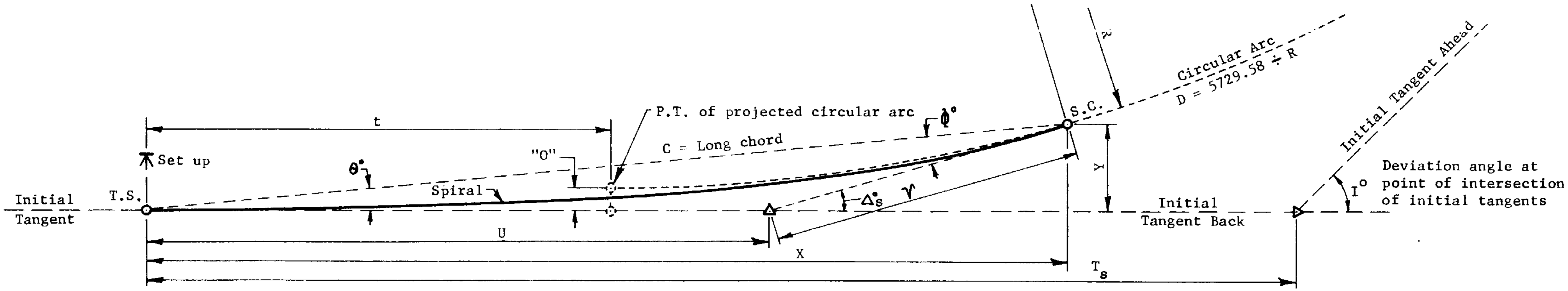
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV DATE 4/78
APPROVED FOR DISTRIBUTION	SPIRAL TRANSITION TABLE FOR a=2	PLAN NO. D-57.35



L_s	D	R	"O"	t	Δ°_s	θ°	ϕ°	ν	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
10	0-15- 0	22918.31	0.00	5.00	0- 0-45	0- 0-15	0- 0-30	3.33	6.67	10.00	10.00	0.00
20	0-30- 0	11459.16	0.00	10.00	0- 3- 0	0- 1- 0	0- 2- 0	6.67	13.33	20.00	20.00	0.01
30	0-45- 0	7639.44	0.00	15.00	0- 6-45	0- 2-15	0- 4-30	10.00	20.00	30.00	30.00	0.02
40	1- 0- 0	5729.58	0.01	20.00	0-12- 0	0- 4- 0	0- 8- 0	13.33	26.67	40.00	40.00	0.05
50	1-15- 0	4583.66	0.02	25.00	0-18-45	0- 6-15	0-12-30	16.67	33.33	50.00	50.00	0.09
60	1-30- 0	3819.72	0.04	30.00	0-27- 0	0- 9- 0	0-18- 0	20.00	40.00	60.00	60.00	0.16
70	1-45- 0	3274.04	0.06	35.00	0-36-45	0-12-15	0-24-30	23.33	46.67	70.00	70.00	0.25
80	2- 0- 0	2864.79	0.09	40.00	0-48- 0	0-16- 0	0-32- 0	26.67	53.33	80.00	80.00	0.37
90	2-15- 0	2546.48	0.13	45.00	1- 0-45	0-20-15	0-40-30	30.00	60.00	90.00	90.00	0.53
100	2-30- 0	2291.83	0.18	50.00	1-15- 0	0-25- 0	0-50- 0	33.33	66.67	100.00	100.00	0.73
110	2-45- 0	2083.48	0.24	55.00	1-30-45	0-30-15	1- 0-30	36.67	73.34	110.00	109.99	0.97
120	3- 0- 0	1909.86	0.31	60.00	1-48- 0	0-36- 0	1-12- 0	40.00	80.00	119.99	119.99	1.26
130	3-15- 0	1762.95	0.40	65.00	2- 6-45	0-42-15	1-24-30	43.34	86.67	129.99	129.98	1.60
140	3-30- 0	1637.02	0.50	70.00	2-27- 0	0-49- 0	1-38- 0	46.68	93.34	139.99	139.97	2.00
150	3-45- 0	1527.89	0.61	74.99	2-48-45	0-56-15	1-52-30	50.01	100.01	149.98	149.96	2.45
160	4- 0- 0	1432.39	0.74	79.99	3-12- 0	1- 4- 0	2- 8- 0	53.35	106.68	159.98	159.95	2.98
170	4-15- 0	1348.14	0.89	84.99	3-36-45	1-12-15	2-24-30	56.69	113.35	169.97	169.93	3.57
180	4-30- 0	1273.24	1.06	89.99	4- 3- 0	1-21- 0	2-42- 0	60.03	120.03	179.96	179.91	4.24
190	4-45- 0	1206.23	1.25	94.98	4-30-45	1-30-15	3- 0-30	63.37	126.70	189.95	189.88	4.99
200	5- 0- 0	1145.92	1.45	99.97	5- 0- 0	1-40- 0	3-20- 0	66.72	133.38	199.93	199.85	5.81
210	5-15- 0	1091.35	1.68	104.97	5-30-45	1-50-15	3-40-30	70.07	140.06	209.91	209.81	6.73
220	5-30- 0	1041.74	1.94	109.96	6- 3- 0	2- 1- 0	4- 2- 0	73.42	146.75	219.89	219.75	7.74
230	5-45- 0	996.45	2.21	114.95	6-36-45	2-12-15	4-24-30	76.77	153.43	229.86	229.69	8.84
240	6- 0- 0	954.93	2.51	119.94	7-12- 0	2-24- 0	4-48- 0	80.13	160.12	239.83	239.62	10.04
250	6-15- 0	916.73	2.84	124.92	7-48-45	2-36-15	5-12-30	83.49	166.82	249.79	249.53	11.35
260	6-30- 0	881.47	3.19	129.91	8-27- 0	2-49- 0	5-38- 0	86.86	173.51	259.75	259.43	12.76
270	6-45- 0	848.83	3.58	134.89	9- 6-45	3- 2-15	6- 4-30	90.24	180.22	269.70	269.32	14.29
280	7- 0- 0	818.51	3.99	139.86	9-48- 0	3-16- 0	6-32- 0	93.62	186.93	279.63	279.18	15.93
290	7-15- 0	790.29	4.43	144.84	10-30-45	3-30-15	7- 0-30	97.00	193.65	289.56	289.02	17.70
300	7-30- 0	763.94	4.91	149.81	11-15- 0	3-45- 0	7-30- 0	100.40	200.37	299.48	298.84	19.59
310	7-45- 0	739.30	5.41	154.77	12- 0-45	4- 0-15	8- 0-30	103.81	207.10	309.39	308.64	21.60
320	8- 0- 0	716.20	5.96	159.73	12-48- 0	4-16- 0	8-32- 0	107.22	213.85	319.29	318.40	23.75
330	8-15- 0	694.49	6.53	164.69	13-36-45	4-32-15	9- 4-30	110.65	220.60	329.17	328.14	26.04
340	8-30- 0	674.07	7.14	169.64	14-27- 0	4-49- 0	9-38- 0	114.08	227.36	339.03	337.84	28.47
350	8-45- 0	654.81	7.79	174.58	15-18-45	5- 6-15	10-12-30	117.54	234.14	348.88	347.50	31.04
360	9- 0- 0	636.62	8.48	179.52	16-12- 0	5-24- 0	10-48- 0	121.00	240.93	358.72	357.12	33.76

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

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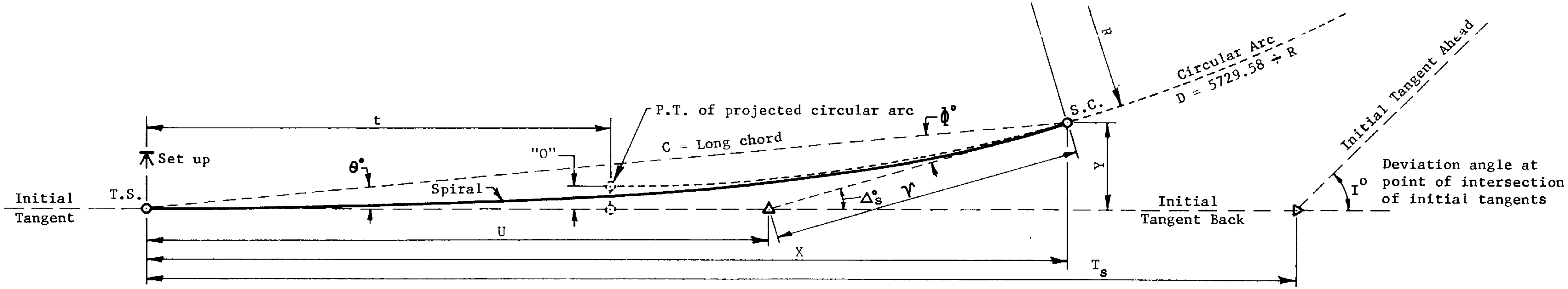
ARIZONA
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD PLANS

REV. DATE 4/78

SPIRAL TRANSITION TABLE
FOR a=2-1/2

PLAN NO. D-57.37



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0-40- 0	8594.37	0.00	12.50	0- 5- 0	0- 1-40	0- 3-20	8.33	16.67	25.00	25.00	0.01
50	1-20- 0	4297.18	0.02	25.00	0-20- 0	0- 6-40	0-13-20	16.67	33.33	50.00	50.00	0.10
75	2- 0- 0	2864.79	0.08	37.50	0-45- 0	0-15- 0	0-30- 0	25.00	50.00	75.00	75.00	0.33
100	2-40- 0	2148.59	0.19	50.00	1-20- 0	0-26-40	0-53-20	33.34	66.67	100.00	99.99	0.78
125	3-20- 0	1718.87	0.38	62.50	2- 5- 0	0-41-40	1-23-20	41.67	83.34	124.99	124.98	1.51
150	4- 0- 0	1432.39	0.65	74.99	3- 0- 0	1- 0- 0	2- 0- 0	50.01	100.01	149.98	149.96	2.62

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

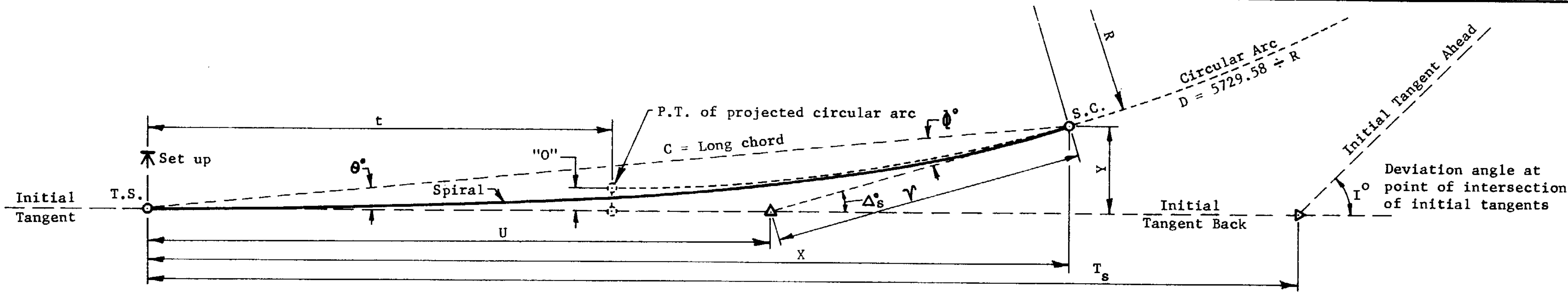
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	SPIRAL TRANSITION TABLE FOR a=2-2/3	PLAN NO. D-57.40



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0-45- 0	7639.44	0.00	12.50	0- 5-38	0- 1-53	0- 3-45	8.33	16.67	25.00	25.00	0.01
50	1-30- 0	3819.72	0.03	25.00	0-22-30	0- 7-30	0-15- 0	16.67	33.33	50.00	50.00	0.11
75	2-15- 0	2546.48	0.09	37.50	0-50-38	0-16-53	0-33-45	25.00	50.00	75.00	75.00	0.37
100	3- 0- 0	1909.86	0.22	50.00	1-30- 0	0-30- 0	1- 0- 0	33.34	66.67	100.00	99.99	0.87
125	3-45- 0	1527.89	0.43	62.50	2-20-38	0-46-53	1-33-45	41.67	83.34	124.99	124.98	1.70
150	4-30- 0	1273.24	0.74	74.99	3-22-30	1- 7-30	2-15- 0	50.02	100.02	149.98	149.95	2.94
175	5-15- 0	1091.35	1.17	87.48	4-35-38	1-31-53	3- 3-45	58.37	116.70	174.95	174.89	4.68
200	6- 0- 0	954.93	1.74	99.96	6- 0- 0	2- 0- 0	4- 0- 0	66.74	133.40	199.90	199.78	6.98

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

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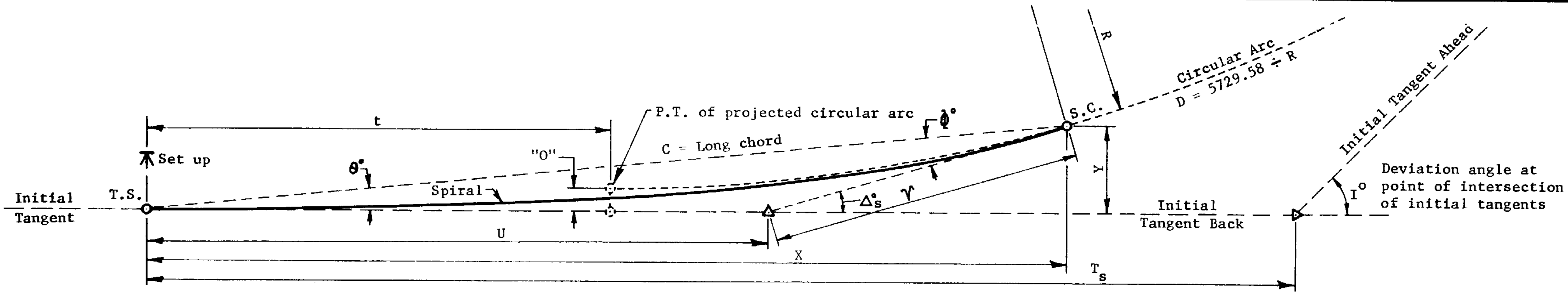
ARIZONA
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD PLANS

REV. DATE 4/78

SPIRAL TRANSITION TABLE
FOR a=3

PLAN NO. D-57.42



L_s	D	R	"O"	t	Δ°_s	θ°	ϕ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
10	0-20- 0	17188.74	0.00	5.00	0- 1- 0	0- 0-20	0- 0-40	3.33	6.67	10.00	10.00	0.00
20	0-40- 0	8594.37	0.00	10.00	0- 4- 0	0- 1-20	0- 2-40	6.67	13.33	20.00	20.00	0.01
30	1- 0- 0	5729.58	0.01	15.00	0- 9- 0	0- 3- 0	0- 6- 0	10.00	20.00	30.00	30.00	0.03
40	1-20- 0	4297.18	0.02	20.00	0-16- 0	0- 5-20	0-10-40	13.33	26.67	40.00	40.00	0.06
50	1-40- 0	3437.75	0.03	25.00	0-25- 0	0- 8-20	0-16-40	16.67	33.33	50.00	50.00	0.12
60	2- 0- 0	2864.79	0.05	30.00	0-36- 0	0-12- 0	0-24- 0	20.00	40.00	60.00	60.00	0.21
70	2-20- 0	2455.53	0.08	35.00	0-49- 0	0-16-20	0-32-40	23.33	46.67	70.00	70.00	0.33
80	2-40- 0	2148.59	0.12	40.00	1- 4- 0	0-21-20	0-42-40	26.67	53.33	80.00	80.00	0.50
90	3- 0- 0	1909.86	0.18	45.00	1-21- 0	0-27- 0	0-54- 0	30.00	60.00	90.00	89.99	0.71
100	3-20- 0	1718.87	0.24	50.00	1-40- 0	0-33-20	1- 6-40	33.34	66.67	100.00	99.99	0.97
110	3-40- 0	1562.61	0.32	55.00	2- 1- 0	0-40-20	1-20-40	36.67	73.34	109.99	109.99	1.29
120	4- 0- 0	1432.39	0.42	60.00	2-24- 0	0-48- 0	1-36- 0	40.01	80.01	119.99	119.98	1.68
130	4-20- 0	1322.21	0.53	64.99	2-49- 0	0-56-20	1-52-40	43.34	86.68	129.99	129.97	2.13
140	4-40- 0	1227.77	0.66	69.99	3-16- 0	1- 5-20	2-10-40	46.68	93.35	139.98	139.95	2.66
150	5- 0- 0	1145.92	0.82	74.99	3-45- 0	1-15- 0	2-30- 0	50.02	100.02	149.97	149.94	3.27
160	5-20- 0	1074.30	0.99	79.99	4-16- 0	1-25-20	2-50-40	53.36	106.70	159.96	159.91	3.97
170	5-40- 0	1011.10	1.19	84.98	4-49- 0	1-36-20	3-12-40	56.71	113.37	169.95	169.88	4.76
180	6- 0- 0	954.93	1.41	89.97	5-24- 0	1-48- 0	3-36- 0	60.06	120.05	179.93	179.84	5.65
190	6-20- 0	904.67	1.66	94.97	6- 1- 0	2- 0-20	4- 0-40	63.41	126.73	189.91	189.79	6.65
200	6-40- 0	859.44	1.94	99.95	6-40- 0	2-13-20	4-26-40	66.76	133.42	199.88	199.73	7.75
210	7- 0- 0	818.51	2.24	104.94	7-21- 0	2-27- 0	4-54- 0	70.12	140.11	209.85	209.65	8.97
220	7-20- 0	781.31	2.58	109.93	8- 4- 0	2-41-20	5-22-40	73.48	146.81	219.81	219.56	10.31
230	7-40- 0	747.34	2.95	114.91	8-49- 0	2-56-20	5-52-40	76.85	153.51	229.76	229.45	11.78
240	8- 0- 0	716.20	3.35	119.89	9-36- 0	3-12- 0	6-24- 0	80.23	160.22	239.70	239.33	13.38
250	8-20- 0	687.55	3.79	124.86	10-25- 0	3-28-20	6-56-40	83.62	166.93	249.63	249.17	15.12
260	8-40- 0	661.11	4.26	129.83	11-16- 0	3-45-20	7-30-40	87.01	173.66	259.55	258.99	17.00
270	9- 0- 0	636.62	4.77	134.80	12- 9- 0	4- 3- 0	8- 6- 0	90.42	180.39	269.46	268.79	19.03
280	9-20- 0	613.88	5.32	139.76	13- 4- 0	4-21-20	8-42-40	93.84	187.13	279.35	278.54	21.22
290	9-40- 0	592.72	5.91	144.71	14- 1- 0	4-40-20	9-20-40	97.27	193.89	289.23	288.26	23.56
300	10- 0- 0	572.96	6.54	149.66	15- 0- 0	5- 0- 0	10- 0- 0	100.71	200.66	299.08	297.94	26.07
310	10-20- 0	554.48	7.22	154.60	16- 1- 0	5-20-20	10-40-40	104.18	207.45	308.92	307.58	28.74
320	10-40- 0	537.15	7.94	159.53	17- 4- 0	5-41-20	11-22-40	107.65	214.25	318.73	317.16	31.59
330	11- 0- 0	520.87	8.71	164.45	18- 9- 0	6- 3- 0	12- 6- 0	111.15	221.07	328.52	326.69	34.62
340	11-20- 0	505.55	9.52	169.36	19-16- 0	6-25-20	12-50-40	114.67	227.91	338.28	336.16	37.84
350	11-40- 0	491.11	10.39	174.26	20-25- 0	6-48-20	13-36-40	118.22	234.77	348.02	345.56	41.24

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

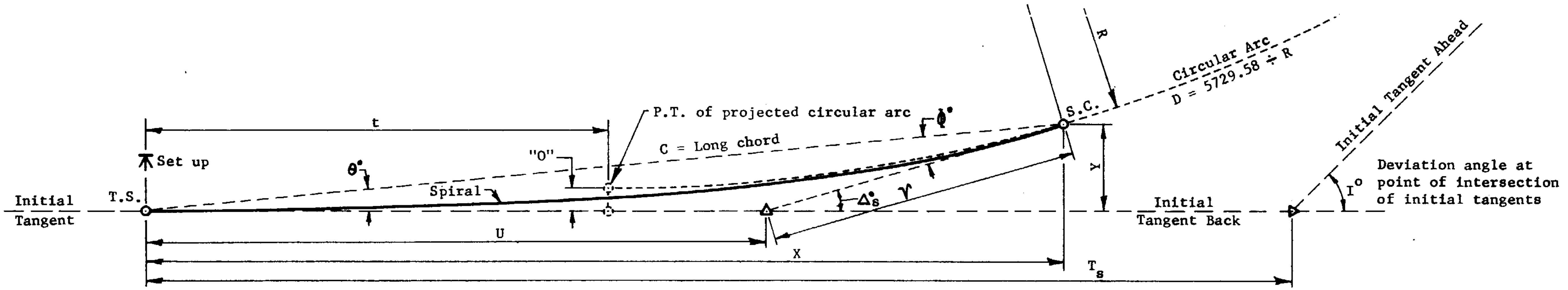
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	SPIRAL TRANSITION TABLE FOR a=3-1/3	PLAN NO. D-57.45



L_s	D	R	"O"	t	$\Delta_s°$	$\theta°$	$\phi°$	γ	U	C	X	Y
0C	00-00-00	00.00	0.00	0.00	00-00-C0	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0-52-30	6548.09	0.00	12.50	0- 6-34	0- 2-11	0- 4-22	8.33	16.67	25.00	25.00	0.02
50	1-45- 0	3274.04	0.03	25.0C	0-26-15	0- 8-45	0-17-30	16.67	33.33	5C.00	50.00	0.13
75	2-37-30	2182.70	0.11	37.50	0-59- 4	0-19-41	0-39-23	25.00	50.00	75.00	75.00	0.43
100	3-30- 0	1637.02	0.25	50.00	1-45- 0	0-35- 0	1-10- 0	33.34	66.67	100.00	99.99	1.02
125	4-22-30	1309.62	0.50	62.50	2-44- 4	0-54-41	1-49-22	41.68	83.34	124.99	124.97	1.99
150	5-15- 0	1091.35	0.86	74.99	3-56-15	1-18-45	2-37-30	50.02	100.02	149.97	149.93	3.44

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED

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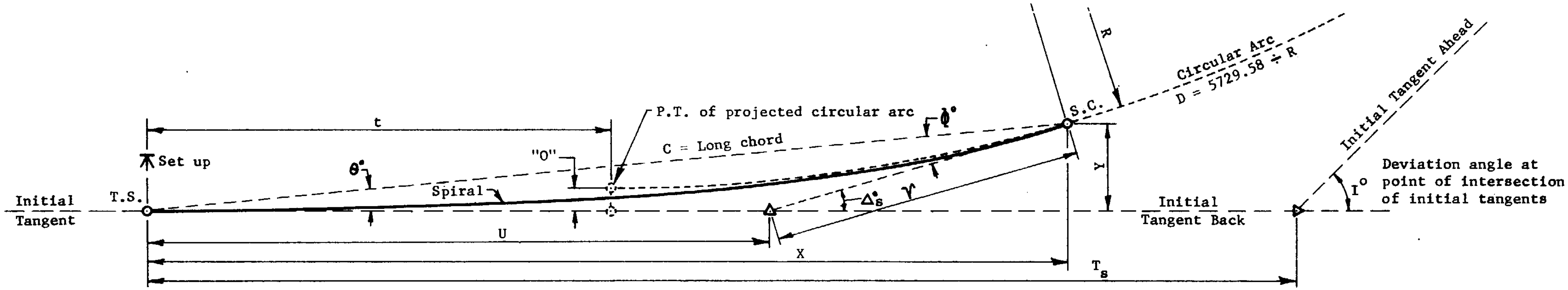
ARIZONA
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD PLANS

REV. DATE 4/78

SPIRAL TRANSITION TABLE
FOR a=3-1/2

PLAN NO. D-57.47



L_s	D	R	"O"	t	Δ_s°	θ°	ϕ°	γ	U	C	X	Y
0C	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	0-52-30	6548.09	0.00	12.50	0- 6-34	0- 2-11	0- 4-22	8.33	16.67	25.00	25.00	0.02
50	1-45- 0	3274.04	0.03	25.00	0-26-15	0- 8-45	0-17-30	16.67	33.33	50.00	50.00	0.13
75	2-37-30	2182.70	0.11	37.50	0-59- 4	0-19-41	0-39-23	25.00	50.00	75.00	75.00	0.43
100	3-30- 0	1637.02	0.25	50.00	1-45- 0	0-35- 0	1-10- 0	33.34	66.67	100.00	99.99	1.02
125	4-22-30	1309.62	0.50	62.50	2-44- 4	0-54-41	1-49-22	41.68	83.34	124.99	124.97	1.99
150	5-15- 0	1091.35	0.86	74.99	3-56-15	1-18-45	2-37-30	50.02	100.02	149.97	149.93	3.44

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

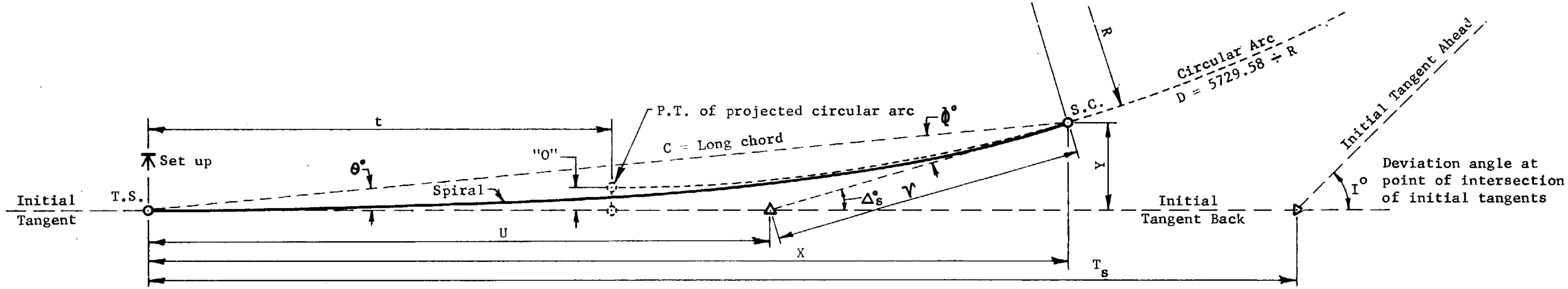
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	SPIRAL TRANSITION TABLE FOR a=3-1/2	PLAN NO. D-57.47



L_s	D	R	"O"	t	Δ°_s	θ°	ϕ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
10	0-22-30	15278.87	0.00	5.00	0- 1- 7	0- 0-23	0- 0-45	3.33	6.67	10.00	10.00	0.00
20	0-45- 0	7639.44	0.00	10.00	0- 4-30	0- 1-30	0- 3- 0	6.67	13.33	20.00	20.00	0.01
30	1- 7-30	5092.96	0.01	15.00	0-10- 7	0- 3-23	0- 6-45	10.00	20.00	30.00	30.00	0.03
40	1-30- 0	3819.72	0.02	20.00	0-18- 0	0- 6- 0	0-12- 0	13.33	26.67	40.00	40.00	0.07
50	1-52-30	3055.77	0.03	25.00	0-28- 8	0- 9-23	0-18-45	16.67	33.33	50.00	50.00	0.14
60	2-15- 0	2546.48	0.06	30.00	0-40-30	0-13-30	0-27- 0	20.00	40.00	60.00	60.00	0.24
70	2-37-30	2182.70	0.09	35.00	0-55- 7	0-18-23	0-36-45	23.33	46.67	70.00	70.00	0.37
80	3- 0- 0	1909.86	0.14	40.00	1-12- 0	0-24- 0	0-48- 0	26.67	53.33	80.00	80.00	0.56
90	3-22-30	1697.65	0.20	45.00	1-31- 7	0-30-23	1- 0-45	30.00	60.00	90.00	89.99	0.80
100	3-45- 0	1527.89	0.27	50.00	1-52-30	0-37-30	1-15- 0	33.34	66.67	100.00	99.99	1.09
110	4- 7-30	1388.99	0.36	55.00	2-16- 7	0-45-23	1-30-45	36.67	73.34	109.99	109.98	1.45
120	4-30- 0	1273.24	0.47	60.00	2-42- 0	0-54- 0	1-48- 0	40.01	80.01	119.99	119.97	1.88
130	4-52-30	1175.30	0.60	64.99	3-10- 7	1- 3-23	2- 6-45	43.35	86.68	129.98	129.96	2.40
140	5-15- 0	1091.35	0.75	69.99	3-40-30	1-13-30	2-27- 0	46.69	93.35	139.97	139.94	2.99
150	5-37-30	1018.59	0.92	74.99	4-13- 8	1-24-23	2-48-45	50.03	100.03	149.96	149.92	3.68
160	6- 0- 0	954.93	1.12	79.98	4-48- 0	1-36- 0	3-12- 0	53.37	106.70	159.95	159.89	4.47

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

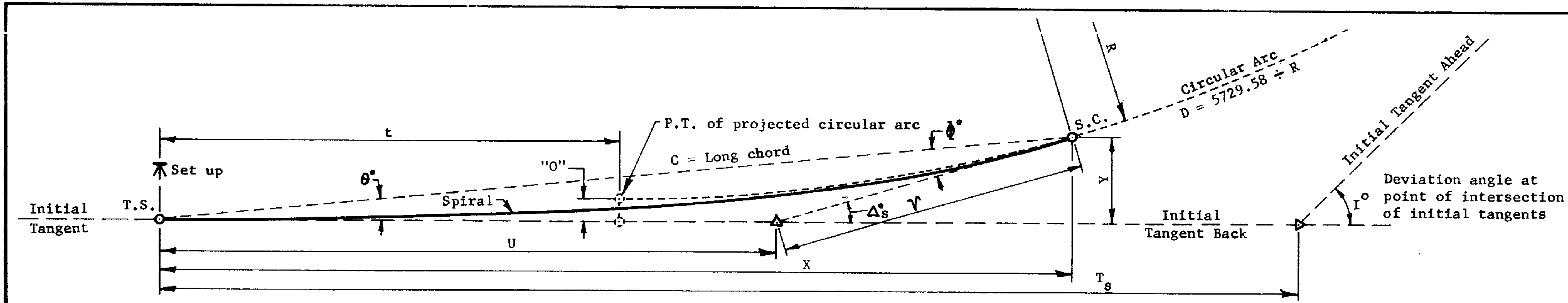
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=3-3/4	PLAN NO. D-57.50



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	ν	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	1- 0- 0	5729.58	0.00	12.50	0- 7-30	0- 2-30	0- 5- 0	8.33	16.67	25.00	25.00	0.02
50	2- 0- 0	2864.79	0.04	25.00	0-30- 0	0-10- 0	0-20- 0	16.67	33.33	50.00	50.00	0.15
75	3- 0- 0	1909.86	0.12	37.50	1- 7-30	0-22-30	0-45- 0	25.00	50.00	75.00	75.00	0.49
100	4- 0- 0	1432.39	0.29	50.00	2- 0- 0	0-40- 0	1-20- 0	33.34	66.67	99.99	99.99	1.16
125	5- 0- 0	1145.92	0.57	62.49	3- 7-30	1- 2-30	2- 5- 0	41.68	83.35	124.98	124.96	2.27
150	6- 0- 0	954.93	0.98	74.98	4-30- 0	1-30- 0	3- 0- 0	50.03	100.03	149.96	149.91	3.93
175	7- 0- 0	818.51	1.56	87.47	6- 7-30	2- 2-30	4- 5- 0	58.40	116.73	174.91	174.80	6.23
200	8- 0- 0	716.20	2.33	99.93	8- 0- 0	2-40- 0	5-20- 0	66.80	133.46	199.83	199.61	9.30

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

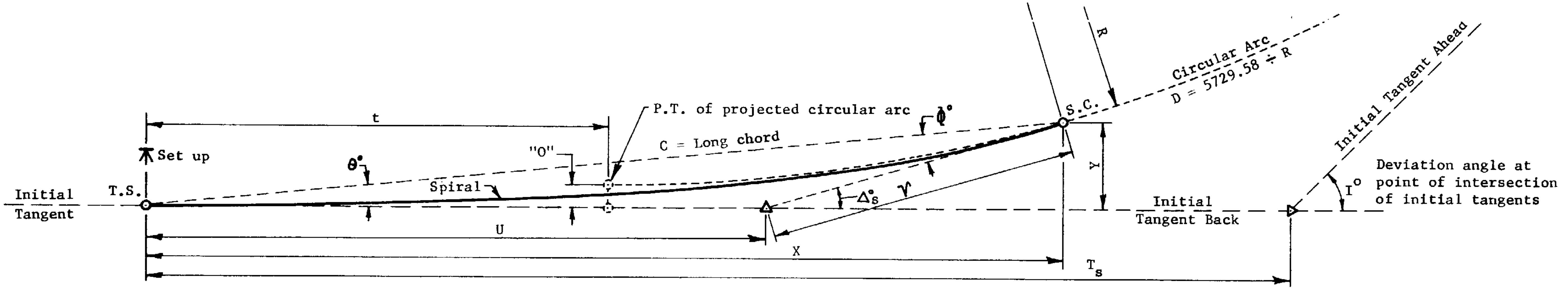
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=4	PLAN NO. D-57.52



L_s	D	R	"O"	t	Δ_s°	θ°	ϕ°	γ	U	C	X	Y
00	00-00-00	CC.00	0.00	0.CC	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	1- 7-30	5092.96	0.01	12.50	0- 8-26	0- 2-49	0- 5-38	8.33	16.67	25.00	25.00	0.02
50	2-15- 0	2546.48	0.04	25.00	0-33-45	0-11-15	0-22-30	16.67	33.33	50.00	50.00	0.16
75	3-22-30	1697.65	0.14	37.50	1-15-56	0-25-19	0-50-38	25.00	50.00	75.00	75.00	0.55
100	4-30- 0	1273.24	0.33	50.00	2-15- 0	0-45- 0	1-30- 0	33.34	66.67	99.99	99.98	1.31
125	5-37-30	1018.59	0.64	62.49	3-30-56	1-10-19	2-20-38	41.68	83.35	124.98	124.95	2.56
150	6-45- 0	848.83	1.10	74.98	5- 3-45	1-41-15	3-22-30	50.04	100.04	149.95	149.88	4.42
175	7-52-30	727.57	1.75	87.46	6-53-26	2-17-49	4-35-38	58.42	116.75	174.89	174.75	7.01
200	9- 0- 0	636.62	2.62	99.92	9- 0- 0	3- 0- 0	6- 0- 0	66.84	133.49	199.78	199.51	10.46

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

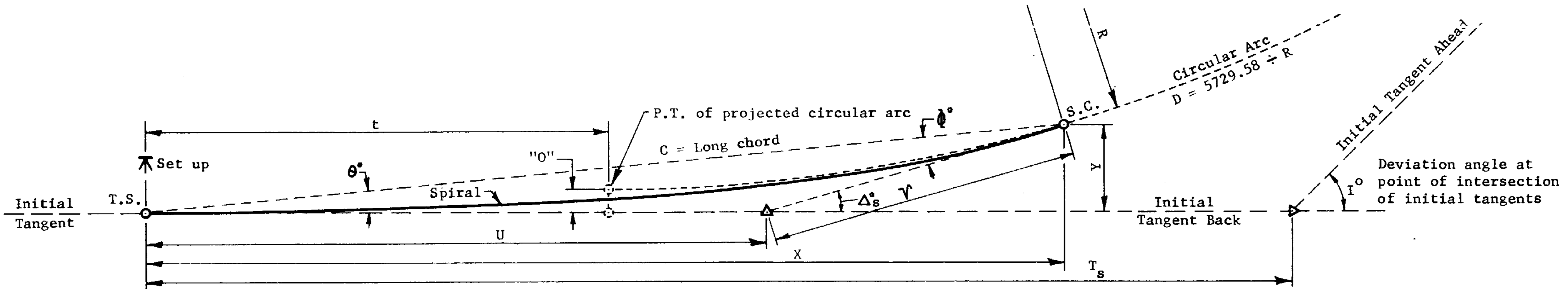
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=4-1/2	PLAN NO. D-57.55



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	1-10- 0	4911.07	0.01	12.50	0- 8-45	0- 2-55	0- 5-50	8.33	16.67	25.00	25.00	0.02
50	2-20- 0	2455.53	0.04	25.00	0-35- 0	0-11-40	0-23-20	16.67	33.33	50.00	50.00	0.17
75	3-30- 0	1637.02	0.14	37.50	1-18-45	0-26-15	0-52-30	25.00	50.00	75.00	75.00	0.57
100	4-40- 0	1227.77	0.34	50.00	2-20- 0	0-46-40	1-33-20	33.34	66.67	99.99	99.98	1.36
125	5-50- 0	982.21	0.66	62.49	3-38-45	1-12-55	2-25-50	41.68	83.35	124.98	124.95	2.65
150	7- 0- 0	818.51	1.15	74.98	5-15- 0	1-45- 0	3-30- 0	50.04	100.04	149.94	149.87	4.58

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

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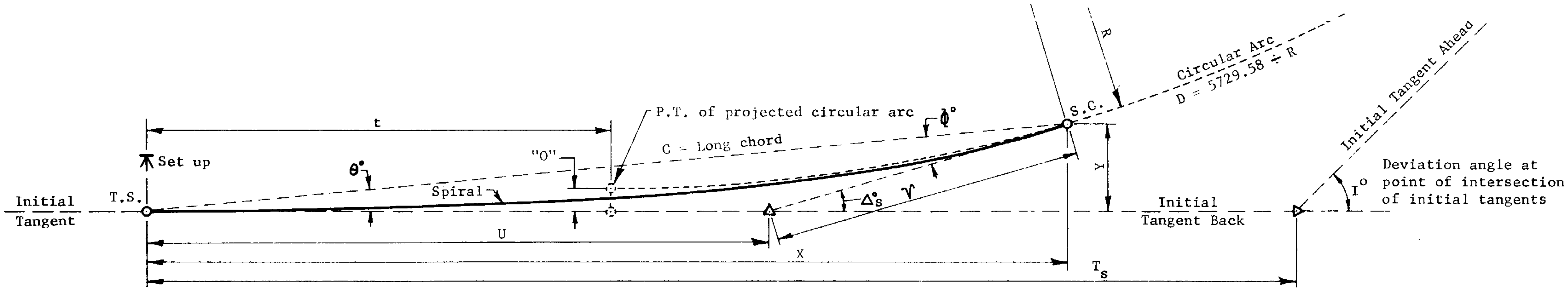
ARIZONA
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD PLANS

REV. DATE 4/78

TRANSITION SPIRAL TABLE
FOR a=4-2/3

PLAN NO. D-57.57



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
10	0-30- 0	11459.16	0.00	5.00	0- 1-30	0- 0-30	0- 1- 0	3.33	6.67	10.00	10.00	0.00
20	1- 0- 0	5729.58	0.00	10.00	0- 6- 0	0- 2- 0	0- 4- 0	6.67	13.33	20.00	20.00	0.01
30	1-30- 0	3819.72	0.01	15.00	0-13-30	0- 4-30	0- 9- 0	10.00	20.00	30.00	30.00	0.04
40	2- 0- 0	2864.79	0.02	20.00	0-24- 0	0- 8- 0	0-16- 0	13.33	26.67	40.00	40.00	0.09
50	2-30- 0	2291.83	0.05	25.00	0-37-30	0-12-30	0-25- 0	16.67	33.33	50.00	50.00	0.18
60	3- 0- 0	1909.86	0.08	30.00	0-54- 0	0-18- 0	0-36- 0	20.00	40.00	60.00	60.00	0.31
70	3-30- 0	1637.02	0.12	35.00	1-13-30	0-24-30	0-49- 0	23.33	46.67	70.00	70.00	0.50
80	4- 0- 0	1432.39	0.19	40.00	1-36- 0	0-32- 0	1- 4- 0	26.67	53.34	80.00	79.99	0.74
90	4-30- 0	1273.24	0.26	45.00	2- 1-30	0-40-30	1-21- 0	30.00	60.00	89.99	89.99	1.06
100	5- 0- 0	1145.92	0.36	50.00	2-30- 0	0-50- 0	1-40- 0	33.34	66.67	99.99	99.98	1.45
110	5-30- 0	1041.74	0.48	54.99	3- 1-30	1- 0-30	2- 1- 0	36.68	73.34	109.99	109.97	1.94
120	6- 0- 0	954.93	0.63	59.99	3-36- 0	1-12- 0	2-24- 0	40.02	80.02	119.98	119.95	2.51
130	6-30- 0	881.47	0.80	64.99	4-13-30	1-24-30	2-49- 0	43.36	86.69	129.97	129.93	3.19
140	7- 0- 0	818.51	1.00	69.98	4-54- 0	1-38- 0	3-16- 0	46.70	93.37	139.95	139.90	3.99
150	7-30- 0	763.94	1.23	74.98	5-37-30	1-52-30	3-45- 0	50.05	100.05	149.94	149.86	4.91
160	8- 0- 0	716.20	1.49	79.97	6-24- 0	2- 8- 0	4-16- 0	53.40	106.73	159.91	159.80	5.95
170	8-30- 0	674.07	1.79	84.95	7-13-30	2-24-30	4-49- 0	56.76	113.42	169.88	169.73	7.14
180	9- 0- 0	636.62	2.12	89.94	8- 6- 0	2-42- 0	5-24- 0	60.12	120.12	179.84	179.64	8.47
190	9-30- 0	603.11	2.49	94.92	9- 1-30	3- 0-30	6- 1- 0	63.50	126.82	189.79	189.53	9.96
200	10- 0- 0	572.96	2.91	99.90	10- 0- 0	3-20- 0	6-40- 0	66.88	133.53	199.73	199.39	11.61
210	10-30- 0	545.67	3.37	104.87	11- 1-30	3-40-30	7-21- 0	70.27	140.25	209.65	209.22	13.44
220	11- 0- 0	520.87	3.87	109.84	12- 6- 0	4- 2- 0	8- 4- 0	73.67	146.98	219.56	219.02	15.44
230	11-30- 0	498.22	4.42	114.80	13-13-30	4-24-30	8-49- 0	77.09	153.73	229.45	228.77	17.64
240	12- 0- 0	477.46	5.03	119.75	14-24- 0	4-48- 0	9-36- 0	80.53	160.49	239.32	238.48	20.03
250	12-30- 0	458.37	5.68	124.69	15-37-30	5-12-30	10-25- 0	83.98	167.27	249.17	248.14	22.62
260	13- 0- 0	440.74	6.39	129.62	16-54- 0	5-38- 0	11-16- 0	87.45	174.06	258.99	257.74	25.42
270	13-30- 0	424.41	7.15	134.54	18-13-30	6- 4-30	12- 9- 0	90.95	180.88	268.78	267.27	28.45
280	14- 0- 0	409.26	7.98	139.45	19-36- 0	6-32- 0	13- 4- 0	94.48	187.73	278.54	276.73	31.69
290	14-30- 0	395.14	8.87	144.35	21- 1-30	7- 0-30	14- 1- 0	98.03	194.60	288.26	286.10	35.17
300	15- 0- 0	381.97	9.81	149.23	22-30- 0	7-30- 0	15- 0- 0	101.62	201.50	297.93	295.39	38.89

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

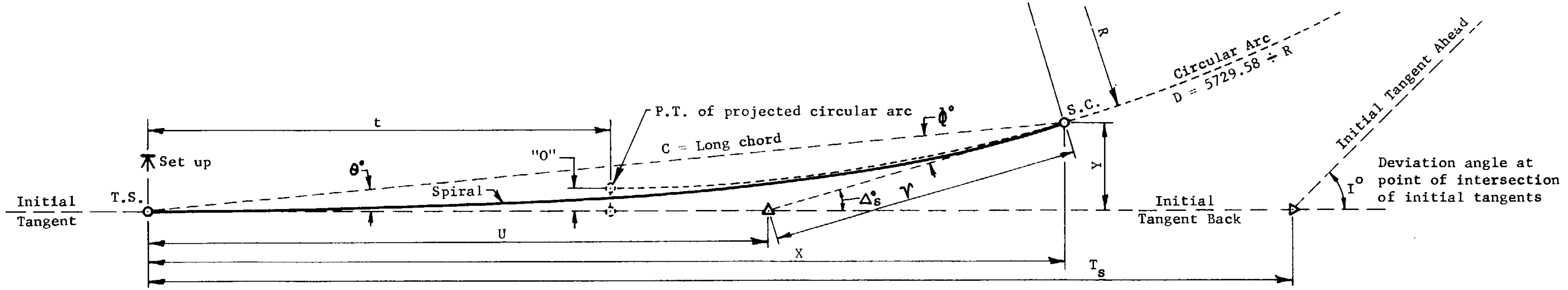
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=5	PLAN NO. D-57.60



L_s	D	R	"O"	t	Δ_s°	θ°	ϕ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	1-20- 0	4297.18	0.01	12.50	0-10- 0	0- 3-20	0- 6-40	8.33	16.67	25.00	25.00	0.02
50	2-40- 0	2148.59	0.05	25.00	0-40- 0	0-13-20	0-26-40	16.67	33.33	50.00	50.00	0.19
75	4- 0- 0	1432.39	0.16	37.50	1-30- 0	0-30- 0	1- 0- 0	25.00	50.00	75.00	74.99	0.65
100	5-20- 0	1074.30	0.39	50.00	2-40- 0	0-53-20	1-46-40	33.34	66.67	99.99	99.98	1.55
125	6-40- 0	859.44	0.76	62.49	4-10- 0	1-23-20	2-46-40	41.69	83.35	124.97	124.93	3.03
150	8- 0- 0	716.20	1.31	74.97	6- 0- 0	2- 0- 0	4- 0- 0	50.06	100.05	149.93	149.84	5.23

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

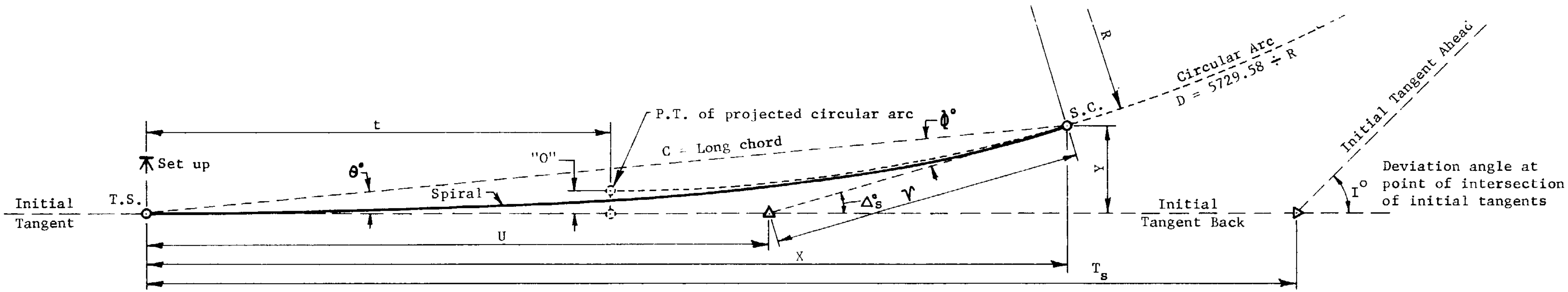
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=5-1/3	PLAN NO. D-57.62



L_s	D	R	"O"	t	Δ_s°	θ°	ɸ°	ν	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	1-22-30	4166.97	0.01	12.50	0-10-19	0- 3-26	0- 6-52	8.33	16.67	25.00	25.00	0.02
50	2-45- 0	2083.48	0.05	25.00	0-41-15	0-13-45	0-27-30	16.67	33.33	50.00	50.00	0.20
75	4- 7-30	1388.99	0.17	37.50	1-32-49	0-30-56	1- 1-53	25.00	50.00	75.00	74.99	0.67
100	5-30- 0	1041.74	0.40	50.00	2-45- 0	0-55- 0	1-50- 0	33.34	66.67	99.99	99.98	1.60
125	6-52-30	833.39	0.78	62.49	4-17-49	1-25-56	2-51-52	41.69	83.36	124.97	124.93	3.12
150	8-15- 0	694.49	1.35	74.97	6-11-15	2- 3-45	4- 7-30	50.06	100.06	149.92	149.82	5.40
175	9-37-30	595.28	2.14	87.44	8-25-19	2-48-26	5-36-52	58.46	116.79	174.83	174.62	8.56
200	11- 0- 0	520.87	3.20	99.88	11- 0- 0	3-40- 0	7-20- 0	66.92	133.57	199.67	199.26	12.77

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

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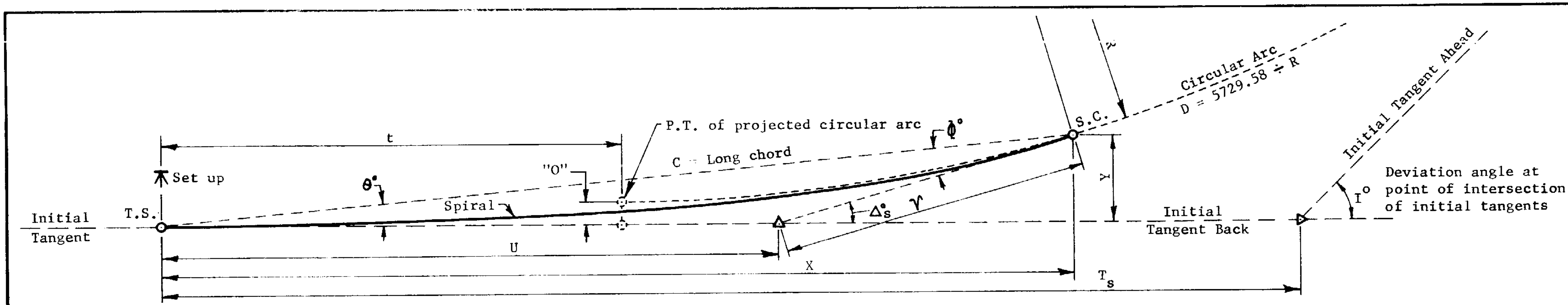
ARIZONA
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD PLANS

REV DATE 4/78

TRANSITION SPIRAL TABLE
FOR a=5-1/2

PLAN NO. D-57.65



L_s	D	R	"O"	t	Δ°_s	θ°	ϕ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	1-30- 0	3819.72	0.01	12.50	0-11-15	0- 3-45	0- 7-30	8.33	16.67	25.00	25.00	0.03
50	3- 0- 0	1909.86	0.05	25.00	0-45- 0	0-15- 0	0-30- 0	16.67	33.33	50.00	50.00	0.22
75	4-30- 0	1273.24	0.18	37.50	1-41-15	0-33-45	1- 7-30	25.00	50.00	75.00	74.99	0.74
100	6- 0- 0	954.93	0.44	50.00	3- 0- 0	1- 0- 0	2- 0- 0	33.34	66.68	99.99	99.97	1.75
125	7-30- 0	763.94	0.85	62.49	4-41-15	1-33-45	3- 7-30	41.70	83.36	124.96	124.92	3.41
150	9- 0- 0	636.62	1.47	74.97	6-45- 0	2-15- 0	4-30- 0	50.07	100.07	149.91	149.79	5.89

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

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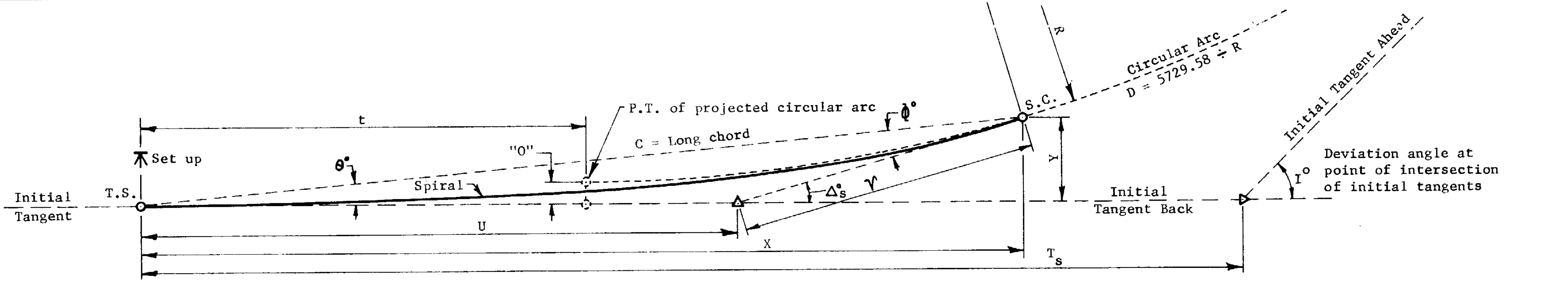
ARIZONA
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD PLANS

REV. DATE 4/78

TRANSITION SPIRAL TABLE
FOR a=6

PLAN NO. D-57.67



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	γ	U	C	X	Y
00	00-00-00	C0.00	0.00	0.0C	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
10	0-37-30	9167.32	0.00	5.00	0- 1-52	0- 0-38	0- 1-15	3.33	6.67	10.00	10.00	0.00
20	1-15- 0	4583.66	0.00	10.0C	0- 7-30	0- 2-30	0- 5- 0	6.67	13.33	2C.00	20.00	0.01
30	1-52-30	3C55.77	0.01	15.CC	0-16-52	0- 5-38	0-11-15	10.00	20.00	30.00	30.00	0.05
40	2-30- 0	2291.83	0.03	20.0C	0-30- 0	0-10- 0	0-20- 0	13.33	26.67	40.00	40.C0	0.12
50	3- 7-30	1833.46	0.06	25.0C	0-46-53	0-15-38	0-31-15	16.67	33.33	5C.00	50.C0	0.23
60	3-45- 0	1527.89	0.10	30.CC	1- 7-30	0-22-30	0-45- 0	20.00	40.00	60.00	60.00	0.39
7C	4-22-30	1309.62	C.16	35.0C	1-31-52	0-30-38	1- 1-15	23.34	46.67	70.00	69.99	0.62
80	5- 0- 0	1145.92	0.23	40.0C	2- C- 0	0-40- 0	1-20- 0	26.67	53.34	8C.00	79.99	0.93
90	5-37-30	1C18.59	0.33	45.C0	2-31-52	0-50-38	1-41-15	30.01	60.01	89.99	89.98	1.33
100	6-15- 0	916.73	0.45	50.00	3- 7-30	1- 2-30	2- 5- 0	33.34	66.68	99.99	99.97	1.82
110	6-52-30	833.39	0.6C	54.99	3-46-52	1-15-38	2-31-15	36.68	73.35	109.98	109.95	2.42
120	7-30- 0	763.94	0.79	59.99	4-30- 0	1-30- 0	3- 0- 0	40.03	80.02	119.97	119.93	3.14
130	8- 7-30	705.18	1.00	64.98	5-16-52	1-45-38	3-31-15	43.37	86.7C	129.95	129.89	3.99
140	8-45- 0	654.81	1.25	69.97	6- 7-30	2- 2-30	4- 5- 0	46.72	93.38	139.93	139.84	4.99
150	9-22-30	611.15	1.53	74.96	7- 1-53	2-20-38	4-41-15	50.C8	100.07	149.9C	149.77	6.13
160	10- 0- 0	572.96	1.86	79.95	8- 0- 0	2-40- 0	5-20- 0	53.44	106.77	159.86	159.69	7.44

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

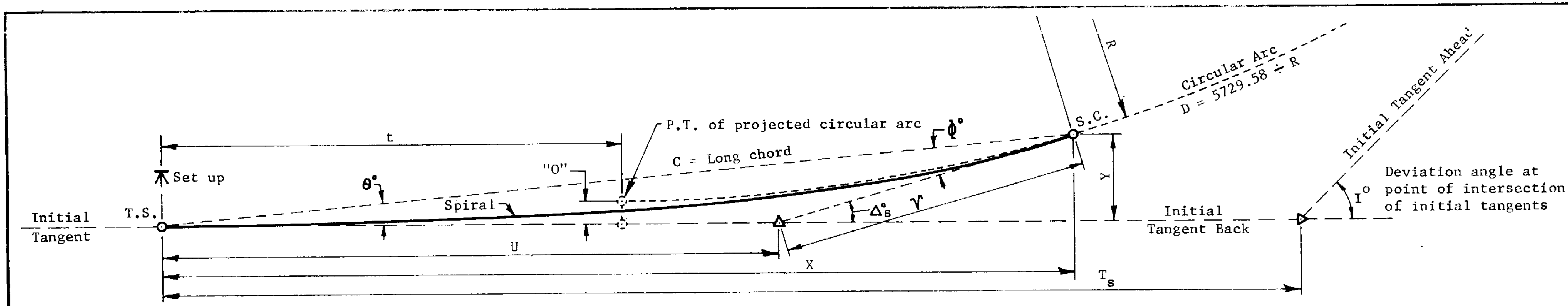
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=6-1/4	PLAN NO. D-57.70



L_s	D	R	"O"	t	Δ_s°	θ°	ϕ°	ν	U	C	X	Y
00	00-00-00	C0.00	0.00	C.CC	00-00-00	00-00-00	00-00-00	0.00	0.00	C.00	0.00	0.00
25	1-37-30	3525.89	0.01	12.50	0-12-11	0- 4- 4	0- 8- 7	8.33	16.67	25.00	25.00	0.03
50	3-15- 0	1762.95	C.06	25.C0	0-48-45	0-16-15	0-32-30	16.67	33.33	5C.00	50.00	0.24
75	4-52-30	1175.30	0.2C	37.50	1-49-41	0-36-34	1-13- 8	25.00	50.00	75.00	74.99	0.80
100	6-30- 0	881.47	0.47	49.99	3-15- 0	1- 5- 0	2-10- 0	33.34	66.68	99.99	99.97	1.89
125	8- 7-30	7C5.18	0.92	62.48	5- 4-41	1-41-34	3-23- 7	41.70	83.36	124.96	124.90	3.69
150	9-45- 0	587.65	1.59	74.96	7-18-45	2-26-15	4-52-30	50.C8	100.08	149.89	149.76	6.37
175	11-22-30	5C3.70	2.53	87.41	9-57-11	3-19- 4	6-38- 7	58.52	116.84	174.76	174.47	10.11
200	13- 0- 0	440.74	3.78	99.83	13- 0- 0	4-20- 0	8-40- 0	67.02	133.66	199.54	198.97	15.08

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

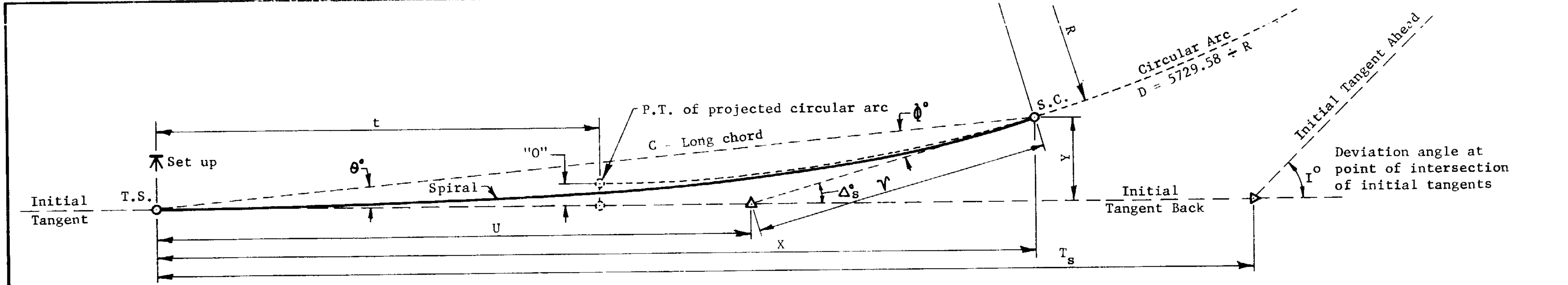
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=6-1/2	PLAN NO. D-57.72



L_s	D	R	"O"	t	$\Delta°_s$	$\theta°$	$\phi°$	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	1-40- 0	3437.75	0.01	12.50	0-12-30	0- 4-10	0- 8-20	8.33	16.67	25.00	25.00	0.03
50	3-20- 0	1718.87	0.06	25.00	0-50- 0	0-16-40	0-33-20	16.67	33.33	50.00	50.00	0.24
75	5- 0- 0	1145.92	0.20	37.50	1-52-30	0-37-30	1-15- 0	25.00	50.00	75.00	74.99	0.82
100	6-40- 0	859.44	0.48	49.99	3-20- 0	1- 6-40	2-13-20	33.35	66.68	99.98	99.97	1.94
125	8-20- 0	687.55	0.95	62.48	5-12-30	1-44-10	3-28-20	41.70	83.37	124.95	124.90	3.79
150	10- 0- 0	572.96	1.64	74.96	7-30- 0	2-30- 0	5- 0- 0	50.09	100.08	149.89	149.74	6.54

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

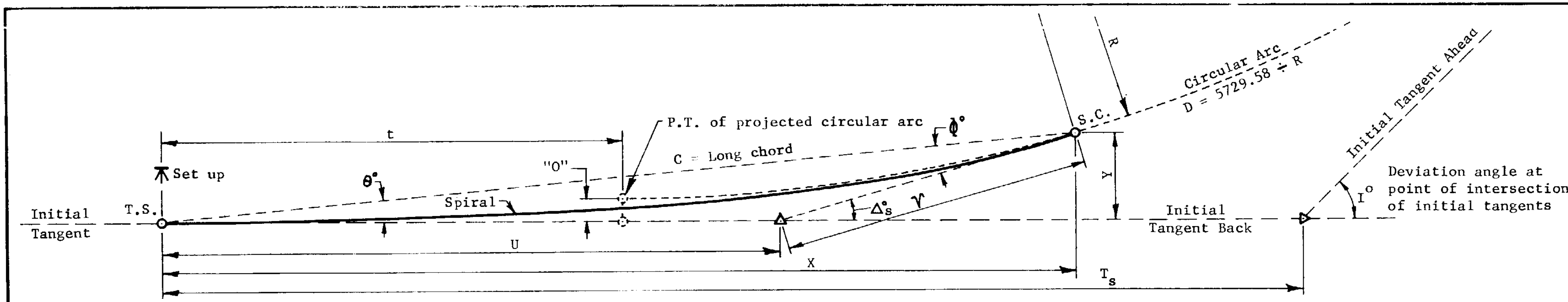
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=6-2/3	PLAN NO. D-57.75



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	γ	U	C	X	Y
00	00-C0-00	00.00	0.00	0.C0	00-00-C0	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
10	0-41-15	8333.93	0.00	5.00	0- 2- 4	0- 0-41	0- 1-22	3.33	6.67	10.00	10.00	0.00
20	1-22-30	4166.97	0.0C	1C.0C	0- 8-15	0- 2-45	0- 5-30	6.67	13.33	2C.00	20.C0	0.02
30	2- 3-45	2777.98	0.01	15.0C	0-18-34	0- 6-11	0-12-22	10.00	20.00	30.00	30.00	0.05
40	2-45- 0	2083.48	0.03	20.0C	0-33- 0	0-11- 0	0-22- 0	13.33	26.67	40.00	40.00	0.13
50	3-26-15	1666.79	0.06	25.00	0-51-34	0-17-11	0-34-22	16.67	33.33	50.00	50.00	0.25
60	4- 7-30	1388.99	0.11	3C.00	1-14-15	0-24-45	0-49-30	20.00	40.00	6C.00	60.00	0.43
70	4-48-45	119C.56	0.17	35.00	1-41- 4	0-33-41	1- 7-22	23.34	46.67	70.00	69.99	0.69
80	5-30- 0	1041.74	0.26	4C.00	2-12- 0	0-44- 0	1-28- 0	26.67	53.34	79.99	79.99	1.02
90	6-11-15	925.99	0.36	45.00	2-47- 4	0-55-41	1-51-22	30.01	60.01	89.99	89.98	1.46
100	6-52-30	833.39	0.50	49.99	3-26-15	1- 8-45	2-17-30	33.35	66.68	99.98	99.96	2.00
110	7-33-45	757.63	0.67	54.99	4- 9-34	1-23-11	2-46-22	36.69	73.35	109.97	109.94	2.66
120	8-15- 0	694.49	0.86	59.99	4-57- 0	1-39- 0	3-18- 0	40.03	80.03	119.96	119.91	3.45
130	8-56-15	641.07	1.10	64.98	5-48-34	1-56-11	3-52-22	43.38	86.71	129.94	129.87	4.39
140	9-37-30	595.28	1.37	69.97	6-44-15	2-14-45	4-29-30	46.73	93.40	139.91	139.81	5.48
150	10-18-45	555.60	1.69	74.95	7-44- 4	2-34-41	5- 9-23	50.C9	100.09	149.88	149.73	6.74
160	11- 0- 0	520.87	2.05	79.94	8-48- 0	2-56- 0	5-52- C	53.46	106.79	159.83	159.62	8.18

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

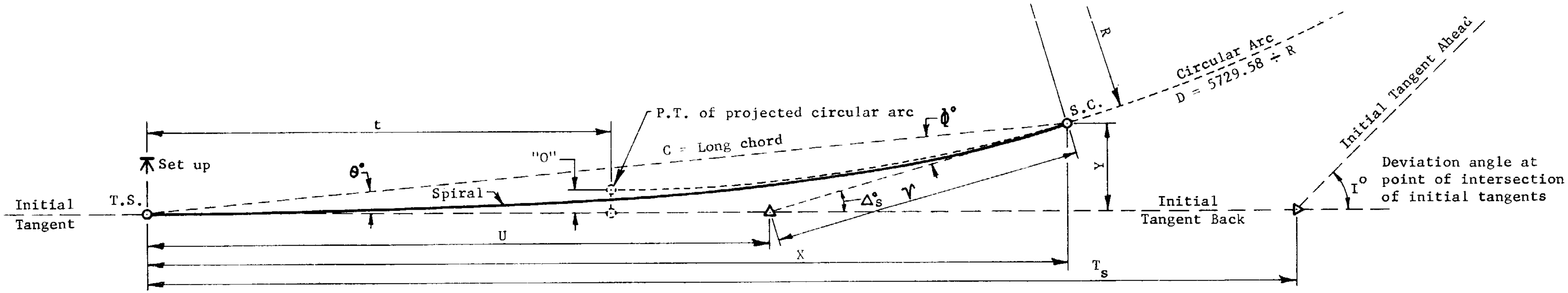
For partial transition spiral formulae, see Std. D-55.20

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=6-7/8	PLAN NO. D-57.77



L_s	D	R	"O"	t	Δ°_s	θ°	ϕ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-C0	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	1-45- 0	3274.04	0.01	12.50	0-13- 8	0- 4-23	0- 8-45	8.33	16.67	25.00	25.00	0.03
50	3-30- 0	1637.C2	0.06	25.CC	C-52-30	0-17-30	0-35- C	16.67	33.33	5C.00	50.00	0.25
75	5-15- 0	1091.35	0.21	37.50	1-58- 8	0-39-23	1-18-45	25.C0	50.0C	75.00	74.99	0.86
100	7- 0- 0	818.51	0.51	49.99	3-30- 0	1-10- 0	2-20- 0	33.35	66.68	99.98	99.96	2.04
125	8-45- 0	654.81	0.99	62.48	5-28- 8	1-49-23	3-38-45	41.71	83.37	124.95	124.89	3.97
150	10-30- 0	545.67	1.72	74.95	7-52-30	2-37-30	5-15- 0	50.1C	100.09	149.87	149.72	6.86
175	12-15- 0	467.72	2.73	87.4C	1C-43- 8	3-34-23	7- 8-45	58.55	116.86	174.73	174.39	10.89
200	14- 0- 0	409.26	4.07	99.80	14- 0- 0	4-40- 0	9-20- 0	67.08	133.72	199.47	198.81	16.23

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

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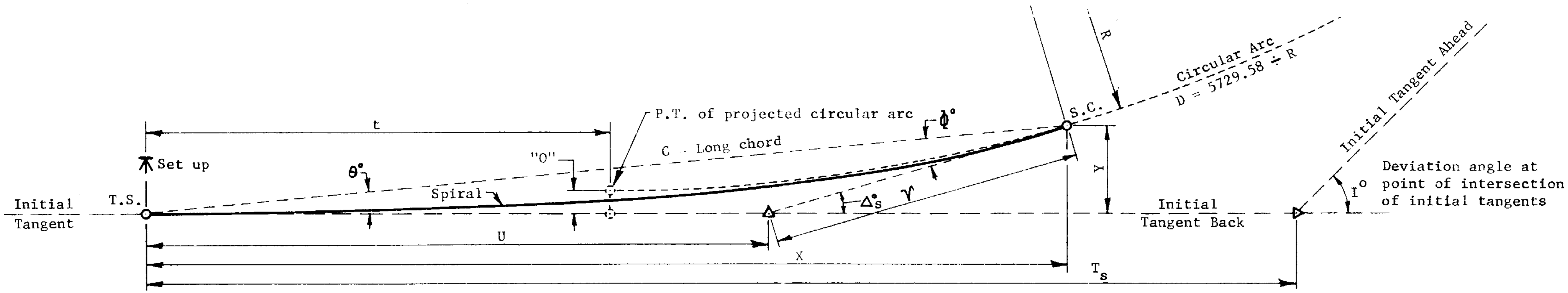
HIGHWAYS DIVISION
STANDARD PLANS

REV. DATE 4/78

TRANSITION SPIRAL TABLE FOR a=7

PLAN NO. D-57.80



L_s	D	R	"O"	t	Δ_s°	θ°	Φ°	ν	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
10	0-45- 0	7639.44	0.00	5.00	0- 2-15	0- 0-45	0- 1-30	3.33	6.67	10.00	10.00	0.00
20	1-30- 0	3819.72	0.00	10.00	0- 9- 0	0- 3- 0	0- 6- 0	6.67	13.33	20.00	20.00	0.02
30	2-15- 0	2546.48	0.01	15.00	0-20-15	0- 6-45	0-13-30	10.00	20.00	30.00	30.00	0.06
40	3- 0- 0	1909.86	0.03	20.00	0-36- 0	0-12- 0	0-24- 0	13.33	26.67	40.00	40.00	0.14
50	3-45- 0	1527.89	0.07	25.00	0-56-15	0-18-45	0-37-30	16.67	33.33	50.00	50.00	0.27
60	4-30- 0	1273.24	0.12	30.00	1-21- 0	0-27- 0	0-54- 0	20.00	40.00	60.00	60.00	0.47
70	5-15- 0	1091.35	0.19	35.00	1-50-15	0-36-45	1-13-30	23.34	46.67	70.00	69.99	0.75
80	6- 0- 0	954.93	0.28	40.00	2-24- 0	0-48- 0	1-36- 0	26.67	53.34	79.99	79.99	1.12
90	6-45- 0	848.83	0.40	45.00	3- 2-15	1- 0-45	2- 1-30	30.01	60.01	89.99	89.97	1.59
100	7-30- 0	763.94	0.55	49.99	3-45- 0	1-15- 0	2-30- 0	33.35	66.68	99.98	99.96	2.18
110	8-15- 0	694.49	0.73	54.99	4-32-15	1-30-45	3- 1-30	36.69	73.36	109.97	109.93	2.90
120	9- 0- 0	636.62	0.94	59.98	5-24- 0	1-48- 0	3-36- 0	40.04	80.03	119.95	119.89	3.77
130	9-45- 0	587.65	1.20	64.97	6-20-15	2- 6-45	4-13-30	43.39	86.72	129.93	129.84	4.79
140	10-30- 0	545.67	1.50	69.96	7-21- 0	2-27- 0	4-54- 0	46.75	93.41	139.90	139.77	5.98
150	11-15- 0	509.30	1.84	74.95	8-26-15	2-48-45	5-37-30	50.11	100.10	149.85	149.67	7.35
160	12- 0- 0	477.46	2.23	79.93	9-36- 0	3-12- 0	6-24- 0	53.49	106.81	159.80	159.55	8.92

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

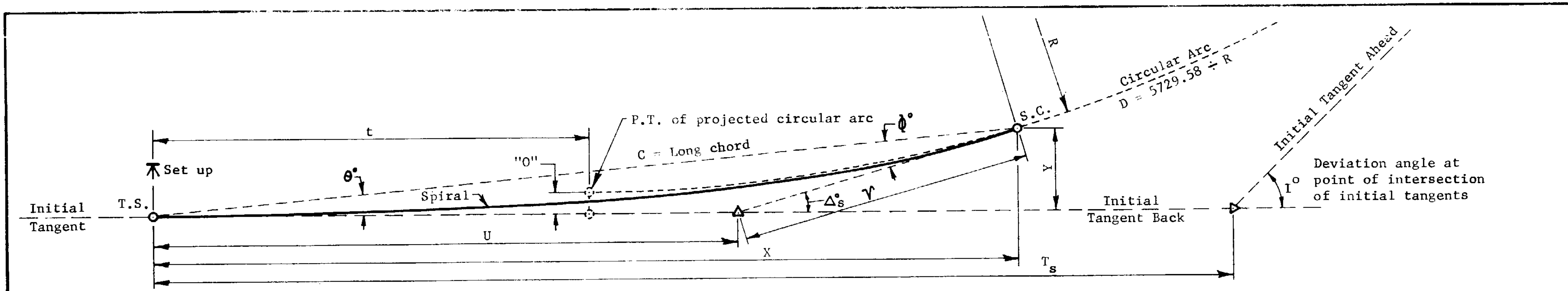
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=7-1/2	PLAN NO. D-57.82



L_s	D	R	"O"	t	Δ_s°	θ°	ϕ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	2- 0- 0	2864.79	0.01	12.50	0-15- 0	0- 5- 0	0-10- 0	8.33	16.67	25.00	25.00	0.04
50	4- 0- 0	1432.39	0.07	25.00	1- 0- 0	0-20- 0	0-40- 0	16.67	33.33	50.00	50.00	0.29
75	6- 0- 0	954.93	0.25	37.50	2-15- 0	0-45- 0	1-30- 0	25.00	50.00	74.99	74.99	0.98
100	8- 0- 0	716.20	0.58	49.99	4- 0- 0	1-20- 0	2-40- 0	33.35	66.68	99.98	99.95	2.33
125	10- 0- 0	572.96	1.14	62.48	6-15- 0	2- 5- 0	4-10- 0	41.72	83.38	124.93	124.85	4.54
150	12- 0- 0	477.46	1.96	74.94	9- 0- 0	3- 0- 0	6- 0- 0	50.13	100.12	149.83	149.63	7.84
175	14- 0- 0	409.26	3.12	87.37	12-15- 0	4- 5- 0	8-10- 0	58.61	116.92	174.64	174.20	12.44
200	16- 0- 0	358.10	4.65	99.74	16- 0- 0	5-20- 0	10-40- 0	67.21	133.84	199.30	198.44	18.53

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

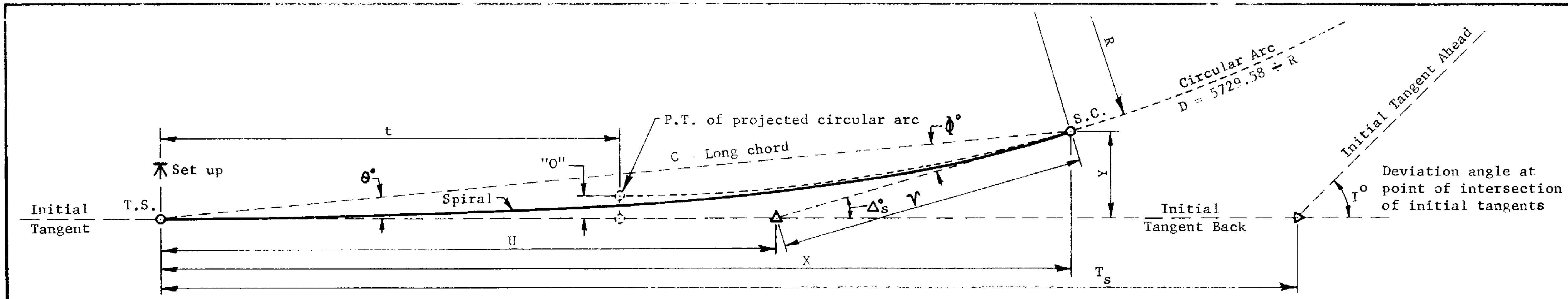
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV. DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=8	PLAN NO. D-57.85



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	ν	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
10	0-48-45	7051.79	0.00	5.00	0- 2-26	0- 0-49	0- 1-37	3.33	6.67	10.00	10.00	0.00
20	1-37-30	3525.89	0.00	10.00	0- 9-45	0- 3-15	0- 6-30	6.67	13.33	20.00	20.00	0.02
30	2-26-15	2350.60	0.02	15.00	0-21-56	0- 7-19	0-14-37	10.00	20.00	30.00	30.00	0.06
40	3-15- 0	1762.95	0.04	20.00	0-39- 0	0-13- 0	0-26- 0	13.33	26.67	40.00	40.00	0.15
50	4- 3-45	1410.36	0.07	25.00	1- 0-56	0-20-19	0-40-37	16.67	33.33	50.00	50.00	0.30
60	4-52-30	1175.30	0.13	30.00	1-27-45	0-29-15	0-58-30	20.00	40.00	60.00	60.00	0.51
70	5-41-15	1007.40	0.20	35.00	1-59-26	0-39-49	1-19-37	23.34	46.67	70.00	69.99	0.81
80	6-30- 0	881.47	0.30	40.00	2-36- 0	0-52- 0	1-44- 0	26.67	53.34	79.99	79.98	1.21
90	7-18-45	783.53	0.43	45.00	3-17-26	1- 5-49	2-11-37	30.01	60.01	89.99	89.97	1.72
100	8- 7-30	705.18	0.59	49.99	4- 3-45	1-21-15	2-42-30	33.35	66.68	99.98	99.95	2.36
110	8-56-15	641.07	0.79	54.99	4-54-56	1-38-19	3-16-37	36.69	73.36	109.96	109.92	3.14
120	9-45- 0	587.65	1.02	59.98	5-51- 0	1-57- 0	3-54- 0	40.04	80.04	119.94	119.87	4.08
130	10-33-45	542.45	1.30	64.97	6-51-56	2-17-19	4-34-37	43.40	86.73	129.92	129.81	5.19
140	11-22-30	503.70	1.62	69.95	7-57-45	2-39-15	5-18-30	46.76	93.42	139.88	139.73	6.48
150	12-11-15	470.12	1.99	74.94	9- 8-26	3- 2-49	6- 5-38	50.13	100.12	149.83	149.62	7.96
160	13- 0- 0	440.74	2.42	79.91	10-24- 0	3-28- 0	6-56- 0	53.52	106.84	159.76	159.47	9.66

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

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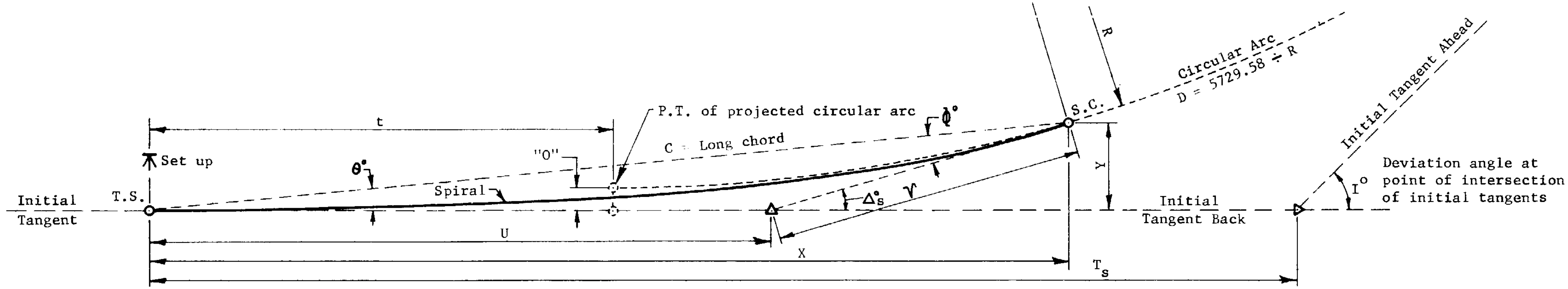
HIGHWAYS DIVISION
STANDARD PLANS

REV. DATE 4/78

TRANSITION SPIRAL TABLE
FOR a=8-1/8

PLAN NO. D-57.87



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	Υ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
10	0-52-30	6548.09	0.00	5.00	0- 2-37	0-.0-53	0- 1-45	3.33	6.67	10.00	10.00	0.00
20	1-45- 0	3274.04	0.01	10.00	0-10-30	0- 3-30	0- 7- 0	6.67	13.33	20.00	20.00	0.02
30	2-37-30	2182.70	0.02	15.00	0-23-37	0- 7-53	0-15-45	10.00	20.00	30.00	30.00	0.07
40	3-30- 0	1637.02	0.04	20.00	0-42- 0	0-14- 0	0-28- 0	13.33	26.67	40.00	40.00	0.16
50	4-22-30	1309.62	0.08	25.00	1- 5-38	0-21-53	0-43-45	16.67	33.33	50.00	50.00	0.32
60	5-15- 0	1091.35	0.14	30.00	1-34-30	0-31-30	1- 3- 0	20.00	40.00	60.00	60.00	0.55
70	6- 7-30	935.44	0.22	35.00	2- 8-37	0-42-53	1-25-45	23.34	46.67	70.00	69.99	0.87
80	7- 0- 0	818.51	0.33	40.00	2-48- 0	0-56- 0	1-52- 0	26.67	53.34	79.99	79.98	1.30
90	7-52-30	727.57	0.46	44.99	3-32-37	1-10-53	2-21-45	30.01	60.01	89.98	89.97	1.86
100	8-45- 0	654.81	0.64	49.99	4-22-30	1-27-30	2-55- 0	33.35	66.69	99.97	99.94	2.54
110	9-37-30	595.28	0.85	54.98	5-17-37	1-45-53	3-31-45	36.70	73.36	109.96	109.91	3.39
120	10-30- 0	545.67	1.10	59.98	6-18- 0	2- 6- 0	4-12- 0	40.05	80.05	119.94	119.85	4.39
130	11-22-30	503.70	1.40	64.96	7-23-37	2-27-53	4-55-45	43.41	86.74	129.90	129.78	5.59
140	12-15- 0	467.72	1.75	69.95	8-34-30	2-51-30	5-43- 0	46.78	93.43	139.86	139.69	6.97
150	13- 7-30	436.54	2.15	74.93	9-50-38	3-16-53	6-33-45	50.15	100.14	149.80	149.56	8.57
160	14- 0- 0	409.26	2.61	79.90	11-12- 0	3-44- 0	7-28- 0	53.55	106.86	159.73	159.39	10.40

GENERAL NOTES

For definitions of spiral values and their applicable formulae, see Std. D-55.10.

For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

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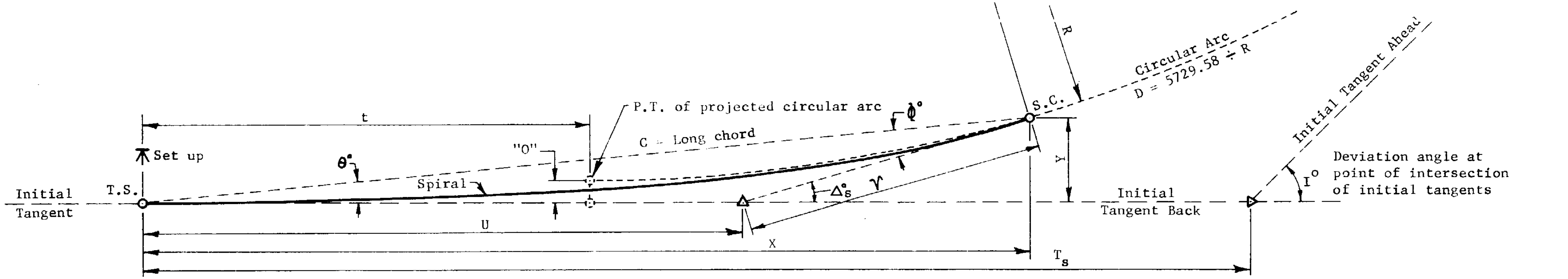
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD PLANS

REV DATE 4/78

TRANSITION SPIRAL TABLE
FOR a=8-3/4

PLAN NO. D-57.90



L_s	D	R	"O"	t	Δ°_s	θ°	Φ°	γ	U	C	X	Y
00	00-00-00	00.00	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
25	2-15- 0	2546.48	0.01	12.50	0-16-53	0- 5-38	0-11-15	8.33	16.67	25.00	25.00	0.04
50	4-30- 0	1273.24	0.08	25.00	1- 7-30	0-22-30	0-45- 0	16.67	33.33	50.00	50.00	0.33
75	6-45- 0	848.83	0.28	37.50	2-31-53	0-50-38	1-41-15	25.01	50.00	74.99	74.99	1.10
100	9- 0- 0	636.62	0.65	49.99	4-30- 0	1-30- 0	3- 0- 0	33.35	66.69	99.97	99.94	2.62
125	11-15- 0	509.30	1.28	62.47	7- 1-53	2-20-38	4-41-15	41.73	83.39	124.92	124.81	5.11
150	13-30- 0	424.41	2.21	74.92	10- 7-30	3-22-30	6-45- 0	50.16	100.15	149.79	149.53	8.82
175	15-45- 0	363.78	3.51	87.33	13-46-53	4-35-38	9-11-15	58.68	116.99	174.55	173.99	13.98
200	18- 0- 0	318.31	5.23	99.67	18- 0- 0	6- 0- 0	12- 0- 0	67.35	133.97	199.12	198.03	20.81

GENERAL NOTES

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For deflection angle formulae for an instrument set-up at a point on spiral, see Std. D-55.10.

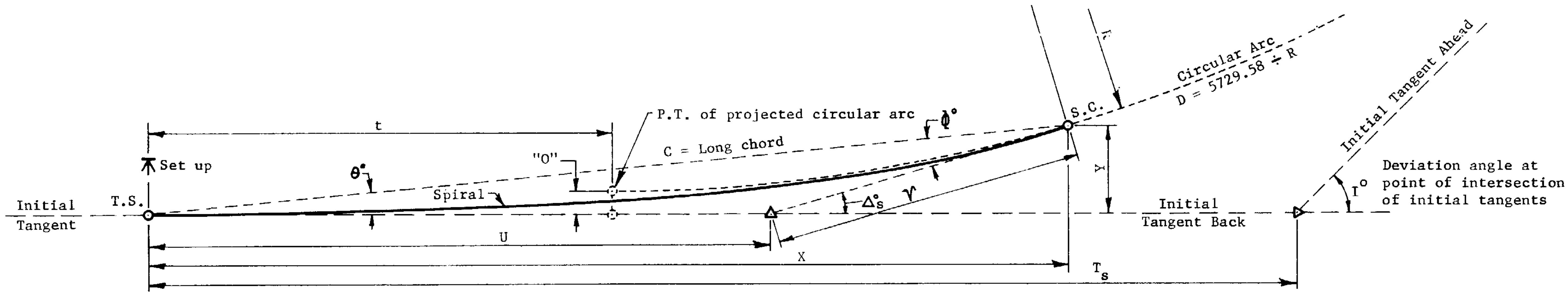
For partial transition spiral formulae, see Std. D-55.20.

For spiral transition between compound curves, see Std. D-55.30.

For curvature, superelevation and superelevation transition standards, see Std. D-6.04, D-6.05 and D-6.06.

For superelevation distribution, see Std. D-6.07.

DESIGN APPROVED	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD PLANS	REV.DATE 4/78
APPROVED FOR DISTRIBUTION	TRANSITION SPIRAL TABLE FOR a=9	PLAN NO. D-57.92



L_s	D	R	"O"	t	$\Delta°_s$	$\theta°$	$\phi°$	γ	U	C	X	Y
0	00-00-00	INFINITY	0.00	0.00	00-00-00	00-00-00	00-00-00	0.00	0.00	0.00	0.00	0.00
10	1-00-00	5,729.58	--	5.00	0-03-00	0-01-00	0-02-00	3.33	6.67	10.00	10.00	--
20	2-00-00	2,864.79	.01	10.00	0-12-00	0-04-00	0-08-00	6.67	13.33	20.00	20.00	.02
30	3-00-00	1,909.86	.02	15.00	0-27-00	0-09-00	0-18-00	10.00	20.00	30.00	30.00	.08
40	4-00-00	1,432.40	.05	20.00	0-48-00	0-16-00	0-32-00	13.33	26.67	40.00	40.00	.19
50	5-00-00	1,145.92	.09	25.00	1-15-00	0-25-00	0-50-00	16.67	33.33	50.00	50.00	.36
60	6-00-00	954.93	.16	30.00	1-48-00	0-36-00	1-12-00	20.00	40.00	60.00	60.00	.63
70	7-00-00	818.51	.25	35.00	2-27-00	0-49-00	1-38-00	23.33	46.67	69.99	69.98	1.00
80	8-00-00	716.20	.37	40.00	3-12-00	1-04-00	2-08-00	26.68	53.35	79.99	79.98	1.49
90	9-00-00	636.62	.53	45.00	4-03-00	1-21-00	2-42-00	30.01	60.02	89.98	89.96	2.12
100	10-00-00	572.96	.73	49.99	5-00-00	1-40-00	3-20-00	33.36	66.69	99.97	99.93	2.91
110	11-00-00	520.87	.97	54.98	6-03-00	2-01-00	4-02-00	36.71	73.38	109.95	109.88	3.87
120	12-00-00	477.47	1.26	59.97	7-12-00	2-24-00	4-48-00	40.07	80.07	119.92	119.81	5.02
130	13-00-00	440.74	1.60	64.95	8-27-00	2-49-00	5-38-00	43.43	86.75	129.87	129.71	6.38
140	14-00-00	409.26	1.99	69.93	9-48-00	3-16-00	6-32-00	46.81	93.47	139.82	139.59	7.96
150	15-00-00	381.97	2.45	74.90	11-15-00	3-45-00	7-30-00	50.20	100.19	149.75	149.43	9.79
160	16-00-00	358.10	2.97	79.87	12-48-00	4-16-00	8-32-00	53.61	106.92	159.64	159.20	11.88
170	17-00-00	337.03	3.56	84.82	14-27-00	4-49-00	9-38-00	57.04	113.68	169.52	168.92	14.23
180	18-00-00	318.31	4.24	89.76	16-12-00	5-24-00	10-48-00	60.50	120.46	179.36	178.56	16.88
190	19-00-00	301.56	4.99	94.68	18-03-00	6-01-00	12-02-00	63.99	127.27	189.16	188.12	19.83
200	20-00-00	286.48	5.82	99.59	20-00-00	6-40-00	13-20-00	67.52	134.13	198.92	197.57	23.09
210	21-00-00	272.84	6.73	104.48	22-03-00	7-21-00	14-42-00	71.09	141.01	208.61	206.90	26.69
220	22-00-00	260.44	7.74	109.35	24-12-00	8-04-00	16-08-00	74.71	147.94	218.25	216.09	30.63
230	23-00-00	249.11	8.84	114.18	26-27-00	8-49-00	17-38-00	78.39	154.93	227.81	225.12	34.92
240	24-00-00	238.73	10.05	118.99	28-48-00	9-36-00	19-12-00	82.14	161.99	237.29	233.97	39.57
250	25-00-00	229.18	11.35	123.76	31-15-00	10-25-00	20-50-00	85.98	169.11	246.68	242.61	44.60
260	26-00-00	220.37	12.78	128.49	33-48-00	11-16-00	22-32-00	89.90	176.32	255.96	251.03	50.01
270	27-00-00	212.21	14.31	133.18	36-27-00	12-09-00	24-18-00	93.92	183.63	265.12	259.18	55.80
280	28-00-00	204.63	15.96	137.81	39-12-00	13-04-00	26-08-00	98.21	191.05	274.15	267.05	62.07

GENERAL NOTES

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For superelevation distribution, see Std. D-6.07.

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STANDARD PLANS

REV. DATE 4/78

TRANSITION SPIRAL TABLE FOR a=10

PLAN NO. D-57.95