Developing an Effective Construction Training Program for American Supervisors with Hispanic Craft Workers:

Spanish as a Second Language Survival Course and Concrete Pavement Construction Basics Course

Sponsored by
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(CTRE Project 04-132)

Center for Transportation Research and Education

Department of Civil, Construction and Environmental Engineering

Iowa State University

Final Report • June 2005

DEVELOPING AN EFFECTIVE CONSTRUCTION TRAINING PROGRAM FOR AMERICAN SUPERVISORS WITH HISPANIC CRAFT WORKERS:

SPANISH AS A SECOND LANGUAGE SURVIVAL COURSE AND CONCRETE PAVING CONSTRUCTION BASICS COURSE

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Preparation of this report was financed in part
through funds provided by the Iowa Department of Transportation
through its research management agreement with the
Center for Transportation Research and Education,
CTRE Project 04-132.

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OVERVIEW

This accessible document compiles materials from two courses developed as part of the second phase of the Hispanic Workforce Research Project: the Spanish as a Second Language (SSL) Survival Course and the Concrete Pavement Construction Basics (CPCB) Course. The SSL Survival Course teaches basic Spanish language skills to non–Spanish-speaking supervisors, providing them enough terminology to communicate daily tasks to their Hispanic workers. The CPCB Course teaches more technical Spanish language skills for specific topics relating to concrete pavement construction practices.

SPANISH AS A SECOND LANGUAGE SURVIVAL COURSE

General

Alphabet

ESL (SSL)
The Alphabet

ESL (SSL)

Survival Course

Aggregate

Agregado

Ah-gre-ga-do

Bag

Saco

Sacko

Barrier

Barrera

Bah-rray-ra

Dig

Excavar/Escarbar

Ex-ca-var / Es-car-bar

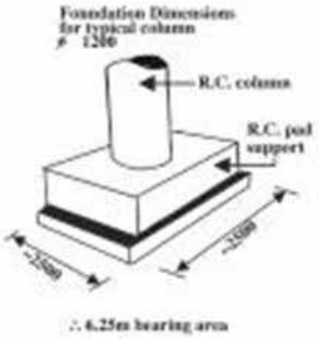
Equipment

Maquinaria

Maki-na-ria

Footing Cimiento/Zapata

See-mee-en-to / Sa-pa-ta



Fence Barda/Cerca

Bar-da / Ser-ka

Vi-dree-o

Glass — Vidrio

Pool-ga-da

Inch — Pulgada

Ga-toe (E-dra-oo-lee-co)

Jack

Gato (Hidraulico)

Koo-chee-yo / Na-va-ha

Knife

Cuchillo/Navaja

Ess-ka-lay-ra

Ladder — Escalera

Al-banyi-le-reea

Masonry — Albañilería

Ru-ee-do

Noise

Ruido

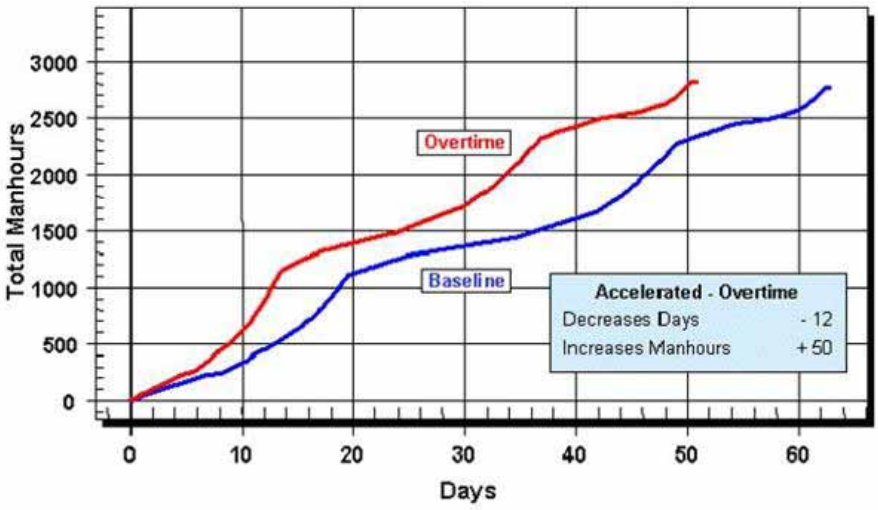
Ah-say-e-te / Petro-lay-o

Oil

Aceite/Petroleo

Oh-ras Extras

Overtime Horas Extras



Pa-vee-men-to

Pavement Pavimento

Ka-mee-no / Veea

Road

Camino/Vía

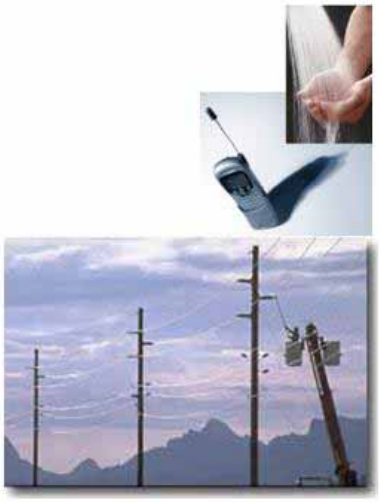
An-da-meeo

Scaffolding

Andamio

Ser-vee-seeos

Utilities — Servicios



A-gua

Water — Agua

Se-der

Yield

Ceder

So-na

Zone

Zona

Flashcards

- Groups of 4 to 5 with a coordinator
- The coordinator places the work in Spanish towards him
- Ask "how do you say what you see Spanish?"
- Everyone answers as remembered
- Repeat the pronunciation in Spanish
- Groups exchange cards

Vowels

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"a"
or
"eh"

E

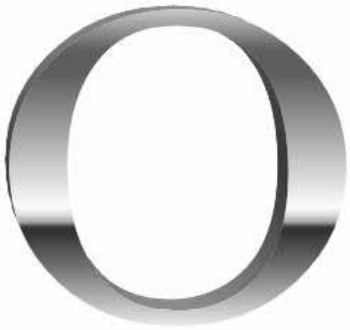
IOWA STATE UNIVERSITY

ee

I

IOWA STATE UNIVERSITY

oh



IOWA STATE UNIVERSITY

oo

See

IOWA STATE UNIVERSITY

Hat

ch

Shake or Change

IOWA STATE UNIVERSITY

ll

Yahoo

canyon

Numbers

Numbers
Los Números
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Oono
Dos
Trays
Quatro
Seenko
1, 2, 3, 4, 5,

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Sayss See-eh-te O-sho Nue-vay Dee-ayss

6, 7, 8, 9, 10

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On-say Dos-say Tray-say Ka-tor-say Keen-say

11, 12, 13, 14, 15,

Dee-ays-see-sayss Dee-ays-see-o-choe Vain-te

Dee-ays-see-see-ai-te Dee-ays-see-nue-ve

16, 17, 18, 19, 20

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Vain-tee oo-no Vain-tee dos

21, 22, ...

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Trainta Traintah-ee-oono Traintah-ee-dos

30, 31, 32, ...

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Qua-ren-ta Seen-quen-ta Say-sen-ta Say-ten-ta

40, 50, 60, 70,

Oh-chen-ta No-ven-ta Syen

80, 90, 100

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Syen-to Dee-ayss Syen-to Vain-te Dos-syen-tos

110, 120, ... ,200

Say-te-syen-tos

Key-nyen-tos

No-ve-syen-tos

Meel

500, 700, 900…., 1000

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Meel Syen

Dee-ayss meel

1100, ……., 10000

Hand Tools

Construction Hand tools
Herramientas para Construcción

Ah-cha

Axe

Acha

Doh-blah-door

Bender

Doblador

Es-koh-bah

Broom

Escoba

Koo-bay-ta

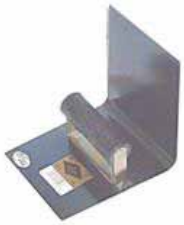
Bucket — Cubeta

Cor-ta-door

Cutter — Cortador

Bor-day-ah-doo-ras

Edgers — Bordeadoras



Ja-na

Floats — Llanas

Ra-noo-ra-do-ras

Groovers — Ranuradoras

Mar-tee-yo

Hammer — Martillo

Knee-vel

Level — Nivel

Mas-sos

Mallets — Mazos

Cor-ta-door day Cah-blay

Nippers Cortador de Cable

Peen-sas

Pliers Pinzas

Pipe cutter Cortador de tubería

Cor-ta-door day too-bay-reeah

Ray-ma-cha-door

Riveter Remachador

Saw (hack saw or chain saw)

Sierra ó Serrucho

See-ay-rra oh Say-rroo-cho

Des-ar-ma-door

Screwdriver

Desarmador

Pa-la

Shovel Pala

Seen-ta May-tree-ca

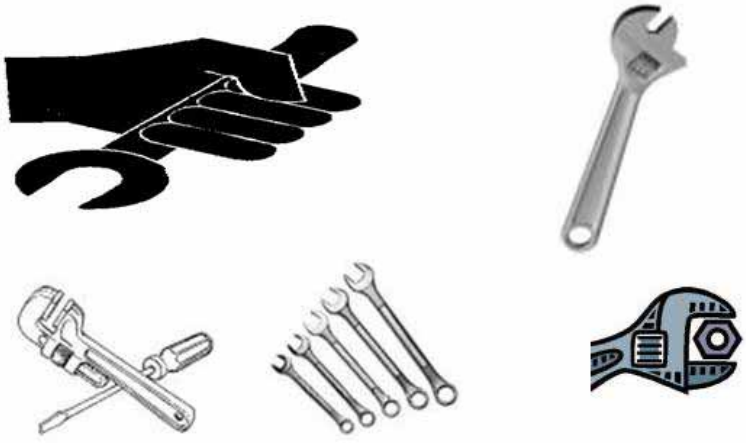
Tape (to measure) Cinta Métrica

Coo-cha-ra

Trowell — Cuchara

Ya-ve

Wrench — Llave



Inputs

Materials

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Asphalt

Asfalto

As-phal-to

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Block

Block-ay

Bloque

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Brick

La-dree-yo

Ladrillo

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Cement

Say-men-to

Cemento

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Tee-eh-rra / Pol-vo

Dirt/Dust

Tierra/Polvo

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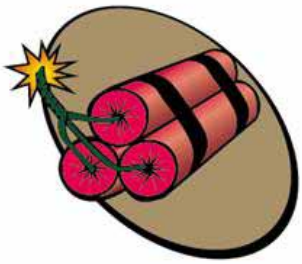
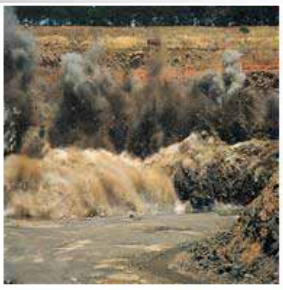
Explo-see-vos

Explosives

Explosivos





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Vee-gah en a-che

H-Beam — Viga en H

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Eyes-la-mee-en-to

Insulation — Aislamiento

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Joist

Vee-ge-ta

Vigueta

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Lumber

Ma-de-rah

Madera

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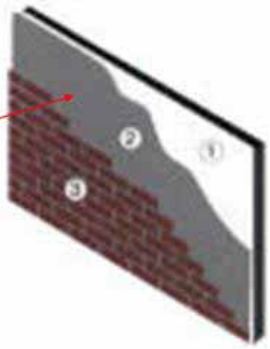
More-te-ro

Mortar Mortero



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Klah-vohs

Nails Clavos

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Peen-too-ra

Paint

Pintura

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Quarry

Pedrera/Mina para extracción de roca

Pay-dre-ra / Mee-na pa-rah
ex-trak-seeon day rro-kah

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Va-ree-ya day Ray-foo-er-so

Rebar — Varilla de Refuerzo

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Ah-ray-nah

Sand — Arena

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Timber

Miembro Estructural de Madera

Me-em-bro Es-trook-too-ral day Ma-de-ra

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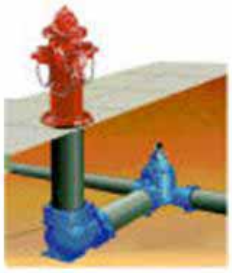
Valve

Val-voo-lah

Válvula



Construction Workforce

Mano de Obra para Construcción

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Bricklayer

Instalador de ladrillos

Ins-ta-lah-door day la-dri-yos

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He-fay

Boss — Jefe

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Car-peen-te-ro

Carpenter — Carpintero

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Drywall Installer Plafonero

Pla-fo-nai-ro

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Elec-tree-sys-ta

Electrician Electricista

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In-he-knee-eh-ro

Engineer Ingeniero

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Foreman Capataz

Ca-pa-tas

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Ah-you-dan-te

Helper Ayudante

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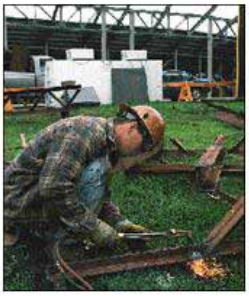
Ironworker / Rod buster Fierrero

Fee-eh-rre-ro



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Inspectohr

Inspector Inspector

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Oh-bre-ro / Pe-on

Laborer Obrero / Peón

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Al-banyeel

Mason

Albañil

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Oh-pe-ra-door

Operator

Operador

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Painter

Peen-tor

Pintor

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Pipelayer / Pipefitter

Tubero

Too-be-ro

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Ploh-may-ro

Plumber

Plomero

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Te-cha-door

Roofer

Techador

IOWA STATE UNIVERSITY

Topogra-fo

Surveyor Topógrafo

IOWA STATE UNIVERSITY

Superinten-den-te

Superintendent Superintendente

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Sol-da-door

Welder

Soldador

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Tra-ba-ha-door

Worker

Trabajador

Equipment

Construction Equipment

Equipo y Maquinaria
para Construcción

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Retroexca-vah-do-ra

Backhoe Retroexcavadora

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Compac-ta-door

Compactor Compactador

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Com-prays-sor

Compressor Compresor

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Groo-ah / Ploo-mah

Crane

Grúa / Pluma

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Trac-tor / Buldoser

Bulldozer

Tractor / Buldozer

1. CRAWLER de CADENAS

2. PULLED de TIRO

3. WHEELED de Neumaticos

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Exca-vah-doh-ra

Excavator Excavadora

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Mon-ta-car-gas

Forklift Montacargas

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He-ne-ra-door

Generator

Generador

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Motorgrader

Motoniveladora/ Motoconformadora

Moto-knee-ve-la-do-ra/Moto-con-for-ma-do-ra

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Jackhammer Martillo / Rompedora

Mar-tee-yo / Rom-pay-do-ra

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Jumping jack or Rammer Apizonadora / Bailarina

Ah-pee-so-na-do-ra / By-la-ree-na

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Loader

Car-ga-door
Cargador

1. TOOL CARRIER CARGADOR

2. WHEELED DE RUEDAS

3. CRAWLER DE CADENAS

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Mixer Mezcladora / Revolvedora

Mays-cla-do-rah / Re-vol-ve-do-ra

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Car-pay-tay-ah-do-ra

Paver Carpeteadora

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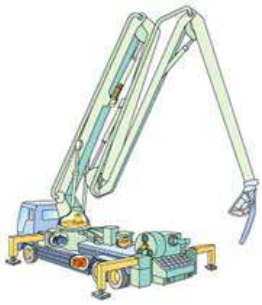
Pump Bombeadora / Motobomba

Bom-bah / Motobombah



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Row-dee-yo

Roller

Rodillo

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Ah-ya-na-do-ra

Screeder

Allanadora

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Moto-es-cray-pa

Motorscraper

Motoescrepa

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Skid steer loader

Minicargador ó Bobcat

Mini-car-ga-door oh Bobcat

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San-ha-do-ra

Trencher

Zanjadora

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Poo-lee-do-ra

Trowel

Pulidora

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Dump Truck Camión de Volteo

Ca-meeon day Vol-tay-o

Safety

Safety Equipment

Protective Clothing

Ropa para Protección

Ro-pa pa-rah Pro-tek-seeon

Cabinets

Gaby-ne-tes

Gabinetes

Ex-ting-gee-door

Extinguisher — Extinguidor

Ear Protection — Protección
Ear Plugs — para los oidos

Pro-tek-seeon pa-rah los oh-ee-dos

Bo-tee-keen

First Aid Kit Botiquín

Flash light Lámpara /Linterna

Lam-pa-ra / Lean-tear-na

Goo-wan-tes

Gloves — Guantes

Go-gless / Ga-fas

Goggles — Gogles / Gafas

Kas-co

Hardhat Casco

Are-nes

Harness Arnés

Mass-caras

Respirators Máscaras

Signs Letreros

Lay-tray-ros

Traffic cones Conos para tráfico

Co-nos pa-rah tra-ffi-ko

Cha-lay-co

Vest Chaleco

Vee-se-ras

Visors

Viseras

Safety Signs

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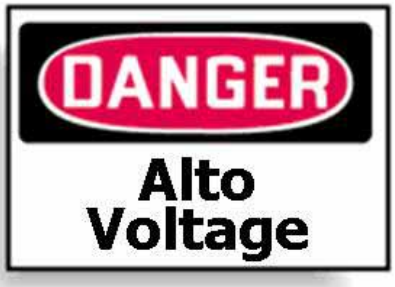
Pe-lee-gro

Danger Peligro



Al-to Vol-ta-he

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Ad-ver-ten-seeah

Warning Advertencia

Ah-pa-gar kwan-
do no es-tah en
oo-so

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Pre-kaoo-seeon

Caution Precaución

Oo-se soo
mass-ca-ree-ya

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A-vee-so

Notice Aviso

A-gua no po-tah-blay

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Electric Shock Hazard

Pe-lee-gro de Shock Elec-tree-co

Peligro de Shok Electrico

- Live wire
  - Cables de alta corriente
- Broken or damaged wire
  - Clables rotos o dañados
- Overloaded circuits
  - Circuitos sobrecargados
- Uncovered Wiring
  - Cables destapados

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Pe-lee-gro de Ka-ee-da

Fall Hazard

Peligro de Caída

- Roofs, wall openings
  - Techos, aberturas en paredes
- Holes & excavations
  - Hoyos & excavaciones
- Scaffolding
  - Andamios
- Residential Construction
  - Construcción Residencial

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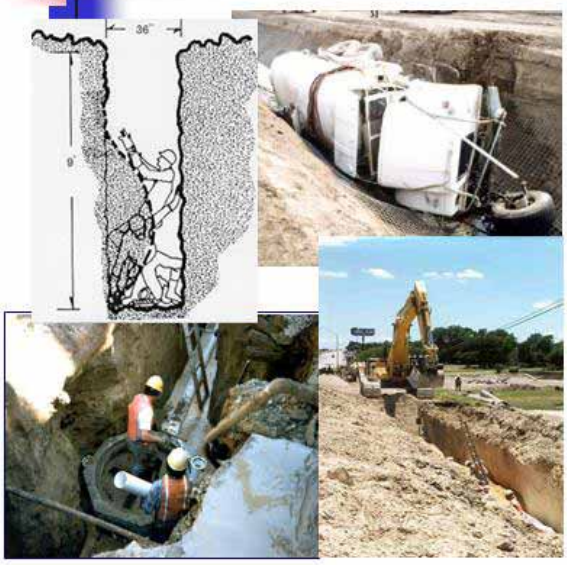
Excavation Hazard

Pe-lee-gro de Ex-ca-vah-seeon

Peligro de Excavación



- Water in trenches
  - Agua en la trinchera
- Cave-ins due to:
  - Inadecuate or no protective systems
  - Weight from equipment, spoils, etc.
  - Derrumbes a causa de:
    - Falta de sistemas de protección o inadecuados
    - Peso de maquinaria, tierra excavada, etc.
- Inadecuate access & exit point
  - Acceso y salidas inadecuadas

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Struck-By Hazard

Peleegro de Golpeh

Peligro de Golpe

- Vehicles
  - Vehículos
- Falling/Flying objects
  - Objetos cayendose/volando
- Masonry Walls
  - Paredes de bloques

Various

Productivity

Construction Productivity

Productividad en Construcción

Linear Foot

Pee-eh Lee-nai-al

Pie Lineal

LF : ft

Unidades de distancia

Oo-nee-da-des de dis-tan-see-ah

a + a + b + b = Perímetro =→ft

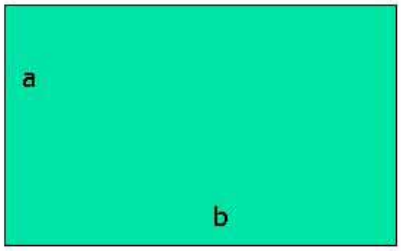
Units in feet, yards, miles

Pee-eh Qua-dra-do

Square foot — Pie cuadrado

SF : ft^2

Unidades de área



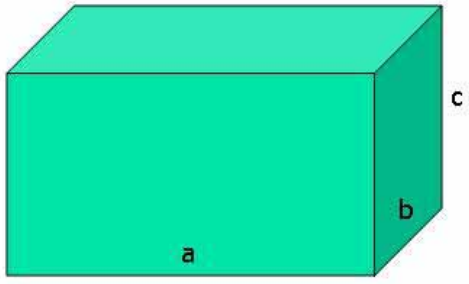
Area = a x b =➔ ft^2

Pee-eh Koo-bee-co

Cubic foot — Pie cúbico

CF : ft^3

Unidades de volúmen

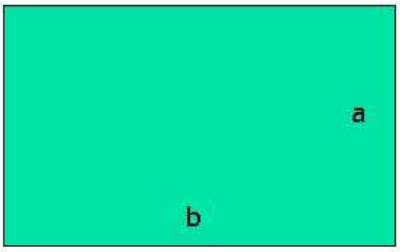


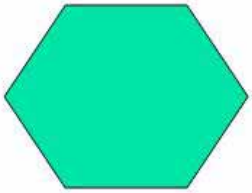
Vol. = a x b x c = → ft^3

Perimeter

Pay-ri-metro

Perímetro





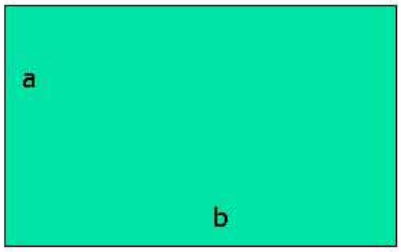
Area

A-re-a

Area

SF : ft^2

Unidades de área



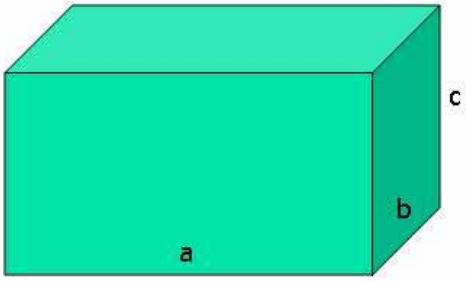
Area = a x b =➔ ft^2

Vo-loo-men

Volume — Volúmen

CF : ft^3

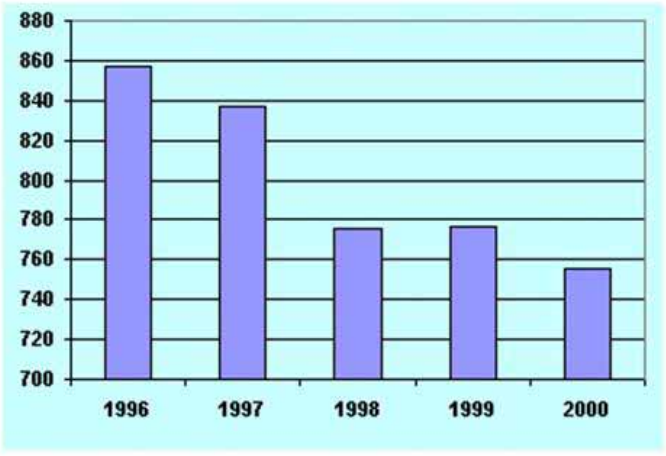
Unidades de volúmen



Vol. = a x b x c = → ft^3

Dees-mee-nu-ear

Decrease — Disminuir



In-crai-men-tar

Increase — Incrementar

Tem-pai-ra-too-ra

Temperature — Temperatura

Fa-ren-height

- Fahrenheit → Centigrade

$^{o}C. = 5/9\ (^{o}F. - 32)$

Sen-tee-gra-do

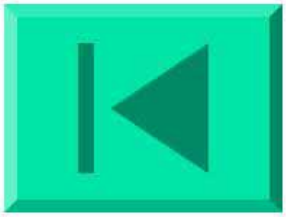
- Centigrade → Fahrenheit

$^{o}F. = 9/5\ ^{o}C. + 32$

°F

°C

- Return to Presentation



Prodoc-chon reit

Production Rate Rendimiento

Definition:

Number of units of work produced by a unit of production or a person in a specified unit of time

$$\text{Rendimiento} = \frac{[\text{ Número de unidades }]}{[\text{ Unidad de tiempo }]}$$

SF / HR : metro cuadrado por hora

CY / HR : yarda cúbica por hora

Common Phrases / Questions

1. How long does it take you to….
   - Install the rebar?
   - Pour the concrete?
   - Complete the task you are doing?
2. You should be done with this task today

1. Cuanto tiempo te tardas en:
   - Instalar el refuerzo?
   - Colar el concreto?
   - Terminar lo que estas haciendo?
2. Debes terminar esta tarea hoy

Common Phrases / Questions

3. Do not waste any material
4. Hurry up

- Do you have the right tools to do the job?
- Is there any thing I can help you with?

3. No desperdicie material
4. Apúrate
5. Tienes la herramienta adecuada para hacer el trabajo?
6. Te puedo ayudar en algo?

Common Phrases / Questions

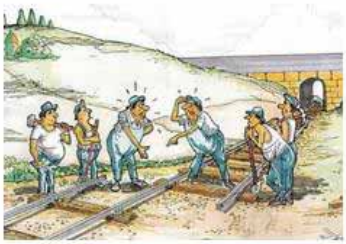
7. I want you to come early tomorrow so we can start the pour on time
8. Would you measure the area of the footing?
9. What is the thickness of the slab?

7. Quiero que vengas mañana temprano para iniciar el colado a tiempo
8. Pudieras medir el área de la zapata?
9. Cuál es el espesor de la losa?

Quality

Construction Quality

Calidad en la Construcción



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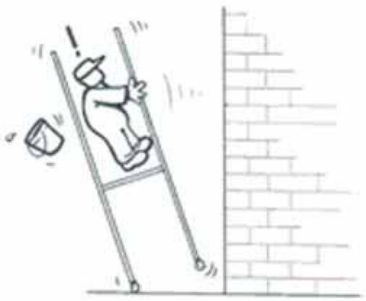
Adequate Tool

Herramienta Adecuada

Ai-ra-mee-en-tas A-dai-qua-das



What can affect quality?

¿Qué puede afectar la calidad?

¿Kai poo-ai-de a-fec-tar la ka-lee-dad?

Quality is everyone's responsibility!!!

Calidad es responsabilidad de todos!!!

Ka-lee-dad es rais-pon-sa-bee-lee-dad de to-dos!!!

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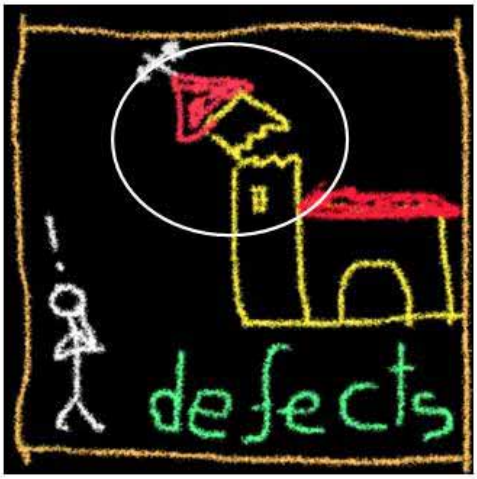
Dai-fec-to

Defect Defecto



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A-va-lua-seeon

Evaluation Evaluación

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Inspec-seeon

Inspection Inspección

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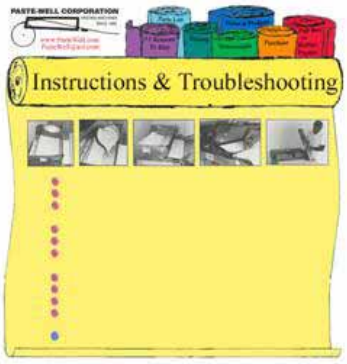
Ins-trook-seeo-nes

Instructions Instrucciones



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Quality control

Control de calidad

Control de ka-lee-dad

Need for training

Necesidad de capacitación

Nai-sai-see-dad de ka-pa-see-ta-seeon

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A-rror

Mistake Error

Mistakes should not be repeated

Los errores no deberían cometerse otra vez

Los a-rro-rais no dai-bai-reean co-me-ter-se o-tra vais

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Dee-ne-ro

Money Dinero

Improved quality saves money and time

La buena calidad ahorra dinero y tiempo

La boo-ai-na ka-lee-dad ah-o-rra dee-ne-ro ee tee-em-po

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Construction Plans

Planos de Construcción

Pla-nes day Cons-trook-seeon

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Problem Identification

Identicación de problemas

E-den-tifi-ka-seeon day pro-blay-mas

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Es-pai-see-fee-ca-seeo-nes

Specifications Especificaciones

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Se-goo-ree-dad

Safety Seguridad

Tra-ba-han-do pa-rah man-tay-ner-te say-goo-ro

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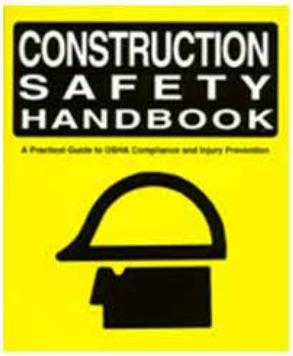
Standard

Stan-dard

Standard



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Teamwork

Trabajo en equipo

Tra-ba-ho n ai-kee-po

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Vee-o-la-seeo-nes

Violations Violaciones

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Return to presentation

Definition of Quality

Definición de Calidad

Those products and services that are perceived to meet or exceed the needs and expectations of the customer at a cost that represent an outstanding value.

Aquellos productos y servicios que son escogidos para cumplir o exceder las necesidades y expectativas del cliente a un costo que representa un excelente valor.

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Vocabulary related...

Product	Pro-dook-to	Producto
Service	Ser-vee-sio	Servicio
Perceive	Per-see-vir	Percibir
Exceed	Ex-say-der	Exceder
Needs	Nai-sai-see-dad	Necesidades
Expectations	Expec-ta-tee-vas	Expectativas
Customer	Clee-en-te	Cliente
Cost	Costo	Costo
Outstanding	Ex-say-len-te	Excelente
Value	Valor	Valor

- Lack of knowledge

Carencia de conocimiento

Ca-ren-seea de co-no-see-mee-ain-to

- Lack of skills

Carencia de habilidades

Ca-ren-seeadeh
ah-bee-lee-da-des

- Lack of communication

Carencia de comunicación

Ca-ren-seea de co-moo-nee-ka-seeon

Miscellaneous

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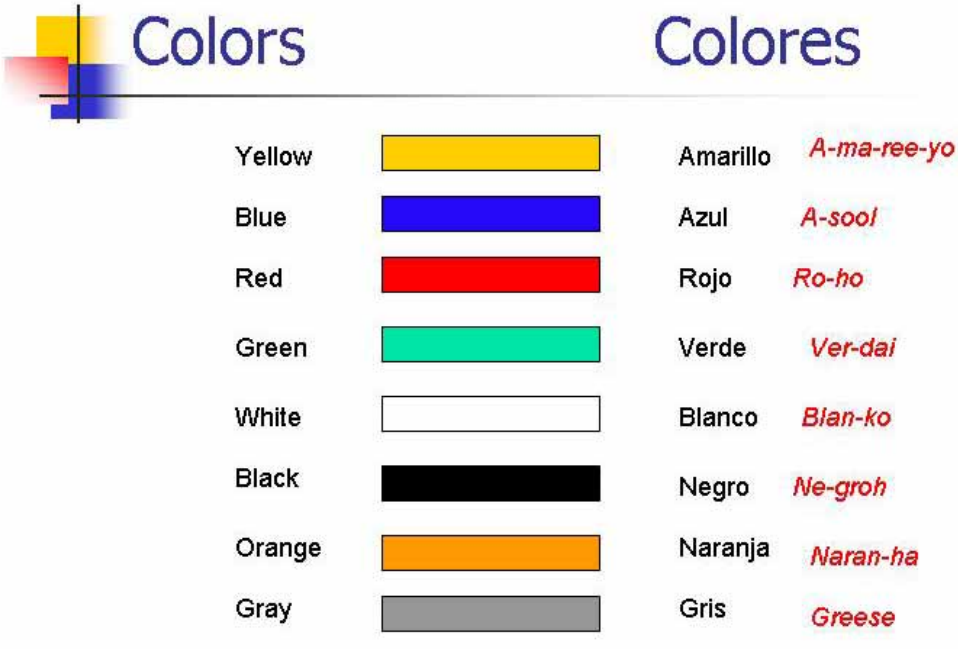

Personal Information

- What is your name? Cómo te llamas?
- Where are you from? De donde eres?
- What is your address? Cuál es tu dirección?
- How old are you? Qué edad tienes?

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- Are you married? Eres casado?
- Do you know how to drive? Sabes manejar?
- Do you have a driver's license? Tienes licencia para conducir?
- In case of emergency, who do we call? A quién llamamos, en caso de emergencia?
- What is your telephone number? Cuál es tu número telefónico?

Days of the week

Monday	Lunes
Tuesday	Martes
Wednesday	Miércoles
Thursday	Jueves
Friday	Viernes
Saturday	Sábado
Sunday	Domingo

Months of the year

January	Enero	July	Julio
February	Febrero	August	Agosto
March	Marzo	September	Septiembre
April	Abril	October	Octubre
May	Mayo	November	Noviembre
June	Junio	December	Diciembre

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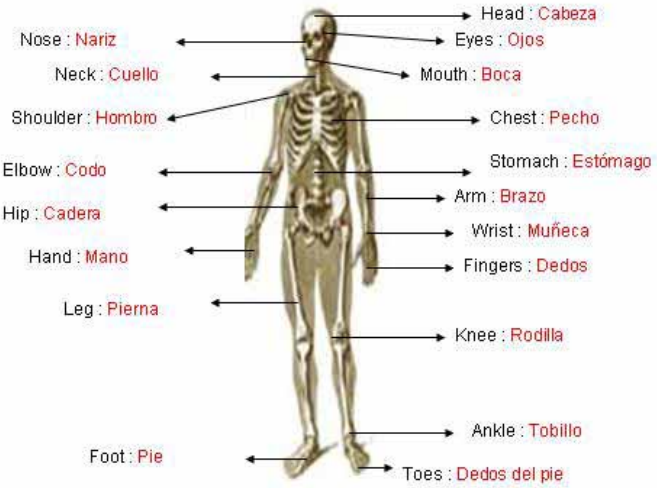
Anatomy Anatomía



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Seasons of the year
Estaciones del año

Esta-see-oh-nes del anyo

Fall Otoño

Winter Invierno

Spring Primavera

Summer Verano

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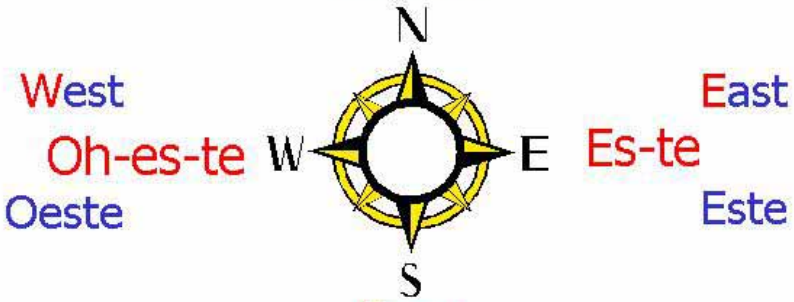
Directions

Direcciones

Dee-rek-see-oh-nes

North Norte

Nor-te



West

Oh-es-te

Oeste

East

Es-te

Este

Soor

South Sur

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Position

Posición

Po-see-seeon

Up

Arriba

Ah-ree-bah

Down

Abajo

Ah-ba-ho

Return

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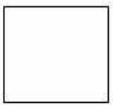
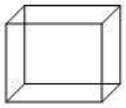
Units Unidades

1. Linear: Lineal
   - Inch: Pulgada → Inches: Pulgadas
   - Foot: Pie (lf) → Feet: Pies
   - Yard: Yard → Yards: Yardas

2. Area: Area
   - Square inch: Pulgada cuadrada
   - Square foot: Pie cuadrado (sf)
   - Acre: Acre



3. Volume: Volúmen
   - Cubic inch: Pulgada cúbica
   - Cubic Foot: Pie cúbico (CF)
   - Cubic yard: Yarda cúbica (CY)



Linear Lineal

- 1″ inch = 2.54 cm
- 12″ (inch) = 1 foot = 30.48 cm
- 1′ or ft (foot) = 0.33 yard
- 1 mile = 1.61 km

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Area Area

- 1 square inch = 6.45 cm^2
- 1 $foot^2$ = 144 $inches^2$ = 929.03 cm^2
- 1 $mile^2$ = 2.59 km^2
- 1 Acre = 4050 m^2
- 1 Acre = 0.40 Hectares
- 1 Acre = 43600 sf
- 1 $Yard^2$ = 9 ft^2

Volium

Volume Volumen

- 1 CY (cubic yard) = 0.765 m^3 (metros cúbicos)
- 1 CY = 27 ft^3 (Pies cúbicos)
- 1 $foot^3$ = 1728 $inches^3$
- 1 $yard^3$ = 27 ft^3 = 0.76 m^3
- 1 $inch^3$ = 16.39 cm^3
- 1 gallon = 3.78 liters

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Temper-chur

Temperature Temperatura

0 Celsius °C = 32 Fahrenheit °F

-40 °C = -40 °F
-30 °C = -22 °F
-20 °C = -4 °F
-10 °C = 14 °F
0 °C = 32 °F

10 °C = 50 °F
20 °C = 68 °F
30 °C = 86 °F
40 °C = 104 °F

Communication: The key to success

Comunicación: La llave del éxito

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I. Consequences due to lack of communication

Consecuencias debido a la falta de comunicación

1. Safety risks and hazards
2. Low productivity
3. Low Quality
4. Frustration
5. Underutilization of people's capabilities
6. Low Morale

1. Alto riesgo y peligro en el trabajo
2. Baja productividad
3. Baja Calidad
4. Frustración
5. Mala utilización de la capacidad del personal
6. Baja moral

Continued,

5. Anxiety
6. Missing crew leadership opportunities
7. No advancement
8. No better pay

5. Ansiedad
6. No aprovechar opportunidades de liderazgo
7. No promociones
8. Falta de aumento salarial

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Return

Continue to recommendations

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II. Recommendations

1. Remove any obstructions to hear clearly
   Quitar cualquier obstrucción que impida oir claramente

2. Look at the person while listening and speaking
   Ver a la persona mientras escuchas ó hablas

Continued,

3. Show your worker you are committed to communication
   Muestrale a tu trabajador tu compromiso con la comunicación

4. Take the time to communicate, either in English or in Spanish or both
   Toma el tiempo para comunicarte, ya sea en Ingles o en Español o en ambos

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Continued,

5. Admit, without embarrassment, that you don't understand
   Admite sin pena que no entiendes

5. Do not let you worker pretend he understands; have him tell you what he understood
   No le permitas a tu trabajador que pretenda que entiende; has que te diga lo que entendió

Continued,

5. If you don't understand, ask the question and / or comment to be repeated

   Si no entiendes, pide que se te pregunte y/o se te diga otra vez

6. If you don't understand again....get paper and pencil to write it down

   Si otra vez no entiendes.....saca tu papel y tu lápiz para escribir

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Continued,

7. Learn to use "survival phrases"

   Aprende a usar frases de supervivencia

8. Get adequate training in Spanish

   Capacitate adecuadamente en Español

Continue to survival phrases

Survival phrases in Construction

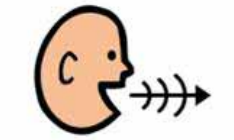
Frases de supervivencia en Construcción

III. Survival Phrases

1. Please repeat
   Por favor dígame otra vez

2. In other words, you are telling me to...
   En otras palabras, me estás diciendo...

3. How do you say this in Spanish?
   Como se dice esto en Español?



4. Sorry, would say that again?
   Disculpa, puedes repetir eso otra vez?

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Continued,

4. Are you sure you understand?
   Estas seguro que entiendes?

5. Please tell me or show me what you understood
   Por favor dime o muestrame lo que entendiste

6. Ok, let me see if I understand you...
   Ok, déjame ver si te entiendo...

Continued,

7. Thanks for your understanding
   Gracias por tu comprensión

Back to
Table of Contents

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Continued,

8.- Any other phrase you would like to learn?
Otra frase que te gustaría aprender?

Back to
Table of Contents

CONCRETE PAVEMENT CONSTRUCTION BASICS COURSE

Curing

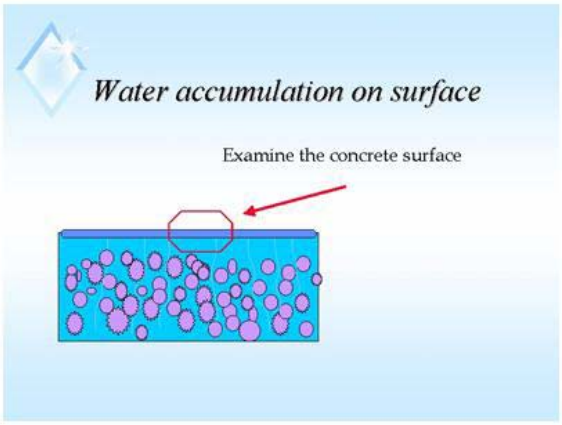
Curing Concrete

Curado de Concreto

1

Soo-dan-do / San-gran-do

Bleeding Sudando / Sangrando



2

Lo-na

Burlap — Lona

Com-poo-es-to de Koo-ra-do

Curing Compound — Compuesto de Curado

4

Man-tah Elec-tree-ca

Electric Blanket

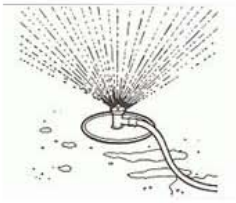
Manta Eléctrica

5

Noo-blar & Rai-gar A-gua

Fogging & Sprinkling

Nublar & Regar Agua

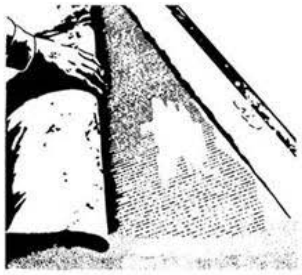


6

Pa-pel Im-per-mai-ah-blai

Impervious Paper

Papel Impermeable

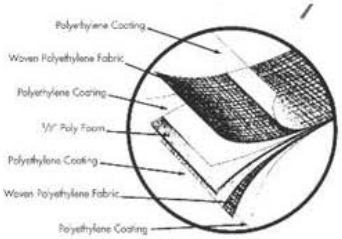


7

Man-tah A-is-la-do-ra

Insulation Blanket

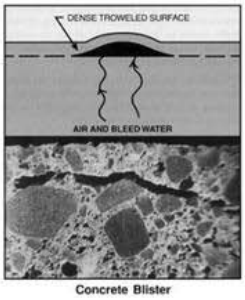
Manta Aisladora



8

Tempai-rah-too-ra Al-ta

High Temperature — Temperatura Alta



Concrete Blister

9

Tempai-rah-too-ra Ba-ha

Low Temperature — Temperatura Baja

10

Oo-mai-dad

Moisture

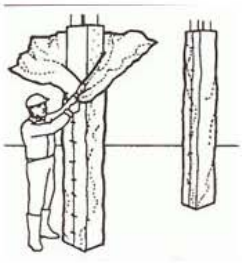
Humedad

11

O-has de plas-tee-co

Plastic Sheets

Hojas de Plástico



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Char-ko

Pond

Charco

13

Ca-lain-ta-do-res Por-tah-tee-les

Portable Heaters

Calentadores Portátiles

14

Tah-pai-tai / Al-fom-bra

Rug

Tapete / Alfombra

15

Ca-lain-ta-do-res

Heaters

Calentadores

16

Koo-ra-do a Vah-por

Steam Curing

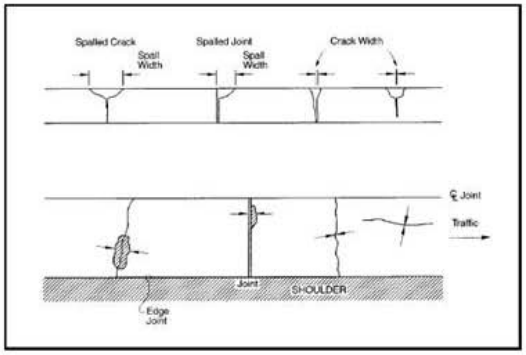
Curado a Vapor

17

Super-fee-see-ay Ah-gree-ay-tada

Cracked Surface

Superficie Agrietada



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See-lin-dros de Pru-ai-ba

Test Cylinders — Cilindros de Prueba

19

En-vol-too-ra Oo-mai-da

Wet Coverings — Envoltura Húmeda

20

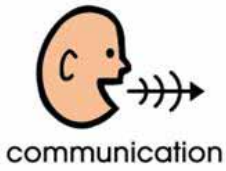
Basic Survival Phrases

1. Please repeat
   Por favor dígame otra vez

2. How do you say this in Spanish?
   ¿Cómo se dice esto en español?

3. I do not understand
   Yo no entiendo

4. Are your sure you understand?
   ¿Estás seguro que entiendes?



5. Show me
   Muéstrame

21

Emergency Phrases — Frases de Emergencia

1. Watch out!
   ¡Cuidado!
2. Get out of the way!
   ¡Salte del medio!
3. Do not move!
   ¡No te muevas!
4. Watch out for fresh concrete!
   ¡Cuidado con el concreto fresco!
5. Danger!
   ¡Peligro!

22

Daily Phrases / Frases Diarias

1. Bring the rug
   Tráe el tapete
2. Take the insulation blanket overthere
   Lleva la manta aisladora allá
3. Find the heater
   Búsca el calentador

23

Daily Phrases / Frases Diarias

4. Use the sprinkler
   Usa la regadera
5. Store the electric blanket
   Guarda la manta eléctrica
6. Move the portable heater
   Mueve el calentador portátil

24

Daily Phrases / Frases Diarias

7. Place the burlap
   Coloca la lona
8. Turn On (Off) the equipment
   Enciende (Apaga) el equipo
9. Put on the curing compound
   Ponle el compuesto de curado

25

Daily Phrases / Frases Diarias

12. Pick up the plastic sheets
    Recoge las hojas de plástico
13. Is the burlap wet?
    ¿Está la lona húmeda?
14. Wash the coverings
    Limpia las envolturas

26

Daily Phrases / Frases Diarias

12. Cover well the concrete
    Cubre bien el concreto

13. Humidify the concrete
    Humedece el concreto

14. Have you cleaned the rug?
    ¿Ház limpiado la alfombra?

27

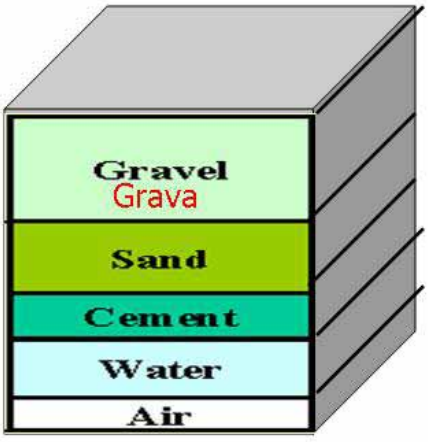
Materials

Materiales
Materials

CENTER FOR
PORTLAND CEMENT CONCRETE
PAVEMENT TECHNOLOGY

1

Materiales para Concreto
Concrete Materials

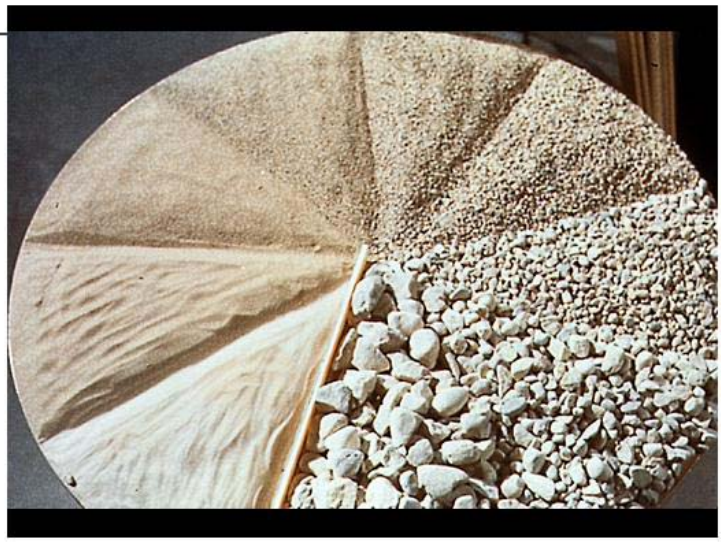


Agregado

- 60-70% Aggregate
  - 30-35% Rock Roca
  - 30-35% Sand Arena
- 9-15% Cements Cemento
- 15-16% Water Agua
- 6- 8% Air Aire

2

Agregados
Aggregates



3

Características de los Agregados
Aggregate Characteristics

- Gradation and Size
  - Coarse, Intermediate, Fine
  - Effect on Workability
- Graduación y tamaño
  - Grueso, Intermedio, Fino
  - Efecto en la trabajabilidad

- Shape and Texture
  - Effect on Workability
- Forma y Textura
  - Efecto en la trabajabilidad

- Durability
  - Chemical – Salt susceptible
  - Physical – Pore size – Freeze/Thaw
- Durabilidad
  - Química – suceptible a la sal
  - Física – Tamaño del Poro – Congelación - deshielo

4

Graduación del Agregado
Aggregate Gradation

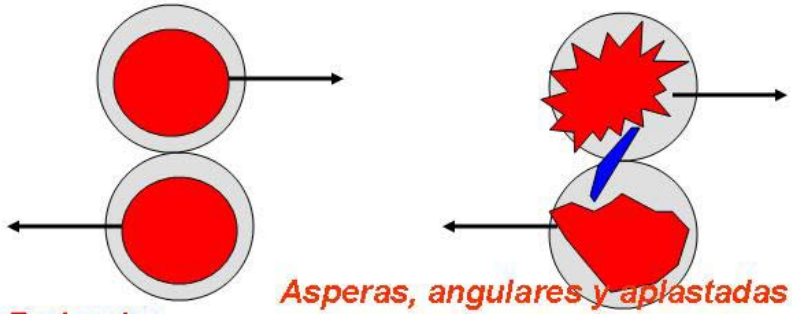
5

Aggregate shapes in Iowa
Formas del Agregado en Iowa

6

La Forma y la Textura afectan la Trabajabilidad

Shape & Texture affect Workability



Lisas y Redondas
Partículas necesitan menos pasta para moverse

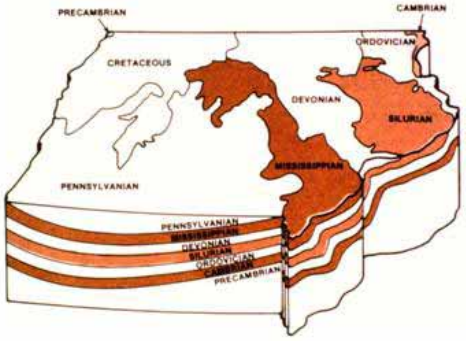
Smooth and round
particles need less paste to move

Asperas, angulares y aplastadas
mas pasta para hacer concreto trabajable

Rough, angular and flat
particles need more paste to make workable concrete

Geologia de Iowa

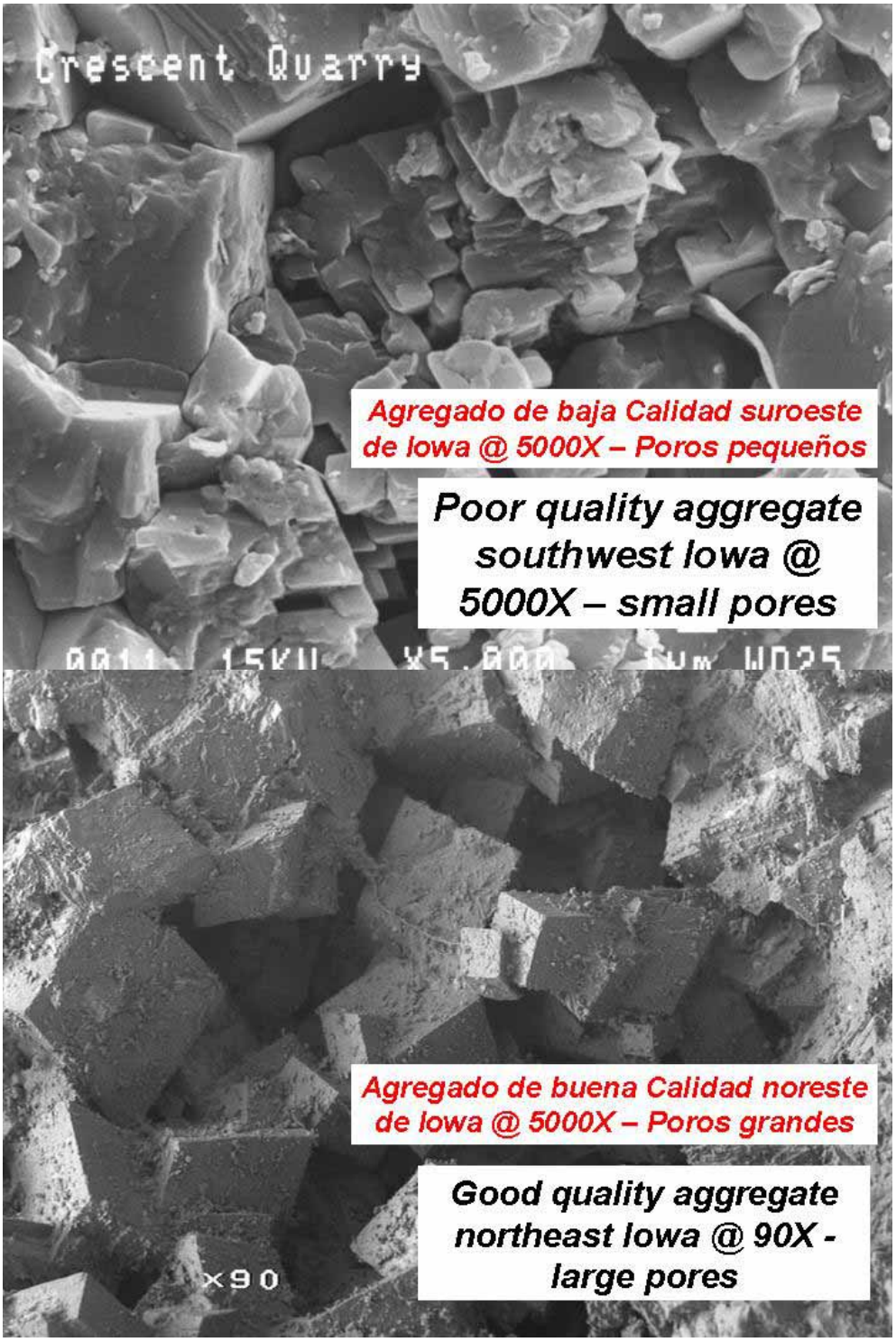
Geology of Iowa



- Iowa was covered by seas and glaciers
- Seas left limestone and glaciers left gravel
- Oldest & best rock (3I) northeast
- Youngest and poor rock southwest

Mares y Glaciares Depositaron Caliza y Gravas

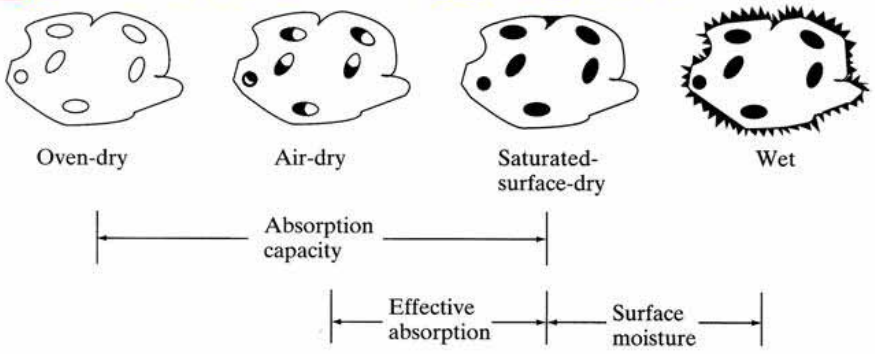
8


Crescent Quarry
Agregado de baja Calidad suroeste de Iowa @ 5000X – Poros pequeños
Poor quality aggregate southwest Iowa @ 5000X – small pores
Agregado de buena Calidad noreste de Iowa @ 5000X – Poros grandes
Good quality aggregate northeast Iowa @ 90X - large pores
×90

Grietas en D
D-Cracking

11

Humedad en los Agregados
Moisture in Aggregates

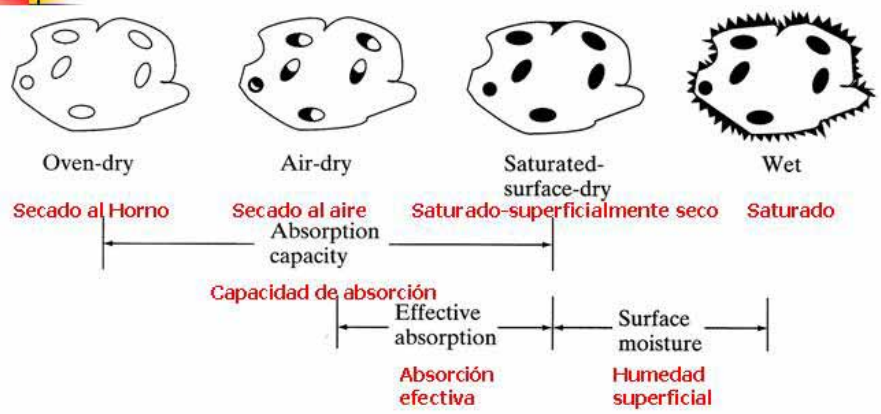


Moisture contents needed for accurate w/c ratio

El contenido de humedad es necesario para una adecuada relación A/C

12

Humedad en los Agregados
Moisture in Aggregates



13

Cemento, Ceniza volante, GGBFS
Cement, Fly Ash, GGBFS

14

Historia del Cemento Portland
History of Portland Cement

- Joseph Aspdin a mason in England applied for patent on a hydraulic cement in 1824

  Cemento hidraúlico

- Portland cement because it resembled stone quarried on the Isle of Portland, England

Globe carved from Portland Stone

15

Materiales usados en la producción de Cemento Portland

Materials used in Portland Cement Production

16

Manufactura del Cemento Portland Moderno

Manufacture of Modern Day Portland Cement

- Raw materials crushed and blended
- Raw blend is burned in the kiln at 2700 °F

- Materia prima quebrada y mezclada
- La mezcla se calienta en el horno a 2700 °F

17

Manufactura del Cemento Portland Moderno

Manufacture of Modern Day Portland Cement

- Quimicamente modificada a cemento granulado (clinker)
- Carbon, llantas, y otros productos de desperdicio son usados como combustible

- Chemically changed to cement clinker
- Coal, tires, and other waste products are used as fuel

18

Manufactura del Cemento Portland Moderno

Manufacture of Modern Day Portland Cement

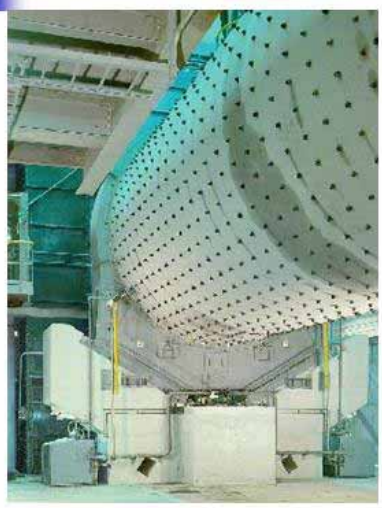
Inside Kiln
Adentro del Kiln

Cement clinker
Cemento granulado (clinker)

19

Manufactura del Cemento Portland Moderno

Manufacture of Modern Day Portland Cement



- Clinker is ground with gypsum in a ball mill to produce the fine gray powder Portland cement
- 80 to 90% passes through No. 325 mesh (holds water)

20

Cement Particles

21

Proceso de Hidratación

Hydration Process

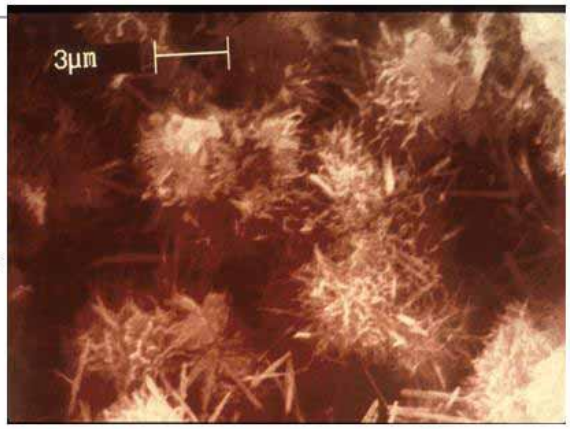
Reacción

Water contacts cement grains, reaction called hydration

Hydration is exothermic (gives off heat)

Needles interlock and form a gel like mass

Las agujas se entrelazan



Hydrated cement grains

Granos de cemento hidratado

22

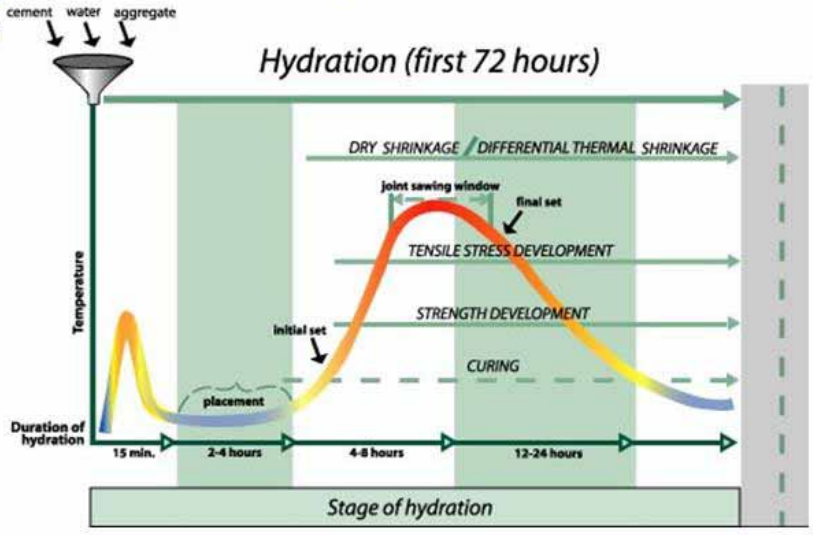
Proceso de Hidratación

Hydration Process

23

Calor de Hidratación

Heat of Hydration



1

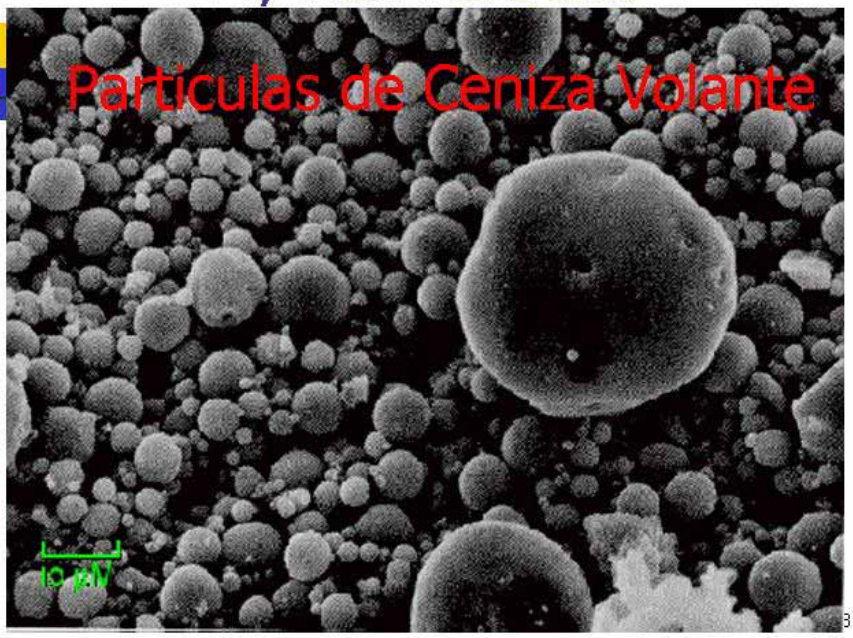
Ceniza Volante

Fly Ash

- Exhaust gases are captured from burning finely ground coal in electric generating plants
- Class C – self cementing
- Class F – Non-cementing
- Approved Sources IM 491.14

2

Fly Ash Particles



3

Advantages to using Fly Ash
Ventajas de usar Ceniza Volante

- Increased workability (rounded particles)
  - Se incrementa la trabajabilidad (particulas redondeadas)
- Reduced permeability (finer than cement)
  - Se reduce la permeabilidad (mas finas que el cemento)
- Economical mix
  - Mezcla económica

4

GGBFS

- **Molten limestone slag floating on top of an iron blast furnace**
- **Quenched in water produces glassy, sand like material,**
- **Ground to fine powder**
- **Approved Sources I.M. 491.14**

5

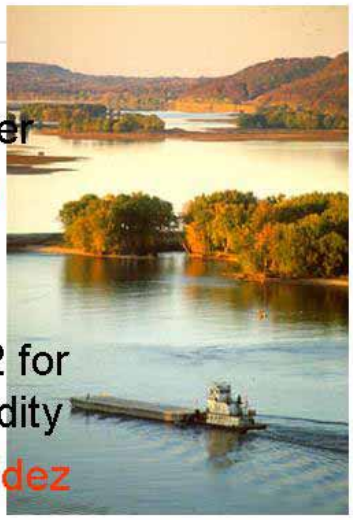
Advantages to GGBFS
Ventajas del GGBFS

- Increased workability, especially in hot weather
  - Se incrementa la trabajabilidad, especialmente en clima caliente
- Reduced permeability
  - Se reduce la permeabilidad
- Increases durability
  - Se incrementa la durabilidad

6

Water
Agua

- Any drinkable source of water
  - Cualquier fuente de agua potable
- Any natural source meeting requirements of Article 4102 for hardness, alkalinity, and acidity
  - Dureza, Alcalinidad, Acidez



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Water/Cement Ratio
Relación agua / cemento

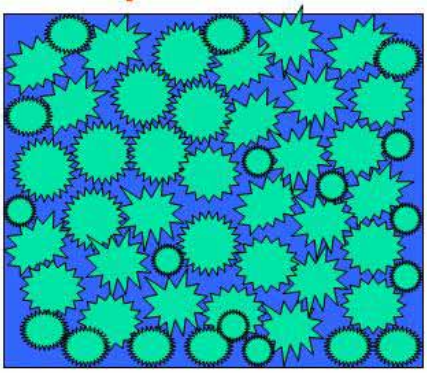
- Weight of water divided by weight of cementitious (cement, fly ash, GGBFS)
  - Peso del agua dividido entre el peso del cementante
- Extra water for workability. Excess water increases pore space between crystals - weaker & porous
  - Agua extra Debilita resistencia
- Direct relationship with strength and permeability
  - Relación directa entre esfuerzo y permeabilidad

8

Water/Cement Ratio
Relación Agua/Cemento

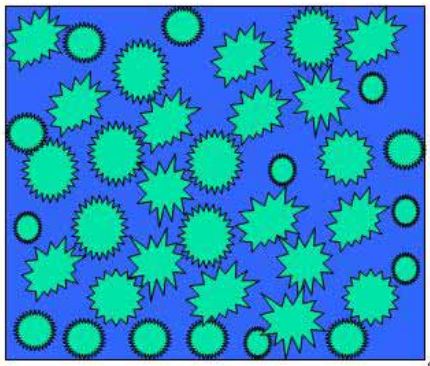
Low w/c ratio

Baja relación a/c



High w/c ratio

Alta relación a/c



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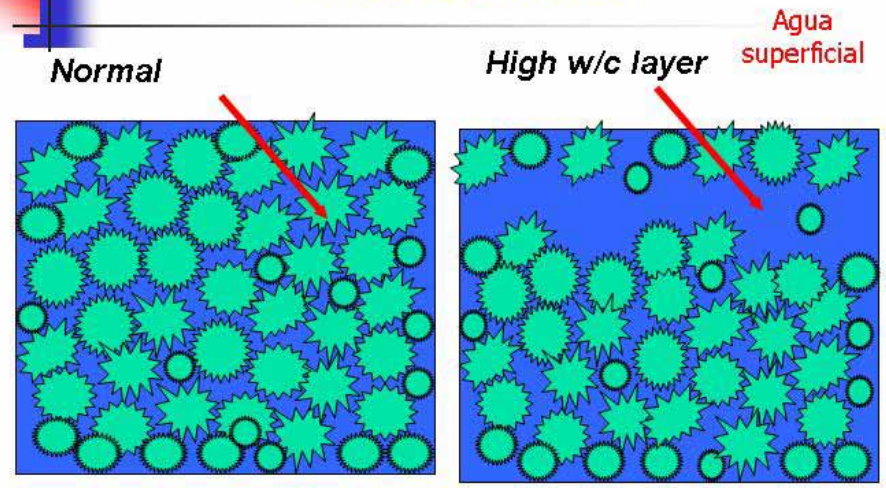
Effect on w/c - Working Water into Surface



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Scaling Desmoronamiento

11

Chemical Admixtures
Aditivos Quimicos

12

Air Entraining Admixtures
Aditivos para aire atrapado

- Stabilize millions of tiny bubbles – Freeze/Thaw
  - Burbujas pequeñas- Congelamiento/Deshielo
- Also, improves workability
  - También, mejora la trabajabilidad

13

Water Expands 9% When Frozen

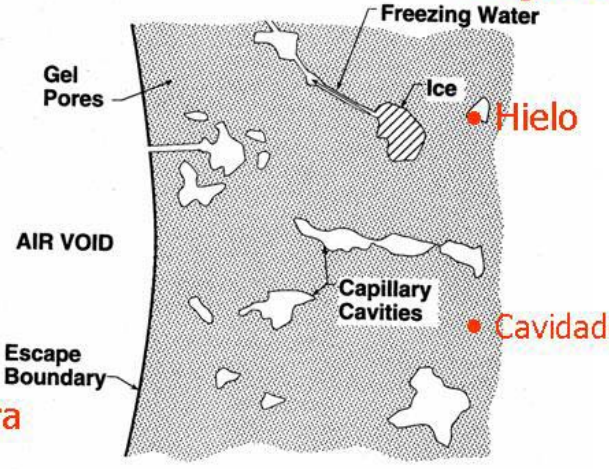
El agua se expande 9% cuando se congela

14

Freeze Thaw Protection

Protección

- Agua congelada
- Poros
- Vacíos
- Hielo
- Cavidades capilares
- Frontera



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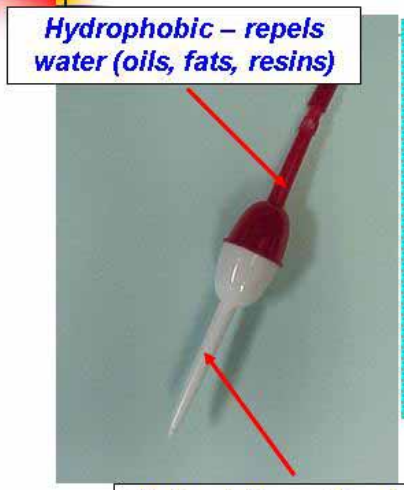
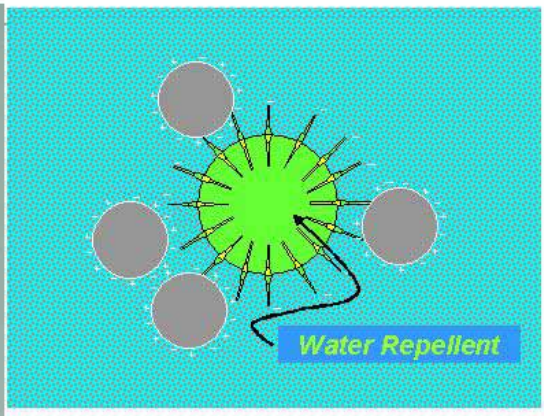
Freeze Thaw Damage

Highway 20 – 8 years old – 3.5% air top 3”

16

How Air Agents Work





Air agents do not add air - mixing action stabilizes bubbles

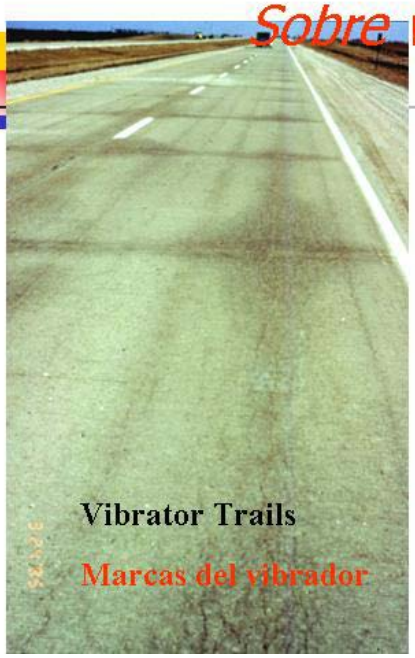
17

Factors Affecting Air Content
Factores que afectan el contenido de aire

- Excessive fines decrease air
  - Excesivos finos disminuyen el aire
- Carbon in fly ash and cement
  - El Carbón en la ceniza volante y el cemento
- Higher temperatures decreases air
  - Las altas temperaturas disminuyen el aire
- Good mixing promotes more air
  - Un buen mezclado aumenta el aire
- Overvibration reduces air
  - La sobrevibración reduce el aire

18

Over Vibration
Sobre vibración



Vibrator Trails

Marcas del vibrador

Vibration Monitor

Monitor de Vibración

19

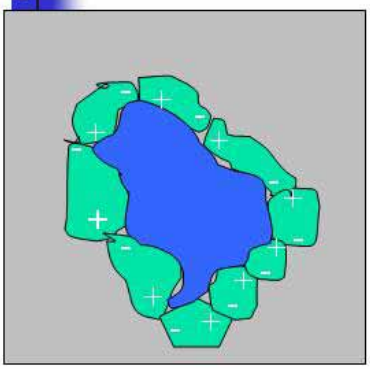
Water Reducing Admixtures
Aditivos reductores de agua

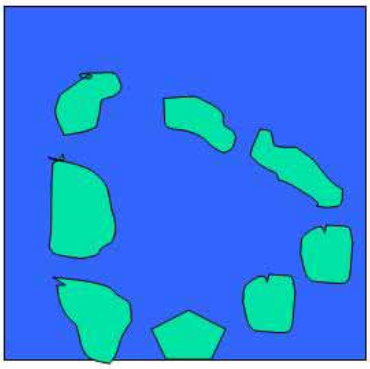
- Disperse static charged cement particles (Anti-static)
- Reduces water required (~7-10%)
- Waste product from paper processing and food industry

Producto de desperdicio

20

How Water Reducers Work
Como trabajan los reductores de agua





- **Cement grains have charge from grinding**
- **Carga electrica del triturado**

- **Reduce static charge release water trapped**
- **Suelta el agua atrapada**

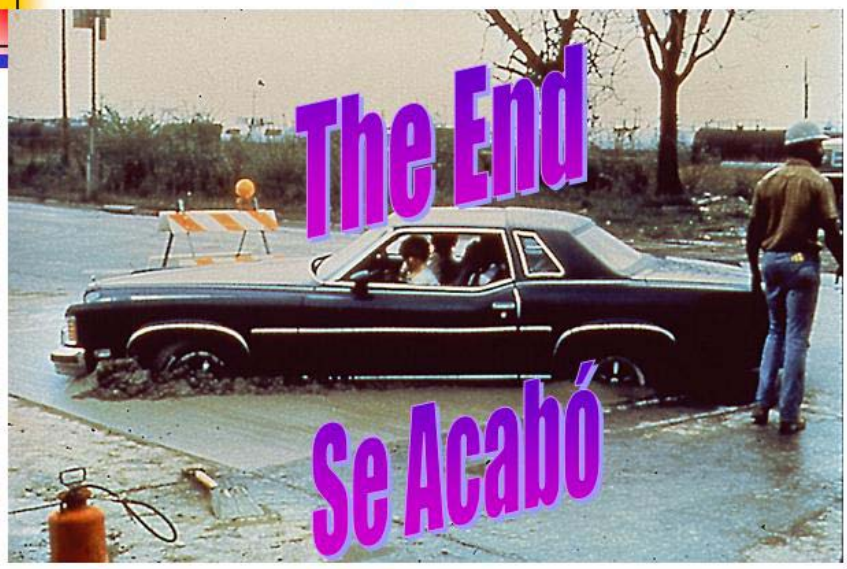
21

Retarders
Retardantes

- Delay hydration of cement by forming film on cement grains, preventing or slowing reaction
  - Retardan la hidratación del cemento formando una capa sobre los granos de cemento, previniendo o retrazando la reacción
- Similar ingredients as water reducer
  - Ingredientes similares al reductor de agua
- Increases working time in hot weather
  - As little as 0.15% sugar added will retard the setting of cement
    - Incrementa el tiempo de trabajo en clima caliente
      - Tan poco como un 0.15% de azúcar agregada retardara el fraguado del cemento

22

Concrete Materials
Materiales para Concreto



1

Jointing

Juntas
Jointing

CENTER FOR
PORTLAND CEMENT CONCRETE
PAVEMENT TECHNOLOGY

1

Porque hacer juntas en el Concreto?
Why Joint Concrete?

- Accommodate pavement movement
  - Internal shrinkage Contracción Interna
  - Temperature related changes Temperatura
- Joints reduce random cracks and other pavement damage caused by natural actions in the concrete that create stresses.

Porque reducen las grietas

2

Los Esfuerzos en el Concreto
Concrete Stresses

- Tensile forces "pull" materials apart
  - Causes tensile stresses to develop
- Compressive forces "squeeze" concrete together
  - For example, vehicle loads "squeeze" concrete between the vehicle and the subgrade
- Concrete has high compressive strength, but relatively little tensile strength
  - Excellent for carrying supported loads Cargas

3

El Propósito de las Juntas
Purpose of Joints

- Cuando el concreto se seca, se encoje!

- As concrete dries, it shrinks!
  - As it shrinks, it "pulls" itself together
  - As it is pulls itself together, parts of it adhere to the subgrade Terracería
  - This causes tensile stresses to develop inside the material Adentro

4

El Propósito de las Juntas
Purpose of Joints

- Las Juntas alivian el esfuerzo
  - Crean una grieta recta y controlada

- Joints provide relief for the tensile stresses that develop as concrete dries
  - Creates a straight, controllable crack
- Different joints relieve different stresses.

5

Para Evitar esto
To Avoid This

6

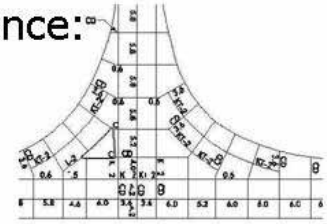
Consecuences of cracks
Consecuencias de las grietas

- Large cracks lead to displacement
  - Grandes grietas producen desplazamiento
- They allow water to percolate into the subgrade
  - Ellas permiten que el agua se filtre a la terracería

7

Planos de Juntas
Why Do Jointing Layouts?

- Provide forethought before construction
- Help the contractor with the bidding process
- Expedite construction by providing clear guidance
- Good layout and field experience:
  - Best end result



Jointing Concerns
Aspectos de Juntas

- Spacing governed by thermal movement
  - El espaciamiento lo gobierna el movimiento termal
- Load transfer prevents faulting
  - La transferencia de carga previene la falla
  - Dowels
    - Dovelas
  - Aggregate interlock
    - Amarre interno del agregado

Joint Spacing
Espaciamiento de Juntas

- Pavements less than 9″ thick
  - Pavimentos de menos 9″ de espesor
    - 15′ Spacing
      - Espaciamiento 15′
- Pavements over 9″ thick
  - Pavimentos con más de 9″ de espesor
    - 20′ Spacing
      - Espaciamiento 20′

10

Jointing Concerns
Aspectos de Juntas

- Joint types to restrict vertical movement
  - Tipos de juntas para restringir movimiemto vertical
    - Tie bars are normally used in:
      - Varillas de amarre se usan normalmente en:
    - Longitudinal joints
      - Juntas longitudinales
    - Headers
      - Cabezales

11

Jointing Concerns
Aspectos de Juntas

- Allow horizontal but not vertical movement
  - Permiten movimiento horizontal pero no vertical
    - Transverse
      - Transversales
    - Expansion
      - De expansión
- Allow differential movement
  - Permiten movimiento diferencial
    - Isolation
      - De aislamiento

12

Contraction Joints
Juntas de Contracción

- Contraction joints reduce random cracking by reducing tensile stress.
  - Las juntas de contracción reducen el agrietamiento sin control reduciendo los esfuerzos de tensión
- Contraction joints simply control where cracks occur
  - Simplemente controlan donde las grietas ocurren

13

Construction Methods
Métodos de Construcción

- Joints are either:
  - Las juntas son ya sea:
  - **Sawed** into hardening concrete
    - **Ranuradas** en el concreto endurecido
  - **Formed**, generally by pressing a T-shaped bar into plastic concrete
    - **Formadas**, generalmente imprimiendo una barra en forma de T en concreto plástico
  - **Constructed**
    - **Construidas**

14

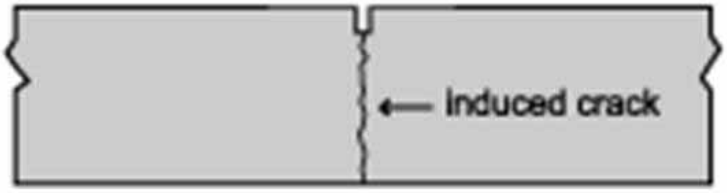
Contraction Joint
Junta de Contracción

Vista Lateral

Ranura

Side View

Saw cut



Grieta inducida

15

Longitudinal Joint
Junta Longitudinal

Vista en planta

Aerial View

Juntas transversales

Transverse joints

Dirección del tráfico

16

Longitudinal Joints
Juntas Longitudinales

- Run parallel with traffic flow
  - Corren paralelas al flujo del tráfico
- Use deformed steel tie bars
  - Usan barras de acero corrugadas para el amarre
- Allows movement but keeps slab from separating
  - Permiten el movimiento pero previene que la losa se separe

Keyed joints
Juntas de chaveta

- In lane-at-a-time construction, longitudinal construction joints between lanes are usually keyed to help connect the two slabs and prevent movement at the joint
  - Construcción de un-carril-a-la-vez,
  - Las juntas de chaveta se usan para conectar las dos losas
  - Previene movimiento en la junta

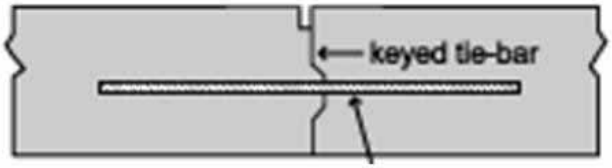
18

Keyed joints
Juntas de chaveta

Vista lateral

Side View

Chaveta



Deformed tie-bar (optional)

Varilla corrugada (opcional)

19

Relation to Adjacent Slabs
Relación con las losas adyacentes

- Joints need a "load transfer" mechanism to reduce vertical movement
  - Las juntas necesitan un mecanismo de "transferencia de carga" para reducir el movimiento vertical

20

Load Transfer Mechanisms
Mecanismos de transferencia de carga

- Aggregate interlock
  - Amarre del agregado
- Aggregate interlock with tie bars
  - Amarre del agregado con varillas de amarre
- Interlock with key and dowels
  - Amarre con chavetas y dovelas

21

Load Transfer Mechanisms
Mecanismos de transferencia de carga

- Dowel bars on pavements 8" or greater
  - Dovelas en pavimentos de 8" de espesor o mas
- Load transfer is important to prevent faulting and pumping
  - Transferencia de carga es importante para prevenir la falla y el bombeo
- Provides for movement: shrinkage or thermal
  - Favorece el movimiento: de contracción o termal

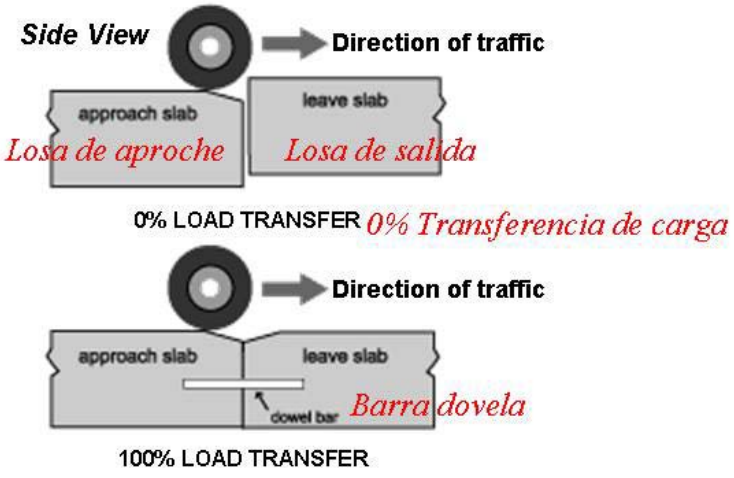
Load Transfer Mechanisms
Mecanismos de transferencia de carga

Help prevent buckling from thermal expansion

- Ayudan a prevenir el pandeo debido a la expansión térmica

- Perpendicular or skewed
  - Perpendicular u oblicuo

Load Transfer Mechanisms
Mecanismos de transferencia de carga



Dowels Dovelas

- Dowels enhance **load transfer**
  - As traffic crosses the joint they reduce vertical movement of the pavement on both sides of the joint

- Las dovelas ayudan **la transferencia de carga**
  - Cuando el trafico cruza la junta, estas reducen el movimiento vertical en ambos lados de la junta

25

Dowels Dovelas

- Dowels are generally placed in transverse joints on pavements that carry a lot of truck traffic

- Las dovelas generalmente se colocan en juntas transversales en pavimentos que admiten mucho trafico de camiones

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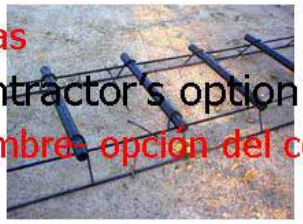
Load Transfer Mechanisms
Mecanismos de transferencia de carga

- Set dowel baskets
  - Colocar las canastas de las dovelas
- Pin behind basket in direction of paving
  - Asegura la canasta en la dirección del pavimento
- Use 8 stakes
  - Usa 8 estacas
- Cut wire- contractor's option
  - Corta el alambre- opción del contratista



Position of Dowels
Posición de las Dovelas

- Position of dowel bars is critical
  - La posición de las dovelas es critica
    - Must be aligned exactly in the middle of the joint line to allow the joint to open and close smoothly during winter and summer
      - Deben estar alineadas exactamente en la línea de junta para permitir que la junta se abra y se cierre suavemente durante le invierno y el verano
  - Saw cuts must be directly over the center of the dowel assembly
    - Los cortes de ranuras deben quedar directamente sobre el centro del montaje de dovelas

28

Position of Dowels
La posición de las dovelas

- Exact locations of dowel assemblies and joints must be marked in some way
  - La exacta ubicación de los montajes de dovelas debe ser marcado de alguna manera
    - Pins may be set
      - Las pijas deben ser colocados
  - Marks may be painted in the rock on either side of the roadway
    - Marcas deben ser pintadas en la roca (la base) a ambos lados del camino

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Position of Dowels
La posición de las dovelas

- Crews should take care not to alter final alignment of dowel assemblies by walking or stepping on them
  - Las cuadrillas deben tener cuidado de no alterar la alineación final de los montajes de dovelas, ya sea caminando sobre ellas o pisándolas

30

Expansion Joints
Juntas de Expansión

- Expansion joints are full-depth transverse joints running across the full width of a slab
  - Las juntas de expansión son juntas transversales de profundidad completa que corren a lo ancho total de la losa
- Divide a slab into separate sections
  - Dividen la losa en secciones

31

Expansion Joints
Juntas de Expansión

- Used to allow for significant slab movement
  - Se usan para permitir movimiento grandes de la losa
- Used at fixed locations such as bridges
  - Usadas en ubicaciones fijas como en puentes
- Dowels are sometimes used to prevent faulting
  - Las dovelas se usan a veces para prevenir la falla

Construction Joints
Juntas de Construcción

- Construction joints are created:
  - Las juntas de construcción se crean para:
    - At the end of the daily paving operation
      - Al final de las operaciones diarias de pavimentación
        - "day's work" joints
          - Juntas del "día de trabajo"

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Construction Joints
Juntas de Construcción

- Construction joints are created:
  - Las juntas de construcción se crean para:
    - Where paving resumes after an interruption
      - Donde el pavimento reinicia despues de una interrupción
    - e.g. when weather or other unexpected situations force paving operations to stop temporarily
      - e.j. cuando el clima u otras situaciones inesperadas forzan que las operaciones de pavimentación se detengan temporalmente
    - This joint is called a "**header**".
      - A esta junta se le llama "Cabezal"

34

Construction Joints
Juntas de Construcción

- Construction joints are created:
  - Las juntas de construcción se crean:
  - Along separately placed, adjoining lanes of pavement
    - A lo largo de carriles de pavimento contiguos pero colados separadamente

35

Isolation Joints
Junta de aislamiento (encajonamiento)

- Fixed objects abut or are within the pavement
  - Objetos fijos a tope o están dentro del pavimento
- Pavement moves- objects don't
  - El pavimento se mueve – los objetos no
- Differential up and down movement
  - Movimiento diferencial arriba y abajo
    - Intakes
      - Tomas
    - Bridges
      - Puentes

36

Isolation Joints
Juntas de aislamiento

- Differential Back and Forth Movement
  - Movimiento diferencial de ida y vuelta
    - Side roads
      - Caminos laterales
    - Railroad crossings
      - Cruces de ferrocarril
    - Bridges
      - Puentes
- Don't need a large gap
  - No se necesita un espacio grande
    - 1/2" is wide enough
      - ½" suficientemente ancho

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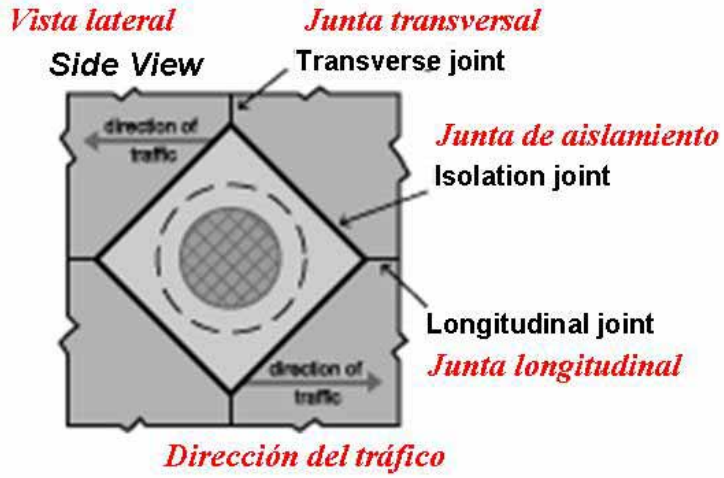
Isolation Joints
Juntas de aislamiento (encajonamiento)



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Joints in Adjacent Pavement
Juntas en pavimentos adyacentes

- When possible, it is best to align new joints with those that already exist in adjacent pavements
  - Cuando sea posible, es mejor alinear las nuevas juntas con aquellas que ya existen en pavimentos adyacentes

39

Other Stressed Locations
Otras ubicaciones

- Irregular corners, manholes, and other locations may require special consideration similar to those for box-outs
  - Esquinas irregulares, alcantarillas, y otros ubicaciones pueden requerir consideración especial similares a aquellas de encajonado

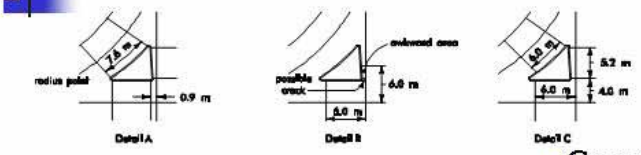
40

Other Stressed Locations
Otras ubicaciones esfuerzadas

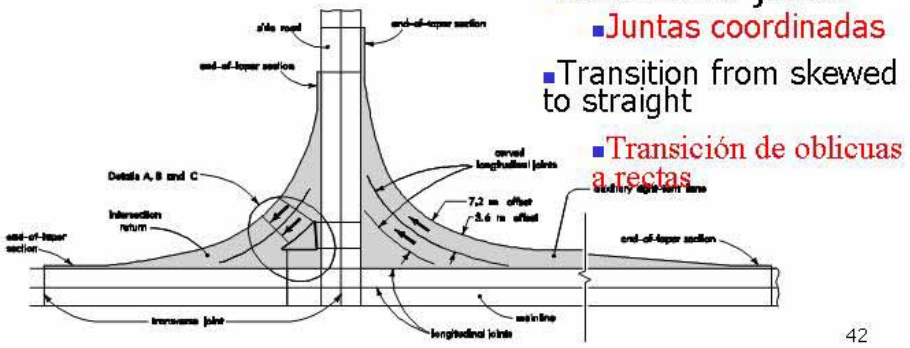
- Is generally better to saw cut a joint where a crack will likely occur than allow the crack to form in an uncontrolled manner
  - Es generalmente mejor ranurar una grieta donde esta es mas probable que ocurra que dejar que aparezca de una manera no controlada

41

T-Intersections
Intersecciónes en T



- Coordinate joints
  - Juntas coordinadas
- Transition from skewed to straight
  - Transición de oblicuas a rectas



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Key Points To Remember
Puntos claves para recordar

- Joints must be at least 2 feet long
  - Las juntas deben ser de por lo menos 2 pies de largo
- Joint angles should be 90 degrees or greater
  - Los ángulos de las juntas deben ser 90 grados o mayores
- Joint angles must be a minimum of 70 degrees
  - Los ángulos de las juntas deben tener un mínimo de 70 grados
- No more than four joints should intersect
  - No mas de cuatro juntas deben intersectar

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A Good And a Bad Example
Un ejemplo bueno y malo

Good

2 ft length
2 pies de longitud

Bad

Less than 70º
Menos de 70 º

44

Key Points To Remember
Puntos claves para recordar

- Maintain working or non-working joint throughout its length
  - Mantenga en toda su longitud las juntas que trabajan y las que no
- Make intersections constructable
  - Has las intersecciones construibles
- Properly label joints
  - Marca las juntas apropiadamente
- Do not skew transverse joints through intersections
  - No construya juntas transversales oblicuas en las intersecciones

45

Rules of Thumb
Reglas de dedo

- Follow the layout on the project plans
  - Sigue el arreglo en los planos de proyecto
- Engineer must approve any change
  - El ingeniero debe aprobar cualquier cambio

46

Rules of Thumb
Reglas de dedo

- Joint intersections should form angles of at least 70-degrees and be as square (90-degree angle) as possible
  - Las intersecciones de las juntas deben formar ángulos de por lo menos 70-grados y ser tan cuadradas (angulo de 90 grados) como sea posible

47

Rules of Thumb
Reglas de dedo

- Slabs should be as square as possible
  - Las losas deben ser tan cuadradas como sea posible
- Avoid joint patterns that create odd-shaped slabs
  - Evitar patrones de juntas que crean losas de forma irregular

48

Rules of Thumb
Reglas de dedo

- No more than four joints should intersect
  - No mas de cuatro juntas deben intersectar

49

Rules of Thumb
Reglas de dedo

- When possible, joints should match adjacent joints in slabs, curbs, or box-outs
  - Cuando sea posible, las juntas deben corresponder a juntas adyacentes en losas, cordones, o encajonados

50

Rules of Thumb
Reglas de dedo

- The centerline of dowels must be clearly and carefully marked on forms of the subgrade so joints can be sawed or formed along the centerline after concrete is placed
  - La línea de centros de las dovelas debe estar clara y cuidadosamente marcada en la cimbra de la terracería de tal manera que las juntas pueden ser ranuradas a lo largo de la línea de centros después de que el concreto es colado

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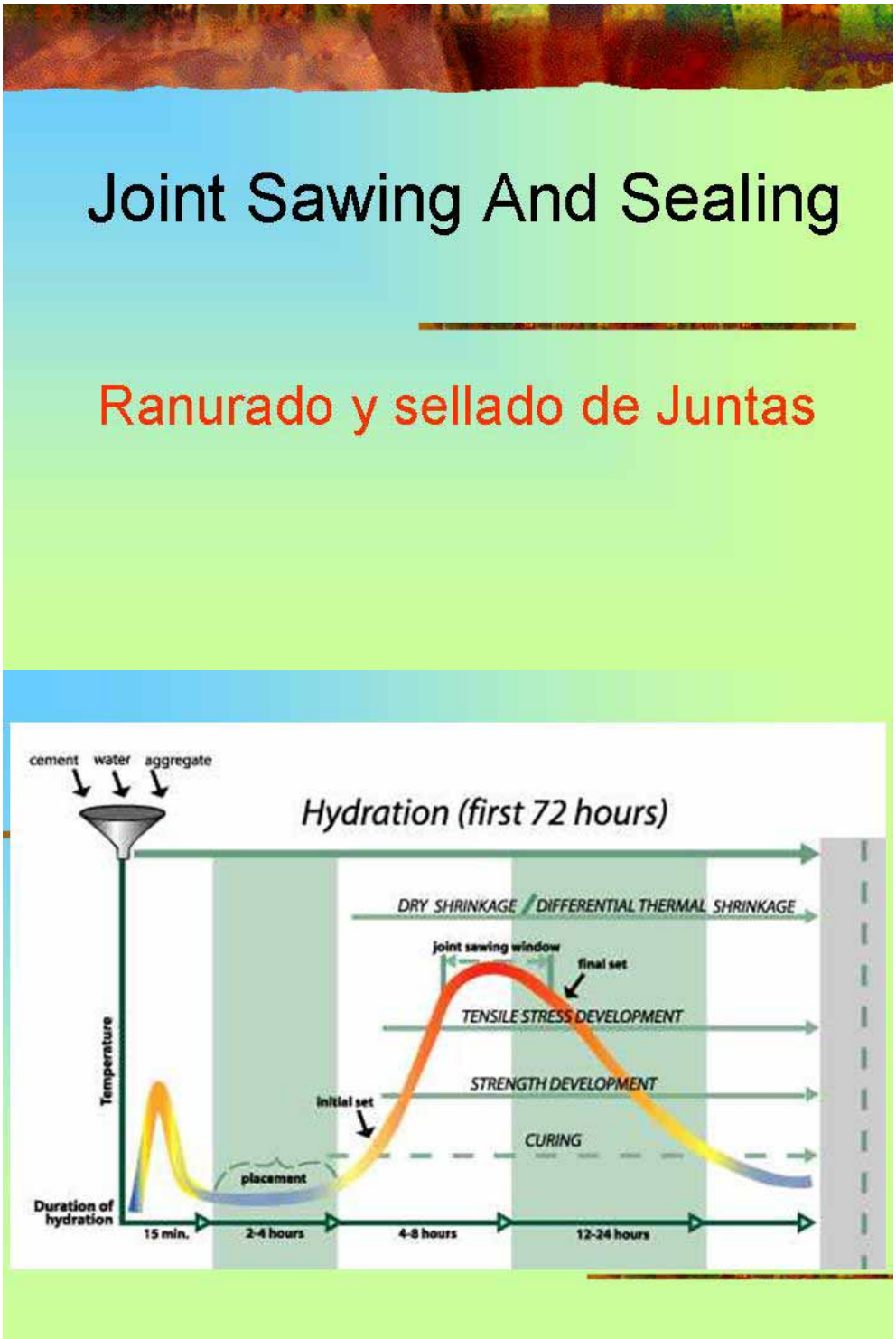
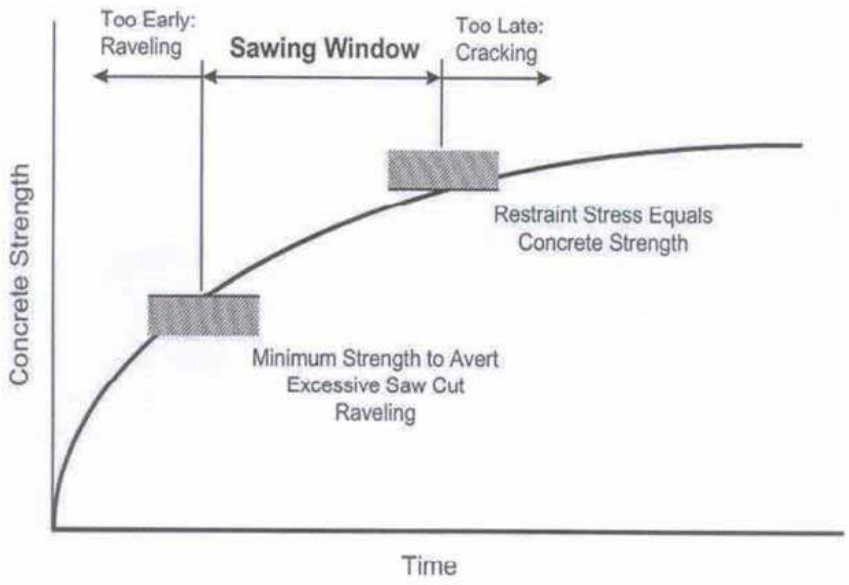
Joint Sawing and Sealing





LIMITE Máximo – Ventana de Influencia

FAR LIMIT – Window of Influence

- WEATHER — Clima
  - Temperature — Temperatura
  - Humidity — Humedad
  - Wind — Viento
- MATERIAL COMBINATIONS
- COMBINACIONES DE MATERIAL

PROFUNDIDAD DE LA RANURA
DEPTH OF SAWCUT

- Conventional Sawing
  - Ranura Convencional
- T / 3
  - T / 3
- Early (Green Sawing)
  - Temprano (Ranurado verde)
- 1 ¼ inch
  - 1 ¼ Pulgada

EFFECT OF AGGREGATE
EFECTO DEL AGREGADO

- Hard - River Gravels
- Duro - Gravas de Río

- Soft - Limestones
- Suaves - Caliza

EARLY AGE (GREEN) SAWING
Ranurado a edad temprana (verde)

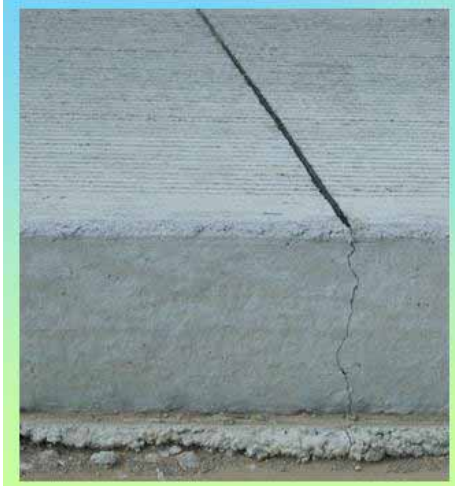
Know When Ready
Debes saber cuándo

Early Sawing Procedures
Procedimientos para el ranurado temprano

- SPECIFY EARLY SAWING
  - ESPECIFICAR RANURADO TEMPRANO
- USE SCRATCH TEST TO START
  - USAR LA PRUEBA DE RAYADO PARA EMPEZAR
- OR AS SOON AS SLAB WILL CARRY WEIGHT
  - O TAN PRONTO QUE LA LOSA PUEDA CARGAR PESO
- SAW JOINTS IN SUCCESSION
  - RANURAR LAS JUNTAS EN SUCESION
- COMPLETE SAWING BEFORE TEMPERATURE DROP
  - COMPLETAR EL RANURADO ANTES DE LA CAÍDA EN TEMPERATURA

SAWING WIDTH
Ancho de ranura

- CONVENTIONAL
  - Normally 1 / 4 inch
- CONVENCIONAL
  - Normalmente 1 / 4 de pulgada
- EARLY
  - 1 / 16 inch – often widened to 1 / 4
  - inch for sealant reservoir
- TEMPRANA
  - 1 / 16 Pulg. – después se amplia a 1 /4 de
  - pulg. para acomodar el sellador



JOINT SEALING
Sellado de Juntas

DO IT THE RIGHT WAY
Hazlo de la forma correcta

CRITICAL ISSUES
Aspectos críticos

- TIMING OF RESERVOIR WIDENING
  - Tiempo de la ampliación de la junta
- CLEANING
  - Limpieza
- DEPTH OF SEALANT
  - Profundidad del sellador
- TIMING OF SEALANT
  - Tiempo del sellador

JOINT CLEANING
Limpieza de las Juntas

IMPORTANT STEP FOR SEALANT

Paso importante para el sellado

CLEANING METHODS
Métodos de Limpieza

- WATER BLASTING
  - Chorro de agua
- AIR BLASTING
  - Chorro de aire
- SAND BLASTING
  - Chorro de arena
- FINAL AIR BLASTING
  - Chorro final de aire

HOT POURED MATERIALS
Materiales vaciados en caliente

Some Combination of:
Alguna combinación de:

- ASPHALT — Asfalto
- COAL TAR — Alquitrán de Hulla
- RUBBER — Hule

KEYS TO A GOOD JOINT
Claves para una buena Junta

- Indirect Heating Kettle
  - Holla para calentado indirecto
- Wand Circulation Line
  - Línea de circulación del aplicador
- Fill Reservoir bottom To Top
  - Llena el reservorio desde el fondo hacia arriba
- Trial Installation
  - Prueba la instalación
- Recess Material From Surface
  - El sellador no llega a la superficie

COLD POURED MATERIALS
Materiales vaciados en frío

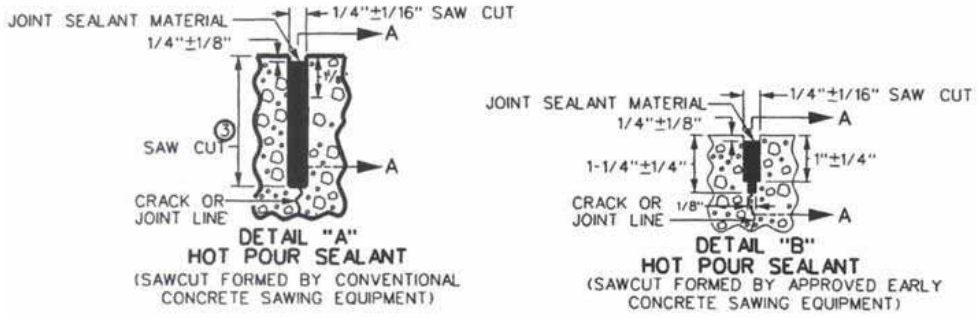
▪ Polysulfides	Polisulfatos
▪ Polyurethanes	Poliuretanos
▪ Silicones	Silicones

KEYS TO A GOOD JOINT
Claves para una buena junta

- MODERN PRESSURE EQUIPMENT
  - Equipo de presión moderno
- COMPATABILITY WITH AGGREGATE
  - Compatibilidad con el agregado
- NO JOINT MOISTURE
  - No humedad en la junta

Test Prueba

URBAN STANDARD SPECIFICATIONS for PUBLIC IMPROVEMENT MANUAL



PREFORMED JOINT SEALERS
Selladores de Juntas Preformados

- NEOPRENE MATERIAL
- Material de Neopreno

KEYS TO A GOOD JOINT
Claves para una buena Junta

- PROPER SIZING
  - Tamaño apropiado
- PROPER INSTALLATION
  - Instalación apropiada
- PROPER LUBRICATION
  - Lubricación apropiada
- INSTALLED WITH MINIMUM COMPRESSION
  - Instaladas con compresión mínima
- NO STRETCHING
  - No estirado

Possible Sawing Problems
Problemas posibles en el ranurado

Possible Problem Problema posible	Area Of Concern A que se debe	What to do? Que hacer?	Why? Porqué?
Crack forms before sawing Las grietaas se forman antes del ranurado	Sawing too late. Ranurar muy tarde	Stop sawing, use crack saw along crack, clean and seal Detener el ranurado, uasr la sierra en la grieta, limpiar y sellar	Cracks have already created the "joints". Las grietas ya crearon las "Juntas"
Crack forms during sawing	Sawing too late.	Stop sawing joint, and use crack saw along crack, clean, and seal.	If sawcutting was completed across the pavement, the cute would not function, and being next to a crack may lead to spalling and other poor performances issues
Raveled sawcuts	Sawing too early	Stop sawing and wait until more strength develops	More raveling will lead to spalled joints

Possible Sealing Problems
The troubleshooting guide below discusses the non-cracking problems associated with joint sealing.

Problem	Probable Cause	Corrective Action
Poured joint sealant adhesion failure	Joint face not clean Joint shape factor not correct	Check joint face for cleanliness Check joint shape factor Replace sealant
Poured Joint sealant cohesive failure	Sealant properties poor due to overheating or underheating	Reduce heat Apply proper heat Use insulated hoses Replace sealant
Loose preformed sealant	Sealant not sized properly Joint width too large Sealant stretched	Use properly sized sealant Check joint width Check sealant quality Review installation procedure
Raveling or spalling of joint face.	Sawcutting performed to early Poor sawcutting operation Joint area not cured properly	Apply curing compound after first cut Delay the reservoir cut Review sawcutting operation Review joint face curing process

QUESTIONS

Preguntas

Equipment

Equipment

Maquinaria

1

Ma-key-na de rai-cor-tar

Trimmer

Máquina de Recortar

2

Pa-vee-men-ta-do-ra

Paver

Pavimentadora

3

Row-dee-yo

Roller

Rodillo

4

Motorgrader

Motoniveladora/ Motoconformadora

Moto-knee-ve-la-do-ra/Moto-con-for-ma-do-ra

5

Ka-meeon Rai-vol-vai-dor oh Trompoh

Ready-mix Truck

Camión Revolvedor ó Trompo

6

Pump Bomba / Motobomba

Bom-bah / Motobombah

7

Screeder Allanadora

Ah-ya-na-do-ra

8

Trowel

Poo-lee-do-ra
Pulidora

9

Dump Truck Camión de Volteo

Ca-meeon de Vol-tay-o

10

Compactor

Compac-ta-door

Compactador

11

Belt Placer

Ban-dah Trans-por-tah-dora

Banda Transportadora

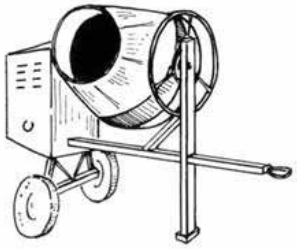
12

Maiz-clah-dora

Mixer

Mezcladora

Figure 72
Petrol-driven concrete mixer



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Retroexca-vah-do-ra

Backhoe

Retroexcavadora

14

Crane

Groo-ah
Grúa

15

Bulldozer

Trac-tor / Buldoser
Tractor / Buldozer

1. CRAWLER de CADENAS

2. PULLED de TIRO

3. WHEELED de Neumaticos

16

Exca-vah-doh-ra

Excavator Excavadora

He-ne-ra-door

Generator Generador

18

Jackhammer Martillo / Rompedora

Mar-tee-yo / Rom-pay-do-ra

19

Jumping jack or Rammer Apizonadora / Bailarina

Ah-pee-so-na-do-ra / By-la-ree-na

20

Loader

Car-ga-door Cargador

1. TOOL CARRIER CARGADOR

2. WHEELED DE RUEDAS

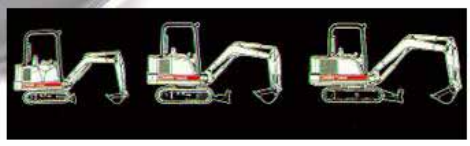
3. CRAWLER DE CADENAS

21

Skid Loader

Minicargador ó Bobcat

Mini-car-ga-door oh Bobcat



22

See-ai-rra

Saw

Sierra

23

Vee-bra-dor

Vibrator

Vibrador

Vibrator, Motors Heads & Shafts

24

Light Tower

To-rrai de Loos

Torre de Luz

25

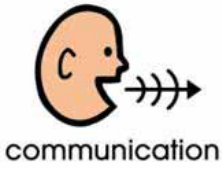
Basic Survival Phrases

1. Please repeat
   Por favor dígame otra vez

2. How do you say this in Spanish?
   ¿Cómo se dice esto en español?

3. I do not understand
   Yo no entiendo

4. Are your sure you understand?
   ¿Estás seguro que entiendes?



5. Show me
   Muéstrame

26

Emergency Phrases / Frases de Emergencia

1. Watch out!
   ¡Cuidado!
2. Get out of the way!
   ¡Salte del medio!
3. Do not move!
   ¡No te muevas!
4. Watch out for the truck!
   ¡Cuidado con el camión!
5. Danger!
   ¡Peligro!

27

Daily Phrases / Frases Diarias

1. Bring the jackhammer
   Tráe el martillo
2. Take the trowel overthere
   Lleva la pulidora allá
3. Find the saw
   Búsca la sierra

28

Daily Phrases / Frases Diarias

4. Use the vibrator
   Usa el vibrador
5. Store the jumping jack
   Guarda la apizonadora
6. Move the equipment
   Mueve el equipo

29

Daily Phrases / Frases Diarias

7. Place the light tower there
   Coloca la torre de luz allí
8. Turn On (Off) the generator
   Enciende (Apaga) el generador
9. Pass the screeder
   Pása la allanadora

30

Daily Phrases — Frases Diarias

12. Make the joints
    Ház las juntas
13. Where is the mixer?
    ¿Dónde esta la mezcladora?
14. Did you check the oil?
    ¿Checáste el aceite?

31

Daily Phrases — Frases Diarias

12. Do not forget the keys
    No olvides las llaves
13. Does it have gas?
    ¿Tiéne gasolina?
14. Have you replaced the parts?
    ¿Ház reemplazado las piezas?

32

Finishing

Finishing Concrete

Acabado de Concreto

1

Say-pee-yoh

Broom

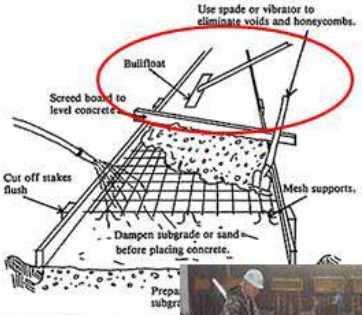
Cepillo

2

Ya-na Gran-dai

Bullfloat

Llana Grande



3

Bor-day-ah-do-ras

Edgers

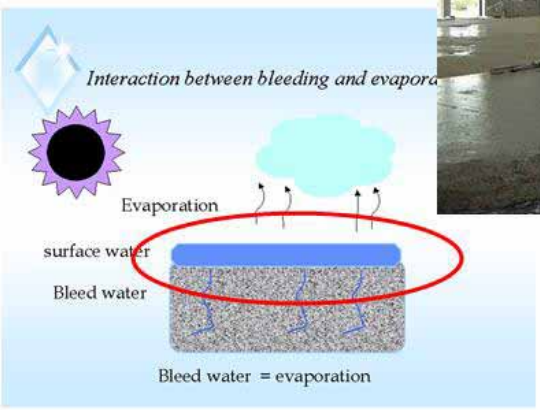
Bordeadoras

4

Excess Water

Ex-sai-soh de Ah-gua

Exceso de Agua



5

Ya-na

Float

Llana

6

Fresno
Trowel

Koo-cha-ra Fresno
Cuchara Fresno

7

Ra-noo-ra-do-ras

Groover

Ranuradoras

8

Koo-cha-ra

Hand Trowel

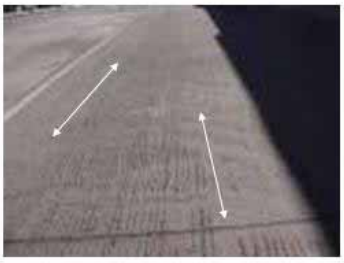
Cuchara

9

Lon-hee-too-dee-nal

Longitudinal

Longitudinal



10

Power Trowel

Koo-cha-ra de Motor

Cuchara de Motor

11

Ride-on Trowel

Koo-cha-ra Mon-ta-blai

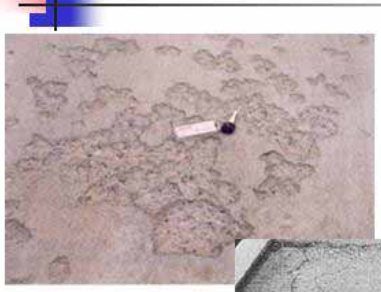
Cuchara Montable

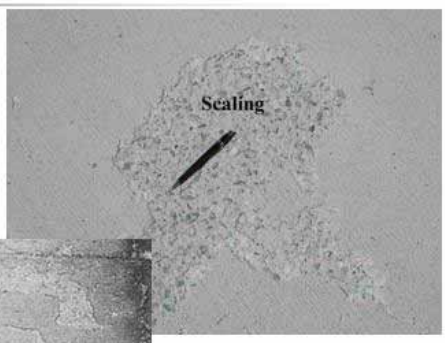
12

Es-ka-ma

Scale

Escama



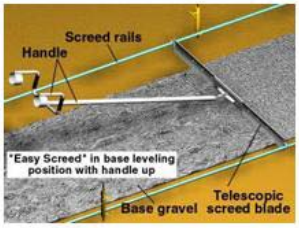


13

Ah-ya-nar

Screed

Allanar



14

Super-fee-see-eh Lee-sa

Smooth Surface

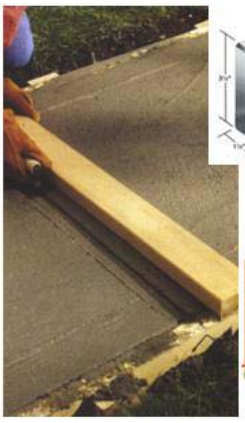
Superficie Lisa

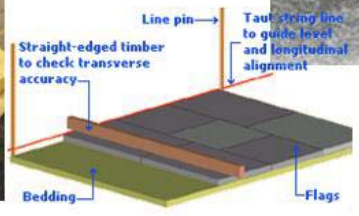
15

Rai-gla

Straigthedge

Regla

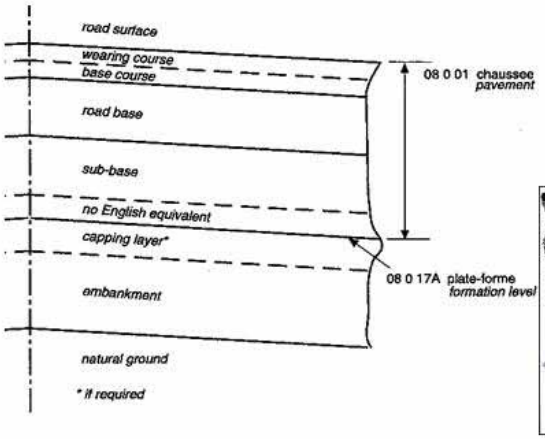


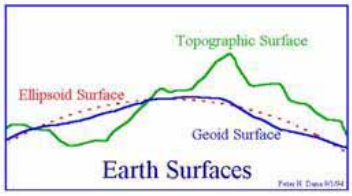


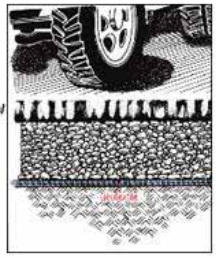
16

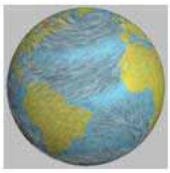
Soo-per-fee-see-eh

Surface — Superficie





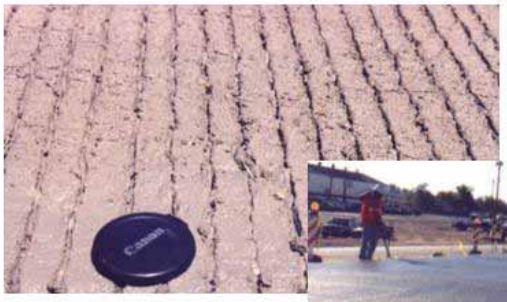




17

Es-co-bai-ar

Tining — Escobear



18

Trans-vair-so

Tranverse Transverso

19

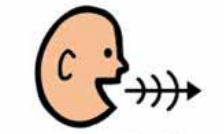
Ah-ya-na-dora Ah-hee-ta-dora

Vibratory Screed Allanadora Agitadora

20

Basic Survival Phrases

1. Please repeat
   Por favor dígame otra vez
2. How do you say this in Spanish?
   ¿Cómo se dice esto en español?
3. I do not understand
   Yo no entiendo
4. Are your sure you understand?
   ¿Estás seguro que entiendes?
5. Show me
   Muéstrame



communication

21

Emergency Phrases / Frases de Emergencia

1. Watch out!
   ¡Cuidado!
2. Get out of the way!
   ¡Salte del medio!
3. Do not move!
   ¡No te muevas!
4. Watch out for fresh concrete!
   ¡Cuidado con el concreto fresco!
5. Danger!
   ¡Peligro!

22

Daily Phrases — Frases Diarias

1. Bring the power trowel
   Tráe al cuchara de motor
2. Take the groovers over there
   Lleva las cucharas allá
3. Find the bullfloat
   Búsca la llana grande

23

Daily Phrases — Frases Diarias

4. Where is the vibratory screed?
   ¿Dónde esta la allanadora agitadora?
5. Store the edgers
   Guarda las bordeadoras
6. The movement should be longitudinal
   El movimiento debe de ser longitudinal

24

Daily Phrases — Frases Diarias

7. Check the surface with the straight edge
   Checa la superficie con la regla
8. Use the float
   Usa la llana
9. Smooth the surface
   Alisa la superficie

25

Daily Phrases — Frases Diarias

10. Broom the concrete surface
    Cepilla la superficie del concreto
11. Is the concrete workable?
    ¿Está trabajable el concreto?
12. If not, notify the supervisor
    Si no, avísale al supervisor

26

Daily Phrases / Frases Diarias

12. Do not add water to the concrete
    No le añadas agua al concreto

13. Be careful
    Ten cuidado

14. Do not finish the concrete excessively
    No acabes el concreto excesivamente

27

Grading

Grade Finish

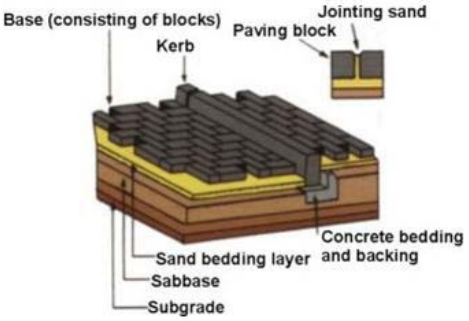
Nivelación del Terreno

1

Te-rra-say-reea

Subgrade

Terracería

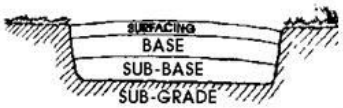


2

Soob-bah-se

Subbase

Sub-base



3

Ka-ma del Cah-mee-no

Roadbed

Cama del Camino

4

Bah-sai

Base

Base

Tee-ai-rra / Soo-ai-lo

Earth /
Soil

Tierra / Suelo

Ai-lai-vah-seeon

Elevation

Elevación

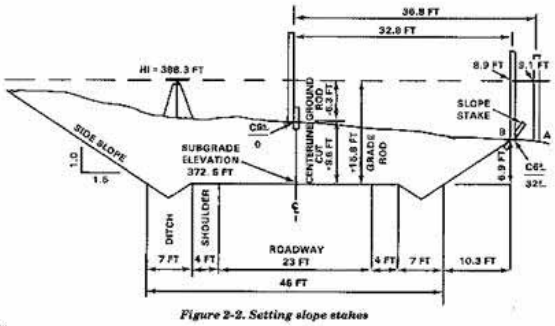


Figure 2-2. Setting slope stakes

7

Ah-ray-nah

Sand

Arena

8

Gra-vah

Gravel

Grava

9

Pee-ai-dra Tree-too-rah-da

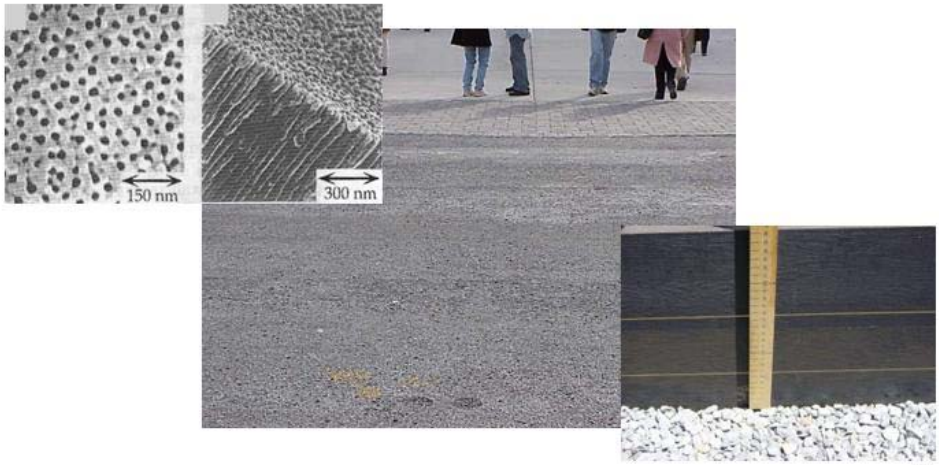
Crushed Stone

Piedra Triturada

Po-ro-so

Porous

Poroso



11

Rai-yai-no Feer-mai

Solid Pad

Relleno Firme

12

Kal

Lime

Cal

13

Ce-main-to Port-land

Portland Cement

Cemento Pórtland

14

Sai-knee-sah Vo-lan-tai

Fly Ash

Ceniza Volante

15

Bah-rro

Loam

Barro

Ar-see-ya

Clay — Arcilla

17

Pee-ai-dra Ka-lee-sa Tree-too-rah-da

Crushed Limestone — Piedra Caliza Triturada

18

Rai-yai-no Es-pai-seeal

Special Backfill

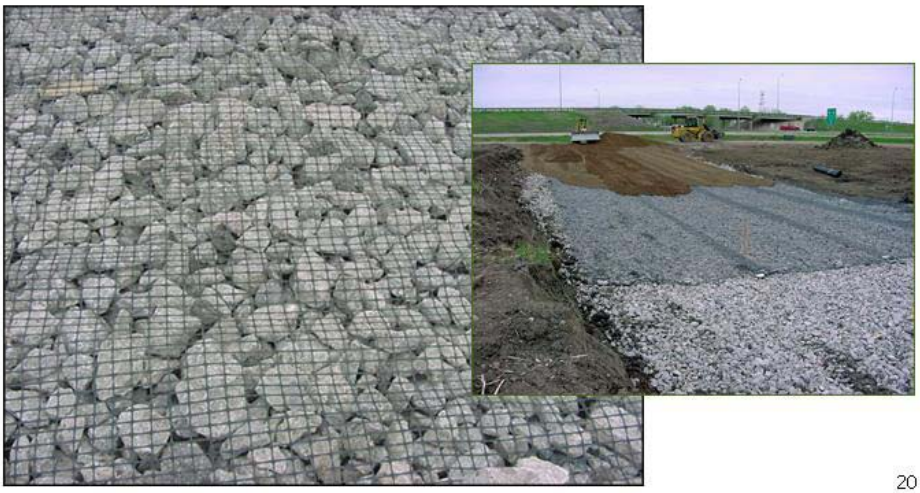
Relleno Especial

19

Hai-o-red

Geogrid

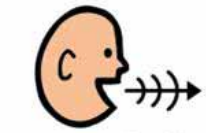
Geored



20

Basic Survival Phrases

1. Please repeat
   Por favor dígame otra vez
2. How do you say this in Spanish?
   ¿Cómo se dice esto en español?
3. I do not understand
   Yo no entiendo
4. Are your sure you understand?
   ¿Estás seguro que entiendes?
5. Show me
   Muéstrame



communication

21

Emergency Phrases — Frases de Emergencia

1. Watch out!
   ¡Cuidado!
2. Get out of the way!
   ¡Salte del medio!
3. Do not move!
   ¡No te muevas!
4. Watch out for the truck!
   ¡Cuidado con el camión!
5. Danger!
   ¡Peligro!

22

Daily Phrases / Frases Diarias

1. Bring the sand
   Tráe la arena
2. Find more gravel
   Búsca más grava
3. Move the equipment
   Mueve el equipo

23

Daily Phrases / Frases Diarias

7. Place the geogrid
   Coloca la gored
8. Pour water
   Echale agua
9. Keep the roadbed clear
   Manten la cama de camino despejada

24

Daily Phrases / Frases Diarias

12. Wet the earth
    Riega el suelo
13. Is there enough soil?
    ¿Hay suficiente tierra?
14. Where is the load?
    ¿Dónde esta la carga?

25

Daily Phrases / Frases Diarias

12. We need more loam
    Necesitamos más barro
13. Is the subgrade ready?
    ¿La terracería esta lista?

26

Hand Tools

Construction Hand tools
Herramientas para Construcción

1

Ah-cha

Axe

Acha

2

Doh-blah-door

Bender

Doblador

3

Say-pee-yo

Broom

Cepillo

4

Koo-bay-ta

Bucket Cubeta

5

Cor-ta-door

Cutter Cortador

6

Bor-day-ah-doo-ras

Edgers — Bordeadoras

7

Ja-na

Floats — Llanas

8

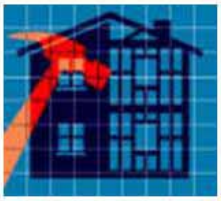
Ra-noo-ra-do-ras

Groovers — Ranuradoras

9

Mar-tee-yo

Hammer — Martillo



10

Level

Knee-vel

Nivel

11

Mallets

Mas-sos

Mazos

12

Cor-ta-door day Cah-blay

Nippers Cortador de Cable

13

Peen-sas

Pliers Pinzas

14

Pipe cutter Cortador de tubería

Cor-ta-door day too-bay-reeah

15

Ray-ma-cha-door

Riveter Remachador

16

Saw (hack saw or chain saw) Sierra ó Serrucho

See-ay-rra oh Say-rroo-cho

17

Screwdriver Desarmador

Des-ar-ma-door

18

Pa-la

Shovel

Pala

19

Seen-ta May-tree-ca

Measuring Tape

Cinta Métrica

20

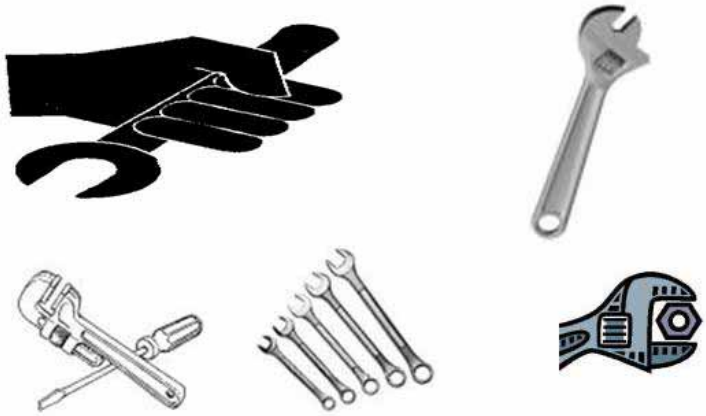
Coo-cha-ra

Trowell Cuchara

21

Ya-ve

Wrench Llave



22

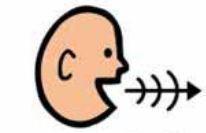
Basic Survival Phrases

1. Please repeat
   Por favor dígame otra vez

2. How do you say this in Spanish?
   ¿Cómo se dice esto en español?

3. I do not understand
   Yo no entiendo

4. Are your sure you understand?
   ¿Estás seguro que entiendes?



communication

5. Show me
   Muéstrame

23

Emergency Phrases — Frases de Emergencia

1. Watch out!
   ¡Cuidado!

2. Get out of the way!
   ¡Salte del medio!

3. Do not move!
   ¡No te muevas!

4. Watch out for trucks!
   ¡Cuidado con los camiones!

5. Danger!
   ¡Peligro!

24

Daily Phrases / Frases Diarias

1. Bring the hammer
   Tráe el martillo
2. Take the tools over there
   Lleva las herramientas allá
3. Find the shovel
   Búsca la pala

25

Daily Phrases / Frases Diarias

4. Use the mallet
   Usa el mazo
5. Store the bucket
   Guarda el cubo
6. Groove the concrete
   Ranura el concreto

26

Daily Phrases — Frases Diarias

7. Pass the broom
   Pásale el sepillo
8. The screwdriver is over there
   El desarmador esta allá
9. You use the cutter like this
   El cortador se usa así

27

Daily Phrases — Frases Diarias

12. Pick up the wrenches
    Recoge las llaves
13. Where is the measuring tape?
    ¿Dónde está la cinta métrica?
14. Wash the floats
    Limpia las llanas

28

Daily Phrases — Frases Diarias

12. Do not loose the axe

    No pierdas la acha

13. Have you cleaned the edgers?

    ¿Ház limpiado las bordeadoras?

29

Placing Concrete

Placing Concrete

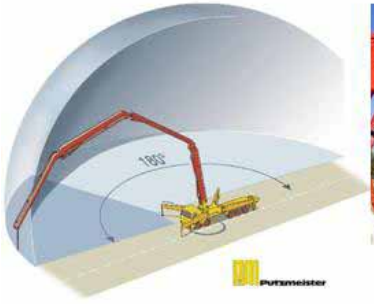
Colocación de Concreto

1

Ploo-ma de Groo-ah

Boom

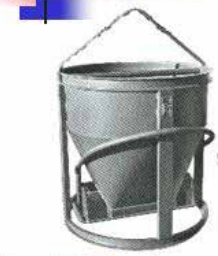
Pluma de Grúa



Koo-bo

Bucket

Cubo

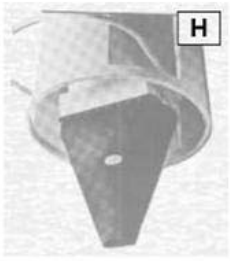


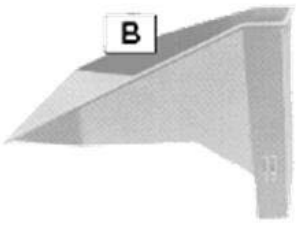
3

Toll-vah

Collection Hopper

Tólva





4

Moto-bom-bah de Con-crai-to

Concrete Pump — Motobomba de Concreto

5

Conveyor / Spreader Belt — Ban-dah Trans-por-tah-dora Banda Transportadora

6

Co-plai

Couplins

Cople

7

Groo-ah

Crane

Grúa

8

Direct Chute

Ka-na-lon

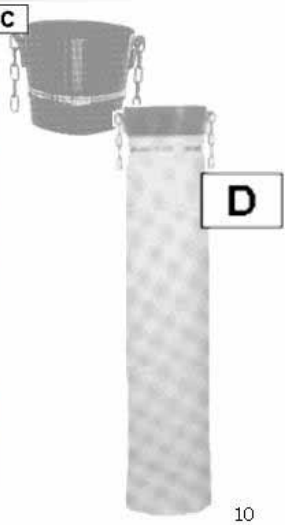
Canalón

9

Elephant Chute

Trom-pa de Ai-lai-fan-tai

Trompa de Elefante



10

Emergency Stop Button

Boh-ton de Ay-mair-hen-seea

Botón de Emergencia

Ka-rree-to Ma-noo-al

Handcart / Buggie

Carrito Manual

12

Man-gai-rah

Hose

Manguera

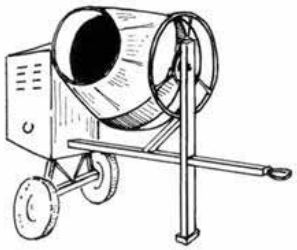
13

Mais-cla-do-ra

Mixer

Mezcladora

Figure 72
Petrol-driven concrete mixer



14

Gah-toe

Outriggers

Gato

15

Pa-vee-main-ta-do-ra

Paver

Pavimentadora

Moto-ka-rree-to

Power Buggies

Motocarrito

17

Bom-bai-an-do Con-crai-to

Pumping Concrete

Bombeando Concreto

Vee-bra-dor

Vibrator

Vibrador

19

Ka-rai-tee-ya

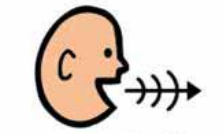
Wheelbarrow

Carretilla

20

Basic Survival Phrases

1. Please repeat
   Por favor dígame otra vez
2. How do you say this in Spanish?
   ¿Cómo se dice esto en español?
3. I do not understand
   Yo no entiendo
4. Are your sure you understand?
   ¿Estás seguro que entiendes?
5. Show me
   Muéstrame



communication

21

Emergency Phrases — Frases de Emergencia

1. Watch out!
   ¡Cuidado!
2. Get out of the way!
   ¡Salte del medio!
3. Do not move!
   ¡No te muevas!
4. Watch out for fresh concrete!
   ¡Cuidado con el concreto fresco!
5. Danger!
   ¡Peligro!

22

Daily Phrases — Frases Diarias

1. Bring the wheelbarrow
   Tráe la carretilla
2. Hook the bucket to the crane
   Engancha el cubo a la grúa
3. Find the power buggie
   Búsca el motocarrito

23

Daily Phrases — Frases Diarias

4. We are pumping concrete today
   Hoy estamos bombeando concreto
5. Keep your distance from the paver
   Manten tu distancia de la pavimentadora
6. Move the concrete pump over there
   Mueve la motobomba allá

24

Daily Phrases / Frases Diarias

7. Place the direct chute
   Coloca el canalón

8. Push the emergency stop button
   Aprieta el botón de emergencia

9. Do you know how to handle the hose?
   ¿Sábes manejar la manguera?

25

Daily Phrases / Frases Diarias

12. Pick up the vibrators
    Recoge los vibradores

13. Have you cleaned the collection hopper?
    ¿Ház limpiado la tólva?

14. Wash the spreader belt
    Limpia la banda transportadora

26

Daily Phrases / Frases Diarias

12. Deposit the concrete continuously
    Deposita el concreto continuamente

13. In horizontal layers
    En capas horizontales

14. As near as possible
    Lo más cerca posible

27

Safety

Safety

Seguridad

1

Loo-says de Flai-chas

Arrow Lights

Luces de Flechas

2

Loo-says de Bah-rree-cah-das

Barricade Lights

Luces de Barricadas

3

Bah-rree-cah-das

Barricades

Barricadas

4

Ba-rrai-ras

Barriers — Barreras

5

Boots (steel toe) — Botas (punta de acero)

Bo-tas (poon-tah de a-se-ro)

6

Gaby-ne-tes

Cabinets — Gabinetes

7

Seen-ta de Prai-ka-oo-seeon

Caution Tape — Cinta de Precaución

8

Paws-tais Dai-lee-nea-do-rais

Delineator Posts

Postes Delineadores

9

Ear Protection Ear Plugs

Protección para los oídos

Pro-tek-seeon pa-rah los oh-ee-dos

10

Ex-ting-gee-door

Extinguisher — Extinguidor

11

Bo-tee-keen

First Aid Kit — Botiquín

12

Flash light Lámpara /Linterna

Lam-pa-ra / Lean-tear-na

13

Goo-wan-tes

Gloves Guantes

14

Go-gless / Gah-fas

Goggles Gogles / Gafas

15

Va-yah de Say-goo-ree-dad

Guardrail Valla de Seguridad

16

Kas-co

Hardhat Casco

17

Are-nes

Harness Arnés

18

Protective Clothing

Ropa para Protección

Ro-pa pa-rah Pro-tek-seeon

19

Mass-cara

Respirator

Máscara

20

Gah-fas Pro-tec-toras

Safety Glasses

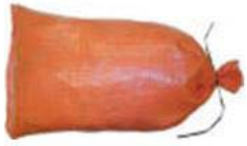
Gafas Protectoras

21

Sah-cos de A-rai-na

Sand Bags

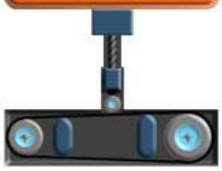
Sacos de Arena



22

Signs — Letreros

Lay-tray-ros



23

Traffic cones — Conos para tráfico

Co-nos pa-rah tra-ffi-ko

24

Tam-bo-rais / Bah-ree-lais

Traffic Drums

Tambores / Barriles

25

Ban-dai-ras de tra-ffi-ko

Traffic Flags

Banderas de Tráfico

26

Cha-lay-co

Vest

Chaleco

27

Vee-se-ras

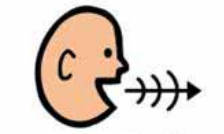
Visors

Viseras

28

Basic Survival Phrases

1. Please repeat
   Por favor dígame otra vez
2. How do you say this in Spanish?
   ¿Cómo se dice esto en español?
3. I do not understand
   Yo no entiendo
4. Are your sure you understand?
   ¿Estás seguro que entiendes?
5. Show me
   Muéstrame



communication

29

Emergency Phrases / Frases de Emergencia

1. Watch out!
   ¡Cuidado!
2. Get out of the way!
   ¡Salte del medio!
3. Do not move!
   ¡No te muevas!
4. Watch out for fresh concrete!
   ¡Cuidado con el camión!
5. Danger!
   ¡Peligro!

30

Daily Phrases / Frases Diarias

1. Bring the sand bags
   Tráe los sacos de arena
2. Take the delineator posts over there
   Lleva los postes delineadores allá
3. Find the extinguisher
   Búsca el extinguidor

31

Daily Phrases / Frases Diarias

4. Where is your hard hat?
   ¿Dónde esta tu casco?
5. Store the signs
   Guarda los letreros
6. Move the barricades
   Mueve las barricadas

32

Daily Phrases / Frases Diarias

7. Place the traffic cones
   Coloca los conos para tráfico
8. You need gloves
   Necesitas guantes
9. Put on a vest
   Ponte el chaleco

33

Daily Phrases / Frases Diarias

10. Pick up the traffic drums
    Recoge los barriles
11. Do you have steel toe boots?
    ¿Tienes botas de punta de acero?
12. Do not forget to place the caution tape
    No te olvides de colocar la cinta de precaución

34

Daily Phrases / Frases Diarias

12. Keep a clear distance
    Mantenga su distancia

13. Be careful
    Ten cuidado

14. Do you know where is the first aid kit?
    ¿Sábes donde esta el botiquín?

35

Stringline and Dowel Bars

Ka-blai

Cable

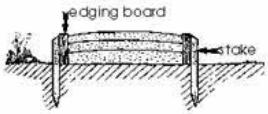
Cable

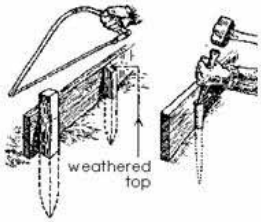
3

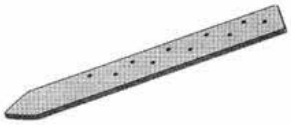
Es-ta-kas

Construction Stakes

Estacas





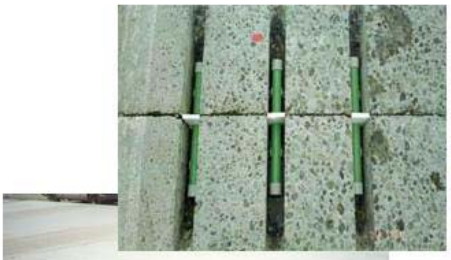


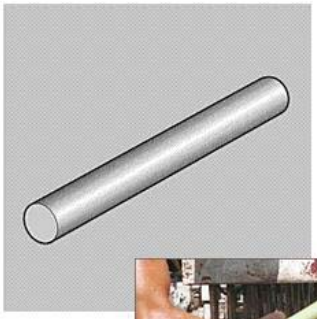
4

Do-vai-la

Dowel

Dóvela





5

Ca-nahs-ta de Do-vai-las

Dowel Basket

Canasta de Dóvela

6

Elevation Sensing Wand

Va-ra Sen-so-ra de Ele-vah-seeon

Vara Sensora de Elevación

7

Hand Winch

Ma-la-kah-tai de Ma-no

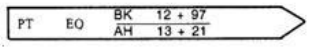
Malacate de Mano

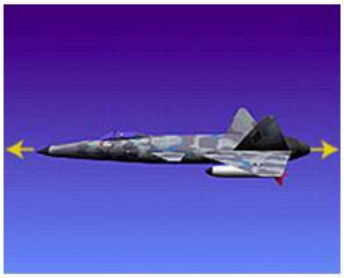
8

O-ree-son-tal

Horizontal

Horizontal



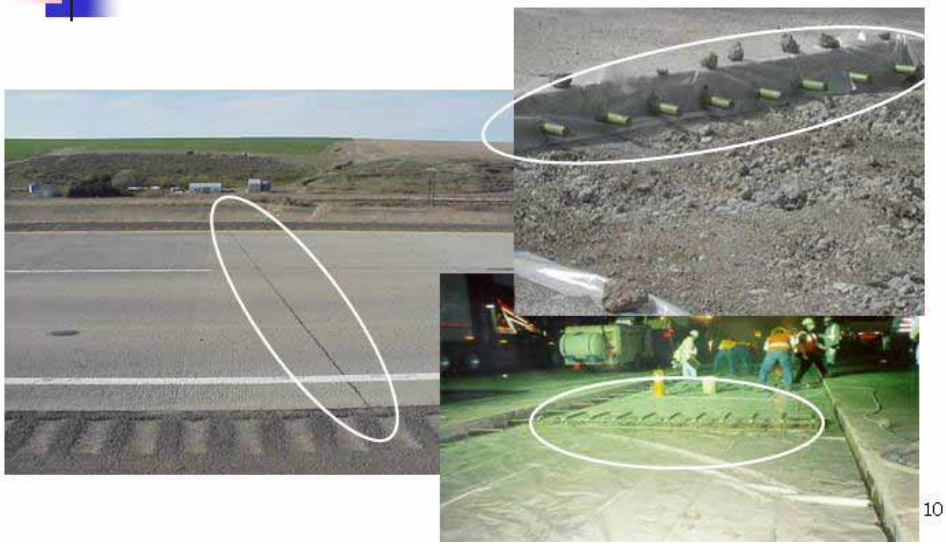


9

Hoon-tas

Joint

Juntas



10

Mar-ca-dor

Marker

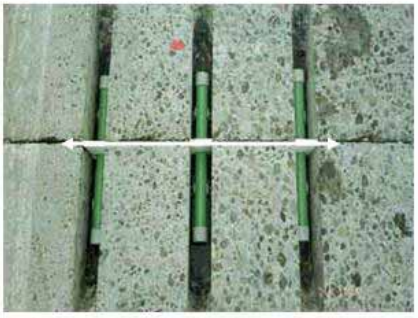
Marcador

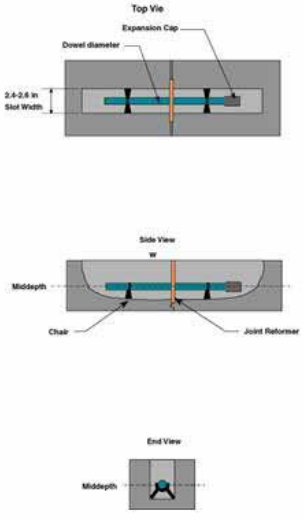
11

Mai-deeo

Middle

Medio





12

Knee-lon

Nylon

Nylon

13

Fran-ha Rai-yai-na-da

Pad Line

Franja Rellenada

14

Pa-ra-lai-lo

Parallel

Paralelo

15

Koo-er-da / So-ga

Rope

Cuerda / Soga

16

Cor-dell

Stringline

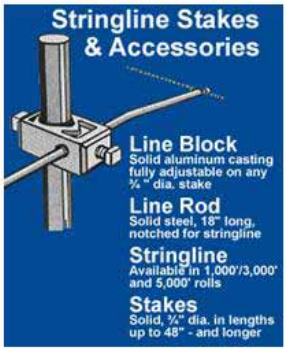
Cordel

17

Es-ta-ka pa-ra Cor-dell

Stringline Stake

Estaca Para Cordel

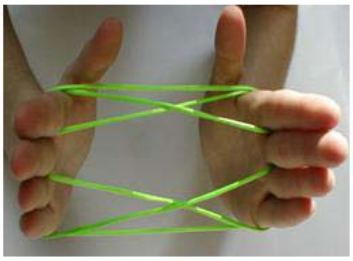


18

Es-tee-ra-do

Taut

Estirado



19

Ver-tee-cal

Vertical

Vertical

20

Ah-lam-brai

Wire

Alambre

21

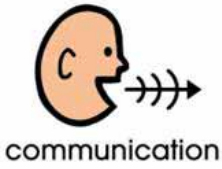
Basic Survival Phrases

1. Please repeat
   Por favor dígame otra vez

2. How do you say this in Spanish?
   ¿Cómo se dice esto en español?

3. I do not understand
   Yo no entiendo

4. Are your sure you understand?
   ¿Estás seguro que entiendes?



communication

5. Show me
   Muéstrame

22

Emergency Phrases — Frases de Emergencia

1. Watch out!
   ¡Cuidado!
2. Get out of the way!
   ¡Salte del medio!
3. Do not move!
   ¡No te muevas!
4. Watch out for fresh concrete!
   ¡Cuidado con el concreto fresco!
5. Danger!
   ¡Peligro!

23

Daily Phrases — Frases Diarias

1. Bring the stringline
   Tráe el cordel
2. Take the rest of the wire there
   Lleva el resto del alambre allá
3. Find the construction stakes
   Búsca las estacas

24

Daily Phrases / Frases Diarias

4. Use the hand winch
   Usa el malacate de mano
5. Store the rope
   Guarda la soga
6. Do not disturb the stringline
   No perturben al cordel

25

Daily Phrases / Frases Diarias

7. Place the dowel basket
   Coloca la canasta de dóvelas
8. Keep your distance from the paver
   Manten tu distancia de la pavimentadora
9. Put on the markers
   Pon lo marcadores

26

Daily Phrases / Frases Diarias

12. Pick up the stringline stakes
    Recoge las estacas para cordel
13. Is the pad line clear?
    ¿Está la franja rellenada despejada?
14. It needs to run parallel to the pavement
    Tiene que estar paralelo al pavimento

27

Daily Phrases / Frases Diarias

12. The dowels need to be aligned
    Las dóvelas tiene que estar alineadas
13. Make sure the cable is taut
    Asegúrate que el cable este estirado
14. Are they in the middle of the joints?
    ¿Están en el medio de las juntas?

28

Transporting Concrete

Transporting Concrete

Transportando Concreto

1

Mobile Batcher Mixer

Mais-cla-do-ra mo-vee-blai

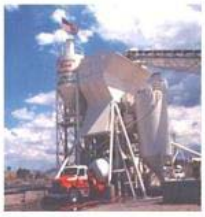
Mezcladora Movible

2

Plan-tah de Con-crai-to

Batch Plant

Planta de Concreto



3

Mais-cla-do-ra
Es-ta-seeo-na-reea

Stationary Mixer

Mezcladora Estacionaria

4

Ka-nah-lon Ex-tain-dee-blai

Extension Chute

Canalón Extendible

Con-dook-to Sa-koo-dee-blai

Flop Chute

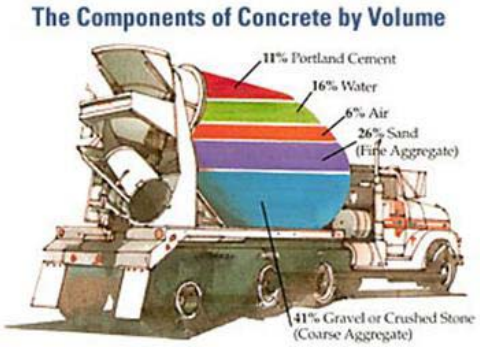
Conducto Sacudible

6

Tam-bor Ro-tah-to-reeo

Rotating Drum

Tambor Rotatorio



7

Ka-mee-on Rai-vol-vai-dor

Ready-mix Truck

Camión Revolvedor

8

Ka-mee-on Ah-hee-ta-dor

Agitator Truck

Camión Agitador

9

Ka-mee-on de Vol-tai-o

Dump Truck

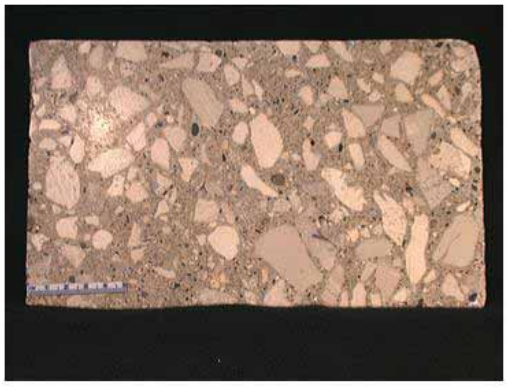
Camión de Volteo

10

Sai-grai-ga-seeon

Segregation

Segregación

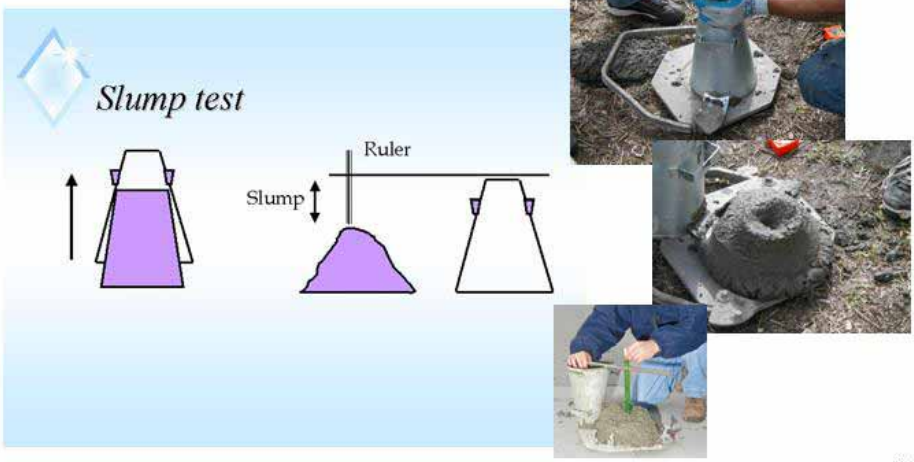


11

Po-co Rai-vai-nee-mee-ain-to

Low Slump

Poco Revenimiento



12

Mais-cla-do-ras Por-tah-til

Portable Mixer

Mezcladora Portátil

13

Man-gai-ra

Hose

Manguera

14

Ka-mee-no de Ak-say-so

Transit Road

Camino de Acceso

Ban-dai-rai-ro

Flagger

Banderero

16

Chou-fair

Driver

Chofer

17

Rah-deeo de Co-moo-nee-ka-seeon

Radio Communicator

Radio de Comunicación

18

Oh-pe-ra-door

Operator — Operador

19

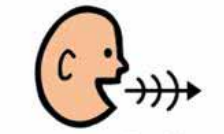
Rai-trah-so

Delay — Retraso

20

Basic Survival Phrases

1. Please repeat
   Por favor dígame otra vez
2. How do you say this in Spanish?
   ¿Cómo se dice esto en español?
3. I do not understand
   Yo no entiendo
4. Are your sure you understand?
   ¿Estás seguro que entiendes?
5. Show me
   Muéstrame



communication

21

Emergency Phrases / Frases de Emergencia

1. Watch out!
   ¡Cuidado!
2. Get out of the way!
   ¡Salte del medio!
3. Do not move!
   ¡No te muevas!
4. Watch out for the truck!
   ¡Cuidado con el camión!
5. Danger!
   ¡Peligro!

22

Daily Phrases — Frases Diarias

1. Bring the jackhammer
   Tráe el martillo
2. Warn the supervisor
   Avísale al supervisor
3. Find the operator
   Búsca al operador

23

Daily Phrases — Frases Diarias

4. Use the hose to clean
   Usa la manguera para limpiar
5. Talk to me through the radio communicator
   Háblame por la radio de comunicación
6. Move the equipment
   Mueve el equipo

24

Daily Phrases / Frases Diarias

7. Guide the traffic
   Dirige el tráfico
8. Help the driver
   Ayuda al chofer
9. Do not be late
   No te tardes

25

Daily Phrases / Frases Diarias

12. We need a flagger
    Necesitamos un banderero
13. Clean the truck
    Limpia el camión
14. Keep the transit road clear
    Manten la vía de tránsito despejada

26

Daily Phrases / Frases Diarias

12. Do not forget the radio communicator
    No olvides la radio de comunicación

13. In what channel are you?
    ¿En qué canal estas?

14. I'm on channel four
    Estoy en el canal cuatro

27